BSSS
AUSTRALIAN CAPITAL TERRITORY

Human Biology

A/T/M

Cover Art provided by Canberra College student Aidan Giddings

Table of Contents

The ACT Senior Secondary System

The ACT senior secondary system recognises a range of university, vocational or life skills pathways.

The system is based on the premise that teachers are experts in their area: they know their students and community and are thus best placed to develop curriculum and assess students according to their needs and interests. Students have ownership of their learning and are respected as young adults who have a voice.

A defining feature of the system is school-based curriculum and continuous assessment. School-based curriculum provides flexibility for teachers to address students' needs and interests. College teachers have an opportunity to develop courses for implementation across ACT schools. Based on the courses that have been accredited by the BSSS, college teachers are responsible for developing programs of learning. A program of learning is developed by individual colleges to implement the courses and units they are delivering.

Teachers must deliver all content descriptions; however, they do have flexibility to emphasise some content descriptions over others. It is at the discretion of the teacher to select the texts or materials to demonstrate the content descriptions. Teachers can choose to deliver course units in any order and teach additional (not listed) content provided it meets the specific unit goals.

School-based continuous assessment means that students are continually assessed throughout years 11 and 12, with both years contributing equally to senior secondary certification. Teachers and students are positioned to have ownership of senior secondary assessment. The system allows teachers to learn from each other and to refine their judgement and develop expertise.

Senior secondary teachers have the flexibility to assess students in a variety of ways. For example: multimedia presentation, inquiry-based project, test, essay, performance and/or practical demonstration may all have their place. College teachers are responsible for developing assessment instruments with task specific rubrics and providing feedback to students.

The integrity of the ACT Senior Secondary Certificate is upheld by a robust, collaborative and rigorous structured consensus-based peer reviewed moderation process. System moderation involves all Year 11 and 12 teachers from public, non-government and international colleges delivering the ACT Senior Secondary Certificate.

Only students who desire a pathway to university are required to sit a general aptitude test, referred to as the ACT Scaling Test (AST), which moderates student course scores across subjects and colleges. Students are required to use critical and creative thinking skills across a range of disciplines to solve problems. They are also required to interpret a stimulus and write an extended response.

Senior secondary curriculum makes provision for student-centred teaching approaches, integrated and project-based learning inquiry, formative assessment and teacher autonomy. ACT Senior Secondary Curriculum makes provision for diverse learners and students with mild to moderate intellectual disabilities, so that all students can achieve an ACT Senior Secondary Certificate.

The ACT Board of Senior Secondary Studies (BSSS) leads senior secondary education. It is responsible for quality assurance in senior secondary curriculum, assessment and certification. The Board consists of representatives from colleges, universities, industry, parent organisations and unions. The Office of the Board of Senior Secondary Studies (OBSSS) consists of professional and administrative staff who support the Board in achieving its objectives and functions.

ACT Senior Secondary Certificate

Courses of study for the ACT Senior Secondary Certificate:

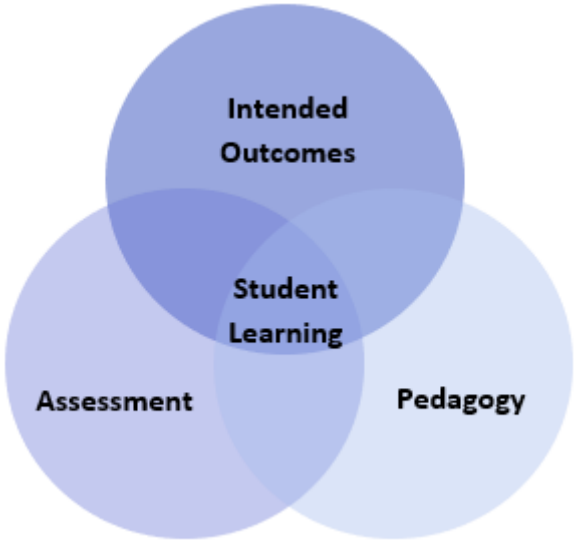
- provide a variety of pathways, to meet different learning needs and encourage students to complete their secondary education
- enable students to develop the essential capabilities for twenty-first century learners
- empower students as active participants in their own learning
- engage students in contemporary issues relevant to their lives
- foster students' intellectual, social and ethical development
- nurture students' wellbeing, and physical and spiritual development
- enable effective and respectful participation in a diverse society.

Each course of study:

- comprises an integrated and interconnected set of knowledge, skills, behaviours and dispositions that students develop and use in their learning across the curriculum
- is based on a model of learning that integrates intended student outcomes, pedagogy and assessment
- outlines teaching strategies which are grounded in learning principles and encompass quality teaching
- promotes intellectual quality, establish a rich learning environment and generate relevant connections between learning and life experiences
- provides formal assessment and certification of students' achievements.

Underpinning beliefs

- All students are able to learn.
- Learning is a partnership between students and teachers.
- Teachers are responsible for advancing student learning.



Learning Principles

1. Learning builds on existing knowledge, understandings and skills.
   (Prior knowledge)
2. When learning is organised around major concepts, principles and significant real-world issues, within and across disciplines, it helps students make connections and build knowledge structures.
   (Deep knowledge and connectedness)
3. Learning is facilitated when students actively monitor their own learning and consciously develop ways of organising and applying knowledge within and across contexts.
   (Metacognition)
4. Learners' sense of self and motivation to learn affects learning.
   (Self-concept)
5. Learning needs to take place in a context of high expectations.
   (High expectations)
6. Learners learn in different ways and at different rates.
   (Individual differences)
7. Different cultural environments, including the use of language, shape learners' understandings and the way they learn.
   (Socio-cultural effects)
8. Learning is a social and collaborative function as well as an individual one.
   (Collaborative learning)
9. Learning is strengthened when learning outcomes and criteria for judging learning are made explicit and when students receive frequent feedback on their progress.
   (Explicit expectations and feedback)

General Capabilities

All courses of study for the ACT Senior Secondary Certificate should enable students to develop essential capabilities for twenty-first century learners. These 'capabilities' comprise an integrated and interconnected set of knowledge, skills, behaviours and dispositions that students develop and use in their learning across the curriculum.

The capabilities include:

- literacy
- numeracy
- information and communication technology (ICT)
- critical and creative thinking
- personal and social
- ethical understanding
- intercultural understanding

Courses of study for the ACT Senior Secondary Certificate should be both relevant to the lives of students and incorporate the contemporary issues they face. Hence, courses address the following three priorities. These priorities are:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability

Elaboration of these General Capabilities and priorities is available on the ACARA website at www.australiancurriculum.edu.au.

Literacy

Literacy is important in students' development of *Science Inquiry Skills* and their understanding of content presented through the *Science Understanding* and *Science as a Human Endeavour* strands. Students gather, interpret, synthesise and evaluate 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 and structure evidence-based arguments, selecting genres and employing appropriate structures and features to communicate for specific purposes and audiences.

Numeracy

Numeracy is key to students' ability to apply a wide range of *Science Inquiry Skills*, including making and recording observations; ordering, representing and analysing data; and interpreting trends and relationships. They employ numeracy skills to interpret complex spatial and graphic representations, and to appreciate the ways in which human systems are structured, interact and change across spatial and temporal scales. They engage in analysis of data, including issues relating to reliability and probability, and they interpret and manipulate mathematical relationships to calculate and predict values.

Information and Communication Technology (ICT) Capability

ICT capability is a key part of *Science Inquiry Skills*. 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. Through exploration of *Science as a Human Endeavour* concepts, students assess the impact of ICT on the development of science and the application of science in society, particularly with regard to collating, storing, managing and analysing large data sets.

Critical and Creative Thinking

Critical and creative thinking is particularly important in the science inquiry process. Science inquiry requires the ability to construct, review and revise questions and hypotheses about increasingly complex and abstract scenarios and to design related investigation methods. Students interpret and evaluate data; interrogate, select and cross-reference evidence; and analyse processes, interpretations, conclusions and claims for validity and reliability, including reflecting on their own processes and conclusions. Science is a creative endeavour and students devise innovative solutions to problems, predict possibilities, envisage consequences and speculate on possible outcomes as they develop *Science Understanding* and *Science Inquiry Skills.* They also appreciate the role of critical and creative individuals and the central importance of critique and review in the development and innovative application of science.

Personal and Social Capability

Personal and social capability is integral to a wide range of activities in Human Biology, as students develop and practise skills of communication, teamwork, decision-making, initiative-taking and self-discipline with increasing confidence and sophistication. In particular, students develop skills in both independent and collaborative investigation; they employ self-management skills to plan effectively, follow procedures efficiently and work safely; and they use collaboration skills to conduct investigations, share research and discuss ideas. In considering aspects of *Science as a Human Endeavour,* students also recognise the role of their own beliefs and attitudes in their response to science issues and applications, consider the perspectives of others, and gauge how science can affect people's lives.

Ethical Understanding

Ethical understanding is a vital part of science inquiry. Students evaluate the ethics of experimental science, codes of practice, and the use of scientific information and science applications. They explore what integrity means in science, and they understand, evaluate and apply ethical guidelines in their investigations. They consider the implications of their investigations on others, the environment and living organisms. They use scientific information to evaluate the claims and actions of others and to inform ethical decisions about a range of social, environmental and personal issues and applications of science.

Intercultural Understanding

Intercultural understanding is fundamental to understanding aspects of *Science as a Human Endeavour*, as students appreciate the contributions of diverse cultures to developing science understanding and the challenges of working in culturally diverse collaborations. They develop awareness that raising some debates within culturally diverse groups requires cultural sensitivity, and they demonstrate open-mindedness to the positions of others. Students also develop an understanding that cultural factors affect the ways in which science influences and is influenced by society.

Cross-Curriculum Priorities

While the significance of the cross-curriculum priorities for Human Biology varies, there are opportunities for teachers to select contexts that incorporate the key concepts from each priority.

Aboriginal and Torres Strait Islander Histories and Cultures

Through an investigation of contexts that draw on Aboriginal and Torres Strait Islander histories and cultures students could investigate the importance of Aboriginal and Torres Strait Islander Peoples' knowledge in developing a richer understanding of the ancient inhabitants of Australia. Students may develop an appreciation of Aboriginal and Torres Strait Islander Peoples and their impact on the environment. They could examine the ways in which the environment, and cultural practices, such as standards stipulating marriage between people of different skin groups have, in turn influenced the genetic integrity of groups, especially in isolated communities and led to changes in physical, behavioural and physiological features of the Aboriginal and Torres Strait Islander Peoples.

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 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 explicitly addressed in the Human Biology curriculum. Human Biology provides authentic contexts for exploring, investigating and understanding the function and interactions of human body tissues across a range of spatial and temporal scales. By investigating the relationships between the tissues and tissue components of the human body, and how tissues 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 human biology provides the basis for decision-making in many areas of society and that these decisions can impact the Earth system. They understand the importance of using science to predict possible effects of an altered environment on the health of the human body and recognise the development of new technologies that minimise their impacts on human populations.

Human Biology

A/T/M

Rationale

Human Biology covers a wide range of ideas relating to the functioning of the human body. Students learn about themselves, relating structure to function. They learn how integrated regulation allows individuals to survive in a changing environment and maintain homeostasis. They research new discoveries that are increasing our understanding of the causes of dysfunction, which can lead to new treatments and preventative measures. Reproduction and the development of the foetus are studied in order to understand the sources of variation that make each of us unique individuals. At a time when Australia is suffering a shortage of doctors (Australian Medical Association 2014; Dingle 2014; Sivey and Scott 2013), and there is an exponential growth in the allied medical field (Australian Health Workforce Advisory Committee 2006; Keast 2015), the study of Human Biology has never been more important.

The Human Biology course uses the human life cycle as a means to create a close link between personal experience and theoretical content for students. Health issues that relate to particular life cycle stages are explored with relation to the structure and function of the human body. This connects theory to practice and provides real world examples. A wide range of factors that affect the homeostatic balance of the human body are explored. These include pathogenic attack, immune responses, hormonal imbalances, environmental factors, mental health issues and chronic disease as a result of life style choices.

As a science, the subject matter of this course is founded on knowledge and understanding that has been gained through systematic inquiry and scientific research. Scientific literacy is treated as a core underlying principle to the development of deep understanding in the subject. The knowledge base of the subject is being added to at an exponential rate and students are introduced to new discoveries and advancements, as well as considering the ethical issues relating to medical treatment and research. As a result, students learn to think critically, to evaluate evidence, to solve problems and to communicate understandings in scientific ways.

As a senior secondary subject, Human Biology provides a valuable foundation for students who wish to follow a variety of career pathways by introducing them to the complex technical language of the discipline and to key concepts around the structure and function of the human body. In addition, students develop their numeracy skills through the analysis of mathematical data and their information and communications technology (ICT) skills by undertaking research, analysis and the interpretation of scientific materials. Students are exposed to the real world of individuals working in this area through talks given by experts in their fields.

These skills enable students to make informed decisions about their pathways into Tertiary studies in the fields of medicine and allied subjects (nursing, nutritional health, occupational therapy, osteopathy, paramedicine and physiotherapy, for example). The course develops students' personal capabilities through practical exercises that apply theoretical knowledge to the student as subject, and social capabilities through the practice of collaborative endeavours. The course therefore develops skills and knowledge that prepare students to be responsible citizens.

Goals

Human Biology aims to develop students':

- interest in, and appreciation of, human biology and its usefulness in helping to explain human health and solve problems encountered in their ever-changing world
- understanding of major human biological concepts, theories and models related to human systems from the level of tissue anatomy and physiology to large-scale human health
- appreciation of knowledge relating to the human body structure and functions, and how integrated regulation allows individuals to survive and thrive in a changing environment
- appreciation of how human biology knowledge has developed over time and continues to develop; how scientists use human biology in a range of applications; and how human biological knowledge influences society in local, regional and global contexts
- ability to plan and carry out laboratory and other research investigations including the collection and analysis of qualitative and quantitative data, macroscopic and microscopic materials, and the interpretation of evidence
- ability to evaluate and debate scientific arguments and claims in order to solve problems and generate informed, responsible and ethical conclusions
- ability to communicate human biology concepts to a range of audiences, by discussing findings, developing arguments and drawing conclusions through the appropriate use of representations, multimodal mechanisms and platforms.

Student Group

The senior secondary Human Biology curriculum continues to develop student understanding and skills from across the three strands of the F-10 Australian Curriculum: Science. In the Science Understanding strand, the Human Biology curriculum draws on knowledge and understanding from across the three sub-strands of Biological, Physical and Chemical sciences.

In particular, the Human Biology curriculum continues to develop the key concepts introduced in the Biological Sciences sub-strand of the F-10 years around such core understandings as that of the human body as a system that responds to its external environment, and the mechanisms by which it maintains homeostasis. For the Chemical Sciences sub-strand it builds upon an understanding of chemical reactions as the basis for energy transfer and the creation of complex molecules that provide the biochemical basis of human life. An understanding of energy transfer also expands the Physical Sciences sub-strand of the F-10 science curriculum.

Mathematical skills expected of students studying Human Biology

The Human Biology curriculum requires students to use the mathematical skills they have developed through the F-10 Australian Curriculum: Mathematics, in addition to the numeracy skills they have developed through the Science Inquiry Skills strand of the Australian Curriculum: Science.

Within the Science Inquiry Skills strand, students are required 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 make measurements using appropriate units to an appropriate degree of accuracy.

Students may need to be taught when it is appropriate to join points on a graph and when it is appropriate to use a line of best fit. They may also need to be taught how to construct a straight line that will serve as the line of best fit for a set of data presented graphically.

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
- transform decimal notation to power of ten notation
- substitute physical quantities into an equation using consistent units so as to calculate one quantity and check the dimensional consistency of such calculations
- solve simple algebraic equations
- comprehend and use the symbols/notations <,>, Δ, ≈
- translate information between graphical, numerical and algebraic forms
- distinguish between discrete and continuous data 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 inter-quartile range
- interpret the slope of a linear graph.

Unit Titles

There are seven units:

- The Essentials of Human Life
- The Aging Human Body
- Human Health and the Environment
- Treating the Human Body
- Independent Study
- Growth of Humans
- Modern Medicine

Organisation of Content

In Human Biology, students develop their understanding of the structure (anatomy) and the function (physiology) of human tissue from cellular through to organ level. Students also explore human health as affected by changes in cell structure, pathogens or other environmental factors.

The Essentials of Human Life

In this unit students are introduced to the study of human embryonic tissue and its specialisation and development as well as the health implications and the latest developments in gene therapy and stem cell research. The anatomy and physiology of epithelial, connective, muscular and nervous tissues will provide a strong basis for the study of the human body.

The Aging Human Body

In this unit students study the human body from reproduction, through foetal development and each stage of aging. The diseases and conditions which affect humans at different stages of development provide a wealth of topics to investigate.

Human Health and the Environment

In this unit students examine the relationship between environmental conditions and human health, focussing on physical, biological, chemical and social risks. The issue of mental health is an increasingly important area of study and the variety of conditions are dealt with respectfully.

Treating the Human Body

In this unit the students investigate the traditional methods of diagnosing illnesses and treatment regimes. Students will also examine cutting edge techniques and new developments that will potentially allow for treatment of a larger range of ailments.

Independent Study

An Independent Study unit has an important place in senior secondary courses. It is a valuable pedagogical approach that empowers students to make decisions about their own learning. An Independent Study unit can be proposed by an individual student for their own independent study and negotiated with their teacher. The program of learning for an Independent Study unit must meet the unit goals and content descriptions as they appear in the course.

Independent Study units are only available to individual students in Year 12. A student can only study a maximum of one Independent Study unit in each course. Students must have studied at least three standard 1.0 units from this course. An Independent Study unit requires the principal's written approval. Principal approval can also be sought by a student in Year 12 to enrol concurrently in an Independent Study unit and their third or fourth 1.0 unit in this course of study.

Growth of Humans

Growth of Humans is a combination of two 0.5 value units to give a variation in delivery. It combines *Study of Human Tissue* 0.5 and *Human Reproduction 0.5*.

Modern Medicine

Modern Medicine combines *Environmental Health* 0.5 and *Diagnosis and Treatment* 0.5.

Science Strand Descriptions

The Australian Curriculum: Science has three interrelated strands: Science Inquiry Skills, Science as a Human Endeavour and Science Understanding. These strands are used to organise the Science learning area from Foundation to Year 12. In the senior secondary Science subjects, the three strands build on students' learning in the F-10 Australian Curriculum: Science.

In the practice of science, the three strands are closely integrated: the work of scientists reflects the nature and development of science, is built around scientific inquiry, and seeks to respond to and influence society. Students' experiences of school science should mirror this multifaceted view of science. To achieve this, the three strands of the Australian Curriculum: Science should be taught in an integrated way. The content descriptions for Science Inquiry Skills, Science as a Human Endeavour and Science Understanding have been written so that this integration is possible in each unit.

Science Inquiry Skills

- Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting data; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, reasoning, drawing valid conclusions, and developing evidence-based arguments.
- Science investigations are activities in which ideas, predictions or hypotheses are tested and conclusions are drawn in response to a question or problem. Investigations can involve a range of activities, including experimental testing, field work, locating and using information sources, conducting surveys, and using modelling and simulations. The investigation design will depend on the context and subject of the investigation.
- In science investigations, the collection and analysis of data to provide evidence plays a major role. This can involve collecting or extracting information and reorganising data in the form of tables, graphs, flow charts, diagrams, prose, keys, spreadsheets and databases. The analysis of data to identify and select evidence, and the communication of findings, involve the selection, construction and use of specific representations, including mathematical relationships, symbols and diagrams.
- Through the senior secondary Science subjects, students will continue to develop generic science inquiry skills, building on the skills acquired in the F-10 Australian Curriculum: Science. These generic skills are described below and will be explicitly taught and assessed in each unit. In addition, each unit provides more specific skills to be taught within the generic science inquiry skills; these specific skills align with the Science Understanding and Science as a Human Endeavour content of the unit.

The generic science inquiry skills are:

- Identifying, researching and constructing questions for investigation; proposing hypotheses; and predicting possible outcomes.
- Designing investigations, including the procedure/s to be followed, the materials required and the type and amount of primary and/or secondary data to be collected; conducting risk assessments; and considering ethical research.
- Conducting investigations, including using equipment and techniques safely, competently and methodically for the collection of valid and reliable data.
- Representing data in meaningful and useful ways; organising and analysing data to identify trends, patterns and relationships; recognising error, uncertainty and limitations in data; and selecting, synthesising and using evidence to construct and justify conclusions.
- Interpreting scientific and media texts and evaluating processes, claims and conclusions by considering the quality of available evidence; and using reasoning to construct scientific arguments.

- Selecting, constructing and using appropriate representations to communicate understanding, solve problems and make predictions.
- Communicating to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes.
- The senior secondary Science subjects have been designed to accommodate, if appropriate, an extended scientific investigation within each pair of units.

Science as a Human Endeavour

- Through science, we seek to improve our understanding and explanations of the natural world. The Science as a Human Endeavour strand highlights the development of science as a unique way of knowing and doing and explores the use and influence of science in society.
- As science involves the construction of explanations based on evidence, the development of science concepts, models and theories is dynamic and involves critique and uncertainty. Science concepts, models and theories are reviewed as their predictions and explanations are continually re-assessed through new evidence, often through the application of new technologies. This review process involves a diverse range of scientists working within an increasingly global community of practice and can involve the use of international conventions and activities such as peer review.
- The use and influence of science are shaped by interactions between science and a wide range of social, economic, ethical and cultural factors. The application of science may provide great benefits to individuals, the community and the environment, but may also pose risks and have unintended consequences. As a result, decision making about socio-scientific issues often involves consideration of multiple lines of evidence and a range of stakeholder needs and values. As an ever-evolving body of knowledge, science frequently informs public debate, but is not always able to provide definitive answers.
- Across the senior secondary Science subjects, the same set of Science as a Human Endeavour content descriptions is used for Units 1 and 2 of the subjects; and another set for Units 3 and 4. This consistent approach enables students to develop a rich appreciation of the complex ways in which science interacts with society, through the exploration of Science as a Human Endeavour concepts across the subjects and in multiple contexts.
- 'Examples in context' will be developed to illustrate possible contexts related to Science Understanding content, in which students could explore Science as a Human Endeavour concepts. Each Example in context will be aligned to the relevant sub-unit in Science Understanding and will include links to the relevant Science as a Human Endeavour content descriptions.

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. Models in science can include diagrams, physical replicas, mathematical representations, word-based analogies (including laws and principles) and computer simulations. Development of models involves selection of the aspects of the system/s to be included in the model, and thus models have inherent approximations, assumptions and limitations.
- The Science Understanding content in each unit develops students' understanding of the key concepts, models and theories that underpin the subject, and of the strengths and limitations of different models and theories for explaining and predicting phenomena.
- Science understanding can be developed through the selection of contexts that have relevance to and are engaging for students.

Assessment

The identification of criteria within the achievement standards and assessment task types and weightings provides a common and agreed basis for the collection of evidence of student achievement.

Assessment Criteria (the dimensions of quality that teachers look for in evaluating student work) provide a common and agreed basis for judgement of performance against unit and course goals, within and across colleges. Over a course, teachers must use all these criteria to assess students' performance but are not required to use all criteria on each task. Assessment criteria are to be used holistically on a given task and in determining the unit grade.

Assessment Tasks elicit responses that demonstrate the degree to which students have achieved the goals of a unit based on the assessment criteria. The Common Curriculum Elements (CCE) is a guide to developing assessment tasks that promote a range of thinking skills (see Appendix C). It is highly desirable that assessment tasks engage students in demonstrating higher order thinking.

Rubrics are constructed for individual tasks, informing the assessment criteria relevant for a particular task and can be used to assess a continuum that indicates levels of student performance against each criterion.

Assessment Criteria

Students will be assessed on the degree to which they demonstrate:

- concepts, models and application
- contexts
- inquiry skills.

Assessment Task Types

Suggested tasks

Individual tasks may incorporate one or more of the following:

- models
- commentary
- debate
- portfolio/journal
- field work
- investigation
- document/source analysis
- practical report
- role play
- research report
- test/quiz
- seminar/workshop/lecture
- poster
- response to stimulus
- essay
- multimedia presentation
- creative response
- interview
- discussion forum
- rationale/validation
- practical skills

It is recommended that a student conceived investigation be undertaken at least once during a minor and twice during a major. This investigation may either be theoretical or practical, or a combination of both.

Weightings in A/T/M 1.0 and 0.5 Units:

No task to be weighted more than 45% for a standard 1.0 unit.

Additional Assessment Information

Requirements

- For a standard unit (1.0), students must complete a minimum of three assessment tasks and a maximum of five.
- For a half standard unit (0.5), students must complete a minimum of two and a maximum of three assessment tasks.
- Students must experience a variety of task types and different modes of communication to demonstrate the Achievement Standards in both theoretical and practical tasks.
- All Achievement Standards must be demonstrated in standard (1.0) or half-standard (0.5) units.
- Task types need to be selected to address all Achievement Standards within the Concepts, Models and Applications, Contexts and Inquiry Skills strands across a standard (1.0) or half-standard (0.5) unit.
- For tasks completed in unsupervised conditions, schools need to have mechanisms to uphold academic integrity, for example: student declaration, plagiarism software, oral defence, interview, or other validation tasks.

Achievement Standards

Years 11 and 12 achievement standards are written for A/T courses. A single achievement standard is written for M courses.

A Year 12 student in any unit is assessed using the Year 12 achievement standards. A Year 11 student in any unit is assessed using the Year 11 achievement standards. Year 12 achievement standards reflect higher expectations of student achievement compared to the Year 11 achievement standards. Years 11 and 12 achievement standards are differentiated by cognitive demand, the number of dimensions and the depth of inquiry.

An achievement standard cannot be used as a rubric for an individual assessment task. Assessment is the responsibility of the college. Student tasks may be assessed using rubrics or marking schemes devised by the college. A teacher may use the achievement standards to inform development of rubrics. The verbs used in achievement standards may be reflected in the rubric. In the context of combined Years 11 and 12 classes, it is best practice to have a distinct rubric for Years 11 and 12. These rubrics should be available for students prior to completion of an assessment task so that success criteria are clear.

BSSS Achievement Standards for Science A Course – Year 11

	*A student who achieves an **A** grade typically*	*A student who achieves a **B** grade typically*	*A student who achieves a **C** grade typically*	*A student who achieves a **D** grade typically*	*A student who achieves an **E** grade typically*
Concepts, Models and Applications	• analyses the fundamental properties and functions of system components, processes and interactions, and how they are affected by factors across a range of temporal and spatial scales • analyses the nature, functions, limitations and applications of theories and models using evidence, in unfamiliar contexts • assesses evidence with reference to models and/or theories, and develops evidence-based conclusions and assesses limitations	• explains the fundamental properties and functions of system components, processes and interactions, and how they are affected by factors across a range of temporal and spatial scales • explains the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts • explains evidence with reference to models and/or theories, and develops evidence-based conclusions and explains limitations	• describes the fundamental properties and functions of system components, processes and interactions, and how they are affected by factors across a range of temporal and spatial scales • describes the nature, functions, limitations and applications of theories and models with supporting evidence • describes evidence with reference to models and/or theories, and develops evidence-based conclusions and describes limitations	• identifies the fundamental properties and functions with some identification of system components and factors that affect processes across a range of temporal and spatial scales • identifies the nature, functions, applications, and some possible limitations of theories and models, with some evidence • identifies evidence, and develops conclusions with some reference to models and/or theories	• identifies the fundamental properties and functions with little or no identification of system components, processes, interactions and contextual scales • identifies the nature, function of theories and models, with an assertion of a few possible limitations • identifies evidence, and asserts conclusions with little or no reference to models and/or theories
Contexts	• analyses how the practice and applications of science meet needs, make decisions; and is influenced by social, economic, technological, and ethical factors	• explains how the practice and applications of science meet needs, make decisions, and is influenced by social, economic, technological, and ethical factors	• describes how the applications of science meet needs, make decisions, and is influenced by social, economic, technological, and ethical factors	• identifies ways in the applications of science meet needs, and is influenced by some factors	• identifies ways in which the application of science has been used in society to meet needs
Inquiry Skills	• designs, conducts and improves safe, ethical and original inquiries individually and collaboratively, that efficiently collect valid and reliable data in response to a complex question • analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and analyses errors • assesses processes and claims, provides a critique based on evidence, and discusses alternatives • reflects with insight on their own thinking and learning and evaluates planning, time management and use of appropriate strategies to work independently and collaboratively • communicates concisely, effectively and accurately, demonstrating scientific literacy in a range of modes, styles, representations, and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• designs, conducts and improves safe, ethical inquiries individually and collaboratively, that collect valid data in response to a complex question • explains causal and correlational relationships, anomalies, reliability and validity of data and representations, and explains errors • explains processes and claims, provides a critique with reference to evidence, and identifies alternatives • reflects on their own thinking and analyses planning, time management, use of appropriate strategies to work independently and collaboratively • communicates clearly and accurately, demonstrating scientific literacy in a range of modes, styles, representations and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• plans and conducts safe, ethical inquiries individually and collaboratively, that collect valid data in response to a question • describes relationships in data sets, reliability and validity of data and representations, and describes common errors • describes processes and claims, and identifies alternatives with some reference to evidence • reflects on their own thinking and explains planning, time management, use of appropriate strategies to work independently and collaboratively • communicates accurately demonstrating scientific literacy, in a range of modes, styles, representations, and genres for specific purposes, with appropriate evidence and mostly consistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data in response to a question with varying success • identifies trends and anomalies in data and representations, with general comments about errors • identifies processes and claims, and identifies the need for improvements with some reference to evidence • reflects on their own thinking with some reference to planning, time management, use of appropriate strategies to work independently and collaboratively • communicates demonstrating some scientific literacy, in a range of modes, representations, and genres with some evidence and inconsistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data with little or no connection to a question • identifies trends in data and representations, with little or no reference to anomalies and errors • identifies processes and the need for some improvements, with little or no reference to evidence • reflects on their own thinking with little or no reference to planning, time management, use of appropriate strategies to work independently and collaboratively • communicates demonstrating limited scientific literacy, in a range of modes and representations, with inconsistent and inaccurate referencing

BSSS Achievement Standards for Science T Course – Year 11

	*A student who achieves an **A** grade typically*	*A student who achieves a **B** grade typically*	*A student who achieves a **C** grade typically*	*A student who achieves a **D** grade typically*	*A student who achieves an **E** grade typically*
Concepts, Models and Applications	• evaluates the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales • evaluates the nature, functions, limitations and applications of theories and models using evidence, in unfamiliar contexts • analyses evidence with reference to models and/or theories, and develops evidence-based conclusions and evaluates limitations	• analyses the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales • analyses the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts • assesses evidence with reference to models and/or theories, and develops evidence-based conclusions and discusses limitations	• explains the fundamental properties and functions of system components, processes and interactions and the effects of factors across a range of scales • explains the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts • explains evidence with reference to models and/or theories, and develops evidence-based conclusions and identifies limitations	• describes the fundamental properties and functions, and with some description of system components, processes and interactions, and the effects of factors across a range of scales • describes the nature, functions, limitations and applications of theories and models with supporting evidence • describes evidence, and develops conclusions with some reference to models and/or theories	• identifies the fundamental properties and functions of system and identifies components, processes and interactions, and the effects of factors across a range of scales • identifies the nature, functions, applications, and some possible limitations of theories and models, with some evidence • identifies evidence, and asserts conclusions with little or no reference to models and/or theories
Contexts	• evaluates epistemology, role of peer review, collaboration and technology in developing knowledge • evaluates the influence of social, economic, ethical and cultural factors on Science	• analyses epistemology, role of peer review and technology in developing knowledge • analyses the influence of social, economic, ethical and cultural factors on Science	• explain epistemology, role of peer review and technology in developing knowledge • explains the influence of social, economic, ethical and cultural factors on Science	• describes the role of peer review in developing knowledge • describes the influence of social, economic, ethical and cultural factors on Science	• identifies that scientific knowledge has changed over time • identifies the influence of social, economic, ethical and cultural factors on Science
Inquiry Skills	• designs, conducts and improves safe, ethical and original inquiries individually and collaboratively, that collect valid, reliable data in response to a complex question • analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and analyses errors • analyses processes and claims, and provides a critique based on evidence, and analyses alternatives • reflects with insight on own thinking and that of others, and evaluates planning, time management, and use of appropriate work strategies to work independently and collaboratively • communicates concisely, effectively and accurately, demonstrating scientific literacy in a range of modes, styles, representations, and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• designs, conducts and improves safe, ethical inquiries individually and collaboratively, that collect valid, reliable data in response to a question • analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and discusses errors • assesses processes and claims, and provides a critique with reference to evidence, and analyses alternatives • reflects on their own thinking and analyses planning, time management, use of appropriate work strategies to work independently and collaboratively • communicates clearly and accurately, demonstrating scientific literacy in a range of modes, styles, representations and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• plans and conducts safe, ethical inquiries individually and collaboratively, that collect valid data in response to a familiar question • explains causal and correlational relationships, anomalies, reliability and validity of data and representations, and cites common errors • explains processes and claims, and identifies alternatives with reference to reliable evidence • reflects on their own thinking and explains planning, time management, use of appropriate work strategies to work independently and collaboratively • communicates accurately demonstrating scientific literacy, in a range of modes, styles, representations, and genres for specific purposes, with appropriate evidence and mostly consistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data in response to a simple question with varying success • describes trends, relationships and anomalies in data, identifies anomalies, and some possible sources of error • describes processes and claims, and identifies the need for improvements with some reference to evidence • reflects on their own thinking, with reference to planning and the use of appropriate work strategies to work independently and collaboratively • communicates demonstrating some scientific literacy, in a range of modes, representations, and genres with some evidence and inconsistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data with little or no connection to a question • identifies trends and relationships in data, with little or no reference to sources of error • identifies processes and the need for some improvements, with little or no reference to evidence • reflects on their own thinking with little or no reference to planning, time management, and use of work strategies to work independently and collaboratively • communicates demonstrating limited scientific literacy, in a range of modes and representations, with inconsistent and inaccurate referencing

BSSS Achievement Standards for Science A Course – Year 12

	*A student who achieves an **A** grade typically*	*A student who achieves a **B** grade typically*	*A student who achieves a **C** grade typically*	*A student who achieves a **D** grade typically*	*A student who achieves an **E** grade typically*
Concepts, Models and Applications	• analyses the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales • analyse the nature, functions, limitations and applications of theories and models using evidence, in unfamiliar contexts • assesses evidence with reference to models and/or theories, and develops evidence-based conclusions and evaluates limitations	• explains the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales • explains the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts • explains evidence with reference to models and/or theories, and develops evidence-based conclusions and discusses limitations	• describes the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales • describes the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts • describes evidence with reference to models and/or theories, and develops evidence-based conclusions and identifies limitations	• describes the fundamental properties and functions of system components, processes and interactions, and the effects of one or more factors • describes the nature, functions, limitations and applications of theories and models with supporting evidence • describes evidence, and develops conclusions with some reference to models and/or theories	• identifies the fundamental properties and functions of system components, processes and interactions, and the effects of factors • identifies the nature, functions, applications, and some limitations of theories and models with some evidence • identifies evidence, and asserts conclusions with little or no reference to models and/or theories
Contexts	• analyses epistemology, role of peer review, collaboration and technology in developing knowledge • analyses the influence of social, economic, ethical and cultural factors on Science	• explains epistemology, role of peer review and technology in developing knowledge • explains the influence of social, economic, ethical and cultural factors on Science	• describes epistemology, role of peer review and technology in developing knowledge • describes the influence of social, economic, ethical and cultural factors on Science	• describes role of peer review and technology in developing knowledge • describes the influence of social, economic, ethical and cultural factors on Science	• identifies that scientific knowledge has changed over time • identifies the influence of social, economic, ethical and cultural factors on Science
Inquiry Skills	• designs, conducts and improves safe, ethical and original inquiries individually and collaboratively, that collect valid, reliable data in response to a complex question • analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and analyses errors • analyses processes and claims, and provides a critique based on evidence, and analyses alternatives • reflects with insight on own thinking and that of others and, evaluates planning, time management and use of appropriate independent and collaborative work strategies • communicates concisely, effectively and accurately, demonstrating scientific literacy in a range of modes, styles, representations, and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• designs, conducts and improves safe, ethical inquiries individually and collaboratively, that collect valid, reliable data in response to a question • analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and discusses errors • explains processes and claims, and provides a critique with reference to evidence, and proposes alternatives • reflects on their own thinking and analyses planning, time management, and use of appropriate independent and collaborative work strategies • communicates clearly and accurately, demonstrating scientific literacy in a range of modes, styles, representations and genres for specific audiences and purposes, with appropriate evidence and accurate referencing	• plans and conducts safe, ethical inquiries individually and collaboratively, that collect valid data in response to a familiar question • describes causal and correlational relationships, anomalies, reliability and validity of data and representations, and cites common errors • describes processes and claims, and identifies alternatives with reference to reliable evidence • reflects on their own thinking and explains planning, time management, and use of appropriate independent and collaborative work strategies • communicates accurately demonstrating scientific literacy, in a range of modes, styles, representations, and genres for specific purposes, with appropriate evidence and mostly consistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data in response to a simple question with varying success • describes trends, relationships and anomalies in data, identifies anomalies, and some possible sources of error • describes processes and claims, and identifies the need for improvements with some reference to evidence • reflects on their own thinking, with reference to planning and the use of appropriate independent and collaborative work strategies • communicates demonstrating some scientific literacy, in a range of modes, representations, and genres with some evidence and inconsistent referencing	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data with little or no connection to a question • identifies trends and relationships in data, with little or no reference to sources of error • identifies processes and the need for some improvements, with little or no reference to evidence • reflects on their own thinking with little or no reference to planning, time management, and use of appropriate independent and collaborative work strategies • communicates demonstrating limited scientific literacy, in a range of modes and representations, with inconsistent and inaccurate referencing

BSSS Achievement Standards for Science T Course – Year 12

	*A student who achieves an **A** grade typically*	*A student who achieves a **B** grade typically*	*A student who achieves a **C** grade typically*	*A student who achieves a **D** grade typically*	*A student who achieves an **E** grade typically*
Concepts, Models and Applications	• evaluates the properties and functions of system components, processes and interactions, and the interplay and effects of factors across a range of scales	• analyses the properties and functions of system components, processes and interactions, and the interplay and effects of factors across a range of scales	• explains the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales	• describes the fundamental properties and functions of system components, processes and interactions, and the effects of one or more factors	• identifies the fundamental properties and functions of system components, processes and interactions, and some affective factors
	• evaluates applications, limitations, and predictions of theories and models to explain systems and create solutions, with evidence, in unfamiliar contexts	• analyses applications, limitations, and predictions of theories and models to explain systems and create plausible solutions, with evidence in familiar contexts	• explains applications, limitations, and predictions of theories and models to explain systems and create plausible solutions in familiar contexts	• describes the nature, functions, limitations and applications of theories and models to create solutions to problems with supporting evidence	• identifies the nature, functions, limitations and applications of theories and models, and suggest solutions to problems with supporting evidence
	• evaluates evidence with reference to analysis of models and/or theories, and develops evidence-based conclusions and evaluates limitations	• analyses evidence with reference to models and/or theories, and develops evidence-based conclusions and discusses limitations	• explains evidence with reference to models and/or theories, and develops evidence-based conclusions and identifies limitations	• describes evidence, and develops conclusions with some reference to models and/or theories	• identifies evidence, and asserts conclusions with little or no reference to models and/or theories
Contexts	• evaluates epistemology, role of peer review, collaboration, and technology in developing knowledge	• analyses epistemology, role of peer review and technology in developing knowledge	• explains epistemology, role of peer review and technology in developing knowledge	• describes role of peer review and technology in developing knowledge	• identifies that scientific knowledge has changed over time
	• evaluates the influence of social, economic, ethical and cultural factors on Science	• analyses the influence of social, economic, ethical and cultural factors on Science	• explains the influence of social, economic, ethical and cultural factors on Science	• describes the influence of social, economic, ethical and cultural factors on Science	• identifies the influence of social, economic, ethical and cultural factors on Science
Inquiry Skills	• designs, conducts and improves safe, ethical and original inquiries individually and collaboratively, that collect valid, reliable data in response to a complex question	• designs, conducts and improves safe, ethical inquiries individually and collaboratively, that collect valid, reliable data in response to a question	• plans and conducts safe, ethical inquiries individually and collaboratively, that collect valid data in response to a familiar question	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data in response to a simple question with varying success	• follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data with little or no connection to a question
	• evaluates cause and correlation, anomalies, reliability and validity of data and representations, and evaluates errors	• analyses cause and correlation, anomalies, reliability and validity of data and representations, and analyses errors	• explains causal and correlational relationships, anomalies, reliability and validity of data and representations, and discusses common errors	• describes trends, relationships and anomalies in data, identifies anomalies, and cites sources of error	• identifies trends and relationships in data with reference to sources of error
	• evaluates processes and claims, and provides a critique based on evidence, and evaluates alternatives	• analyses processes and claims, and provides a critique with reference to evidence, and analyses alternatives	• explains processes and claims, and identifies alternatives with reference to reliable evidence	• describes processes and claims, and identifies the need for improvements with some reference to evidence	• identifies processes and the need for some improvements, with little or no reference to evidence
	• reflects with insight on own thinking and that of others, evaluates planning, time management, and use of appropriate independent and collaborative work strategies	• reflects on their own thinking and analyses planning, time management, and use of appropriate independent and collaborative work strategies	• reflects on their own thinking and explains planning, time management, and use of appropriate independent and collaborative work strategies	• reflects on their own thinking, with reference to planning and the use of appropriate independent and collaborative work strategies	• reflects on their own thinking with little or no reference to planning, time management, and use of appropriate independent and collaborative work strategies
	• communicates concisely, effectively and accurately, with scientific literacy in a range of modes, representations, and genres for specific audiences and purposes, and accurate referencing	• communicates clearly and accurately, with scientific literacy in a range of modes, representations and genres for specific audiences and purposes, and accurate referencing	• communicates accurately demonstrating scientific literacy, in a range of modes, representations, and genres for specific purposes, and mostly consistent referencing	• communicates demonstrating some scientific literacy, in a range of modes, representations, and genres with some evidence and inconsistent referencing	• communicates demonstrating limited scientific literacy, in a range of modes and representations, with inconsistent and inaccurate referencing

Achievement Standards for Science M Course – Years 11 and 12

	*A student who achieves an **A** grade typically*	*A student who achieves a **B** grade typically*	*A student who achieves a **C** grade typically*	*A student who achieves a **D** grade typically*	*A student who achieves an **E** grade typically*
Concepts, Models and Applications	• describes the properties and functions of system components and processes with independence • describes system components and processes with some reference to how they are affected by factors with independence	• describes the properties and functions of system components, processes and interactions with assistance • describes system components, processes and interactions with some reference to how they are affected by factors with assistance	• identifies the properties and functions of system components, processes and interactions with independence • identifies system components, processes and interactions with independence	• identifies the properties and functions of system components, processes and interactions with assistance • identifies system components, processes and interactions with assistance	• identifies the properties and functions of system components, processes and interactions with direct instruction • identifies system components, processes and interactions with direct instruction
Contexts	• describes the impact of science on an aspect of society with independence	• describes the impact of science on an aspect of society with some independence	• identifies the impact of science on an aspect of society with independence	• identifies the impact of science on an aspect of society with assistance	• identifies the impact of science on an aspect of society with direct instruction
Inquiry Skills	• plans and conducts investigations in response to a question or problem with independence • draws evidence-based conclusions from investigations with independence • reflects on own thinking and learning in science with independence • communicates findings effectively with independence	• plans and conducts investigations in response to a question or problem with some independence • draws evidence-based conclusions from investigations with some independence • reflects on own thinking and learning in science with some independence • communicates findings effectively with some independence	• plans and conducts investigations in response to a question or problem with assistance • draws evidence-based conclusions from investigations with assistance • reflects on own thinking and learning in science with assistance • communicates findings with assistance	• plans and conducts investigations in response to a question or problem with repeated cueing • draws evidence-based conclusions from investigations with repeated cueing • reflects on own thinking and learning in science with repeated cueing • communicates findings with repeated cueing	• follows a procedure to conduct investigations to collect data with direct instruction • draws evidence-based conclusions from investigations with direct instruction • reflects on own thinking and learning in science with direct instruction • communicates findings with direct instruction

The Essentials of Human Life — Value 1.0

The Essentials of Human Life a — Value 0.5

The Essentials of Human Life b — Value 0.5

Unit Description

Human embryos undergo cell replication and specialisation to initially form different germ layers and later develop into specialised tissue types (connective, epithelial, muscular and nervous). Students learn about the stem cells from which tissue form in the embryo and which are the foundation for the growing therapeutic treatment of a number of degenerative diseases. In doing so students discover that different sorts of stem cells have different efficacies for treatment of disease.

They also focus on the anatomy and physiology of different tissue types and their purposes in the mature human body. The nature of the different types of tissue is investigated and the roles they play in the human body are explored (for example, the different types of squamous tissue and the impact of different structural forms on different roles in the body). Relationships between the tissue types are explored in order to develop an understanding of the intricate interconnectivity that produces the specialised organs of the human body such as the heart and the liver, with a specialised function.

Through the investigation of appropriate contexts, students explore how evidence from multiple disciplines and the use of ICT and other technologies have contributed to developing understanding of the development of the human embryo and the structure and function of tissue types. They investigate how scientific knowledge is used to offer valid explanations and reliable predictions, and the ways in which scientific knowledge interacts with social, economic, cultural and ethical considerations.

Students use science inquiry skills to explore the relationship between development structure and function, by conducting real or virtual dissections and carrying out microscopic examination of cells and tissues. Students consider the ethical considerations that apply to the use of living organisms in research. They develop skills in constructing and using models to describe and interpret data about the functions of cells and organisms.

Specific Unit Goals

This unit should enable students to:

A Course	T Course	M Course
• understand how important stem cells are in the human body and the role they play in the development of the human body	• understand how important stem cells are in the human body and the role their differentiation plays in the developments of the human body	• understand that stem cells are in the human body
• understand how the classification of tissue types can enhance the study of their function in the human body	• understand how the classification of tissue types can enhance the study of their function in the human body	• understand that different types of tissues have functions in the human body
• understand how the different tissue types present in the human body maintain and control the flow of fluids and other materials	• understand how the different tissue types present in the human body maintain and control the flow of fluids and other materials	

A Course	T Course	M Course
• use science inquiry skills to design, conduct and communicate investigations into the function and nature of tissue at macroscopic and microscopic level	• use science inquiry skills to design, conduct, evaluate and communicate investigations into the function and nature of tissue at macroscopic and microscopic level	• use some science inquiry skills to conduct and communicate investigations
• review, with reference to empirical evidence, investigations into tissue structure and the function of cell differentiation	• evaluate, with reference to empirical evidence, investigations into tissue structure and the function of cell differentiation	
• communicate human biological understanding using qualitative and quantitative representations	• communicate human biological understanding using qualitative and quantitative representations in appropriate modes and genres	• communicate human biological understanding using qualitative representations

Content Descriptions

All knowledge, understanding and skills below must be delivered:

A Course	T Course	M Course
Science Inquiry Skills		
• identify and research questions for investigation; propose hypotheses; and predict possible outcomes	• identify, research and refine questions for investigation; propose hypotheses; and predict possible outcomes	• use data to respond to questions
• design investigations, including the procedure/s to be followed, the materials required, conduct risk assessments; and consider research ethics	• design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics	• follow instructions to conduct practicals
• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations safely, competently and methodically

A Course	T Course	M Course
• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships to make conclusions	• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions	• represent data
• interpret selected scientific and media texts, and evaluate claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• view selected scientific and media texts
• select and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate understanding, solve problems and make predictions	• select, construct and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate conceptual understanding, solve problems and make predictions	• use appropriate representations including labelled diagrams and images of various cells, tissues, to aid understanding
• communicate to a general audience using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to a general audience using appropriate language, about the topic
Science as a Human Endeavour		
• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise
• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of models requires a range of evidence
• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas

A Course	T Course	M Course
• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	
• the use of scientific knowledge may have beneficial and/or unintended consequences	• the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences	• the use of scientific knowledge may have beneficial or unintended consequences
• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	
Science Understanding		
• the human body has more than two hundred different types of cells of varying shape, size and function	• the human body has more than two hundred different types of cells of varying shape, size and function	• the human body has more than many different types of cells
• cell specialisation in humans occurs during embryonic development	• cell specialisation in humans occurs during embryonic development	• cell specialisation in humans occurs with embryonic development
• stem cells have the ability to divide by mitosis and differentiate into many different tissues, depending on the level of cell potency	• stem cells have the ability to divide by mitosis and differentiate into many different tissues, depending on the level of cell potency	
• a germ layer is a group of cells in an embryo that interact with each other as the embryo develops and contribute to the formation of all organs and tissues	• a germ layer is a group of cells in an embryo that interact with each other as the embryo develops and contribute to the formation of all organs and tissues	
• three germ layers in a human embryo are the endoderm, mesoderm and ectoderm	• three germ layers in a human embryo are the endoderm, mesoderm and ectoderm	
• most human organs contain representatives of all four primary tissue types: epithelial, connective, muscular and nervous tissue	• most human organs contain representatives of all four primary tissue types: epithelial, connective, muscular and nervous tissue	• most human organs consist of different tissue types
• some forms of epithelium give rise to the glands of the body during embryonic development	• some forms of epithelium give rise to the glands of the body during embryonic development	

A Course	T Course	M Course
• epithelial tissue forms the barrier between different environments (for example the skin lies between the internal and external environments of the human body which acts to protect, absorb, excrete and act as a sensory receptor)	• epithelial tissue forms the barrier between different environments (for example the skin lies between the internal and external environments of the human body which acts to protect, absorb, excrete and act as a sensory receptor)	• epithelial tissue forms the barrier between different environments
• different sorts of epithelial tissue serve different functions	• different sorts of epithelial tissue serve different functions (for example, simple squamous epithelium allows the rapid and efficient passage of materials by diffusion)	
• connective tissue not only functions to bind and support other tissues but also to protect, insulate and transport (blood)	• connective tissue not only functions to bind and support other tissues but also to protect, insulate and transport (blood)	• connective tissue binds and supports other tissues
• muscle tissue exerts force through the conversion of chemical energy to mechanical energy to either enable the mobility of the body, or force fluid through the body (for example, cardiac muscle)	• muscle tissue exerts force through the conversion of chemical energy to mechanical energy to either enable the mobility of the body, or force fluid through the body (for example, cardiac muscle)	• muscle tissue enables mobility of the body or forces fluid through the body
• nervous tissue of the human body is the master receiver of sensory input, processor of information and communicator through a combination of chemical and electrical signals	• nervous tissue of the human body is the master receiver of sensory input, processor of information and communicator through a combination of chemical and electrical signals	• nervous tissue is the processor and communicator of information
• field of tissue engineering, which aims to repair, regenerate and/or improve scarred tissue, holds great potential for extending tissue therapy (for example, synthetic epidermal layer can be used as artificial human skin to treat burn victims)	• field of tissue engineering, which aims to repair, regenerate and/or improve scarred tissue, holds great potential for extending tissue therapy (for example, synthetic epidermal layer can be used as artificial human skin to treat burn victims)	

A guide to reading and implementing content descriptions

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions. The lens which the teacher uses to demonstrate the content descriptions may be either guided through provision of electives within each unit or determined by the teacher when developing their program of learning.

A program of learning is what a college provides to implement the course for a subject. It is at the discretion of the teacher to emphasis some content descriptions over others. The teacher may teach additional (not listed) content provided it meets the specific unit goals. This will be informed by the student needs and interests.

Assessment

Refer to pages 13-15.

The Aging Human Body — Value 1.0

The Aging Human Body a — **Value 0.5**

The Aging Human Body b — **Value 0.5**

Unit Description

This unit investigates human reproduction and the development of the foetus in order to understand the sources of variation that make each of us unique individuals. Students learn about the mechanisms of transmission of genetic materials to the next generation, the role of gametes in reproduction, the development of the embryo and tests for screening both the embryo and the newly born child for abnormalities. The emphasis is on developing an understanding of the remarkable development and growth rate of the foetus. Advances in technology, such as modern imaging technology, mean that we can trace this development in great detail and precisely mark developmental changes. Students will also study in vitro fertilisation (IVF), sexually transmitted diseases and contraception.

From birth to adulthood, the human body grows at different rates and changes in form. Students focus on a range of illnesses that relate to age and tissue types so that they gain a deep understanding of how disease relates to tissue function in the body. The phenomenon of autophagy is investigated in order to understand the underlying processes of materials from cell destruction being recycled in order to form new tissue. Uncontrolled growth of tissue that leads to cancer is also studied. Students will learn about a range of pathologies that may be age-related and that affect particular tissue types (for example, cystic fibrosis in the young affecting the epithelial tissue of the lungs and digestive systems). Specific instances are chosen in order to provide a wide variety of cases to study such as sensory deprivation in the newly born child through to such pathologies that are age-related such as Alzheimer's and Parkinson's diseases. Medical advances are continually improving the diagnosis of chronic illness and thereby increasing the chances of early intervention. Therapies are considered that may slow the advance of degenerative diseases, such as gene and stem cell therapies.

The unit provides opportunities to explore stem cell research which is an important area that providing opportunities for the development of therapies to treat degenerative diseases. This presents major ethical, social and legal issues. Students investigate how scientific knowledge is used to offer valid explanations and reliable predictions, and the ways in which scientific knowledge interacts with social, economic, cultural and ethical factors.

Students will use ICT to research the population dynamics of these conditions and develop skills in using models to describe and interpret data at the population level. They will also gain an insight into the emotional and mental costs of such diseases as dementia through interaction with practitioners in the field.

Specific Unit Goals

This unit should enable students to:

A Course	T Course	M Course
• understand reproduction in the human body and the development of the foetus through the stages in pregnancy	• understand reproduction in the human body and the development of the foetus through the stages in pregnancy	• describe aspects of human reproduction
• understand the different stages of growth and how aging changes the human body	• understand the different stages of growth and how aging changes the human body	• understand the different stages of growth
• understand how different stages of human development are susceptible to particular conditions and illnesses	• understand how different stages of human development are susceptible to particular conditions and illnesses	• recognise that certain conditions occur at particular stages of development

• use science inquiry skills to conduct and communicate investigations into the review of medical imaging, such as MRI and PET scan films	• use science inquiry skills to design, conduct, evaluate and communicate investigations into reproduction and growth	• use science inquiry skills to conduct investigations
• compare the variety of medical isotopes and their use in the diagnosis and treatment of diseases	• evaluate, with reference to empirical evidence, claims about the relationship between stage of human development and illness, disease or conditions that can develop	
• communicate human biological understanding using qualitative representations in appropriate modes and genres	• communicate human biological understanding using qualitative and quantitative representations in appropriate modes and genres	• communicate some understanding of human biology

Content Descriptions

All knowledge, understanding and skills below must be delivered:

A Course	T Course	M Course
Science Inquiry Skills		
• identify and research questions for investigation; propose hypotheses; and predict possible outcomes	• identify, research and refine questions for investigation; propose hypotheses; and predict possible outcomes	• use data to respond to questions
• design investigations, including the procedure/s to be followed, the materials required, conduct risk assessments; and consider research ethics	• design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics	• follow instructions to conduct practicals
• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations safely, competently and methodically

A Course	T Course	M Course
• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships to make conclusions	• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions	• represent data
• interpret selected scientific and media texts, and evaluate claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• view selected scientific and media texts
• select and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate understanding, solve problems and make predictions	• select, construct and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate conceptual understanding, solve problems and make predictions	• use appropriate representations including labelled diagrams and images of various cells, tissues, to aid understanding
• communicate to a general audience using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to a general audience using appropriate language, about the topic
Science as a Human Endeavour		
• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise
• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of models requires a range of evidence
• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas

A Course	T Course	M Course
• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	
• the use of scientific knowledge may have beneficial and/or unintended consequences	• the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences	• the use of scientific knowledge may have beneficial or unintended consequences
• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	
Science Understanding		
• differences between the structure and function of the male and female reproductive systems facilitate the production of offspring by producing and delivering gametes for fertilisation and providing resources for the developing embryo and foetus	• differences between the structure and function of the male and female reproductive systems facilitate the production of offspring by producing and delivering gametes for fertilisation and providing resources for the developing embryo and foetus	• identify structures of the male and female reproductive systems
• reproductive systems are regulated by hormones, including the regulation of the menstrual and ovarian cycles	• reproductive systems are regulated by hormones, including the regulation of the menstrual and ovarian cycles	• reproductive systems are regulated by hormones
• for pregnancy to occur, conception requires the fusion of viable sperm and ovum, either within the body or through in vitro fertilisation	• for pregnancy to occur, conception requires the fusion of viable sperm and ovum at the optimal time in the ovarian cycle, either within the body or through in vitro fertilisation	• pregnancy to occur, conception requires the sperm and ovum to fuse
• techniques available to genetically screen embryos before implantation or during early development, including blood tests, amniocentesis and chorionic villi sampling	• techniques available to genetically screen embryos (for example to detect brca1 and brca2 genes for breast cancer) before implantation or during early development, including blood tests, amniocentesis and chorionic villi sampling	• techniques available to genetically screen embryos
• contraception methods that reduce the probability of pregnancy all have limitations, risks and benefits	• contraception methods that reduce the probability of the union of gametes or implantation all have limitations, risks and benefits	• contraception methods reduce the probability of pregnancy

A Course	T Course	M Course
• sexually transmitted infections (STIs), diseases transmitted through unprotected sex or genital contact, can be prevented through safe sex methods; early detection and treatment of infection are important and, if left untreated, STIs can lead to serious health consequences	• sexually transmitted infections (STIs), diseases transmitted through unprotected sex or genital contact, can be prevented through safe sex methods; early detection and treatment of infection are important and, if left untreated, STIs can lead to serious health consequences	• sexually transmitted infections (STIs) can lead to serious health consequences
• the process where a baby goes from in utero to an external environment can be explained by looking at the changes in the circulatory system, moving from dependence on the mother's placenta to the baby relying on its own respiratory and cardiovascular systems	• the process where a baby goes from in utero to an external environment can be explained by looking at the changes in the circulatory system, moving from dependence on the mother's placenta to the baby relying on its own respiratory and cardiovascular systems	
• the Apgar score, the very first test given to a newborn, is designed to detect abnormalities in the baby	• the Apgar score, the very first test given to a newborn, is designed to detect abnormalities in the baby	• the Apgar score, the very first test given to a newborn, is designed to detect abnormalities in the baby
• autophagy describes the normal physiological process in the human body that deals with the destruction of cells and the turnover of building materials for new cells	• autophagy describes the normal physiological process in the human body that deals with the destruction of cells and the turnover of building materials for new cells	
• sensory deprivation affects childhood development especially in terms of physiological, emotional and intellectual development and shows the link between the social, psychological and physical environment in health	• sensory deprivation affects childhood development especially in terms of physiological, emotional and intellectual development and shows the link between the social, psychological and physical environment in health	• sensory deprivation affects childhood development
• some diseases (both genetic and non-genetic) are currently incurable (cystic fibrosis, Coeliac disease and Huntington's disease, amyotrophic lateral sclerosis and childhood leukaemia) because of the degeneration of specific tissue types and/or current limits to scientific understanding of the disease	• some diseases (both genetic and non-genetic) are currently incurable (cystic fibrosis, Coeliac disease and Huntington's disease, amyotrophic lateral sclerosis and childhood leukaemia) because of the degeneration of specific tissue types and/or current limits to scientific understanding of the disease	• some diseases are currently incurable

A Course	T Course	M Course
• cystic fibrosis is a disease of the young which affects the epithelial tissue of the lungs and digestive systems	• cystic fibrosis is a disease of the young which affects the epithelial tissue of the lungs and digestive systems	• cystic fibrosis is a disease of the young which affects the tissue of the lungs and digestive systems
• common human ailments during a lifetime can be explained by the interaction of different tissue types (for example, the deterioration of the nervous tissue plays a role in the development of Alzheimer's and Parkinson's diseases)	• common human ailments during a lifetime can be explained by the interaction of different tissue types (for example, the deterioration of the nervous tissue plays a role in the development of Alzheimer's and Parkinson's diseases)	• common human ailments during a lifetime can be explained by the interaction of different tissue types
• uncontrolled division of cells can result in the development of tumours/cancers	• uncontrolled division of cells can result in the development of tumours/cancers	• uncontrolled division of cells can result in the development of tumours/cancers
• biological theories for ageing in the body (for example, the hayflick limit, oxidative damage)	• biological theories for senescence and associated ageing in the body (for example, the hayflick limit, oxidative damage, mitochondrial genome damage and telomere shortening)	
• gerontology looks at old age, the medical problems specific to old age and the aging process	• gerontology looks at old age, the medical problems specific to old age and the aging process	• gerontology is a growing field of study which looks at old age, the medical problems specific to old age and the aging process
• ethical and legal issues associated with disease treatment and life choices (e.g. euthanasia)	• ethical and legal issues associated with disease treatment and life choices (e.g. euthanasia)	

A guide to reading and implementing content descriptions

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions. The lens which the teacher uses to demonstrate the content descriptions may be either guided through provision of electives within each unit or determined by the teacher when developing their program of learning.

A program of learning is what a college provides to implement the course for a subject. It is at the discretion of the teacher to emphasis some content descriptions over others. The teacher may teach additional (not listed) content provided it meets the specific unit goals. This will be informed by the student needs and interests.

Assessment

Refer to pages 13-15.

Human Health and the Environment — Value 1.0

Human Health and the Environment a — Value 0.5

Human Health and the Environment b — Value 0.5

Unit Description

This unit investigates the impact of environmental conditions upon the health of humans both at the individual and population level. The World Health Organisation believes that "environmental risk factors, such as air, water and soil pollution, chemical exposures, climate change, and ultraviolet radiation, contribute to more than 100 diseases", much of which is preventable with the appropriate planning. The environmental causes of disease will be considered, based on the nature of the risk: biological, chemical, physical and social.

Students will also interrogate the environmental and demographic markers of specific chronic diseases such as the link between asbestosis and mining and malaria and living in the tropics. With climate change, the parameters that not only affect the physical environment, but also the spread of biological risks will increase the global burden of disease, particularly zoonotic diseases. Some simple solutions are promoting safe household water storage and safer management of toxic substance storage and use. Students will consider not only the expression of specific environmental diseases but also the means by which the risk can be reduced and possible solutions.

Mental health is an important aspect of human health. Good mental health will be defined. Mental illness will be described as well as its causes, symptoms and treatment. Major mental health issues that affect teenagers will be considered in order to give the content real world relevance for the students.

Through the investigation of appropriate contexts, students will explore how the physical and social environment affects health by using evidence from multiple disciplines and with the use of ICT and other technologies. Students investigate how scientific knowledge is used to offer valid explanations and reliable predictions, and the ways in which scientific knowledge interacts with social, economic, cultural and ethical factors.

Students will use their scientific inquiry skills to explore the relationship between environment and illness, by investigating real world cases and constructing and using appropriate representations in order to analyse data gathered. They also develop their skills in constructing plausible explanation and predictions for a range of environmental health issues.

Specific Unit Goals

This unit should enable students to:

A Course	T Course	M Course
• understand the links between environmental conditions and human health	• understand the links between environmental conditions and human health	• identify links between environmental conditions and human health
• understand that diseases, and the response to them, can be considered on a local or global scale	• understand that diseases, and the response to them, can be considered on a local or global scale	• understand the diseases, and the response to them, can be considered on a local or global scale
• understand that changing climatic conditions will have significant effects on the incidence and spread of zoonotic diseases	• understand that changing climatic conditions will have significant effects on the incidence and spread of zoonotic diseases	• understand that changing climatic affects the spread of disease
• understand that some mental health issues have a biological basis	• understand that some mental health issues have a biological basis	• understand that some mental health issues have a biological basis

• understand how some mental health issues have effects on the individual's body systems • use science inquiry skills to conduct and communicate investigations into environmental conditions that can affect human health • describe claims about the relationship between mental health and social status • communicate human biological understanding using qualitative representations in appropriate modes and genres	• understand how some mental health issues have effects on the individual's body systems • use science inquiry skills to design, conduct, evaluate and communicate investigations into environmental conditions that can affect human health • evaluate, with reference to empirical evidence, claims about the relationship between mental health and social status • communicate human biological understanding using qualitative and quantitative representations in appropriate modes and genres	• understand that mental health issues have effects on the individual's body systems • use science inquiry skills to conduct investigations • communicate human biological understanding in a straightforward way

Content Descriptions

All knowledge, understanding and skills below must be delivered:

A Course	T Course	M Course
Science Inquiry Skills		
• identify and research questions for investigation; propose hypotheses; and predict possible outcomes • design investigations, including the procedure/s to be followed, the materials required, conduct risk assessments; and consider research ethics • conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• identify, research and refine questions for investigation; propose hypotheses; and predict possible outcomes • design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics • conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• use data to respond to questions • follow instructions to conduct practicals • conduct investigations safely, competently and methodically

A Course	T Course	M Course
• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships to make conclusions	• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions	• represent data
• interpret selected scientific and media texts, and evaluate claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• view selected scientific and media texts
• select and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate understanding, solve problems and make predictions	• select, construct and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate conceptual understanding, solve problems and make predictions	• use appropriate representations including labelled diagrams and images of various cells, tissues, to aid understanding
• communicate to a general audience using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to a general audience using appropriate language, about the topic
Science as a Human Endeavour		
• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise
• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of models requires a range of evidence
• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas

A Course	T Course	M Course
• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	
• the use of scientific knowledge may have beneficial and/or unintended consequences	• the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences	• the use of scientific knowledge may have beneficial or unintended consequences
• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	
Science Understanding		
• human health is increasingly impacted by environmental conditions	• human health is increasingly impacted by environmental conditions	• human health is impacted by environmental conditions
• environmental influences include physical, chemical and biological hazards	• environmental influences include physical, chemical and biological hazards	• environmental influences include physical, chemical and biological hazards
• chemical pollutants/ contaminants, such as DDT, dieldrin and other pesticides can persist in the environment and have significant, and sometimes hidden, long-term effects on human health	• chemical pollutants/ contaminants, such as DDT, dieldrin and other pesticides can persist in the environment and have significant, and sometimes hidden, long-term effects on human health	• chemical pollutants can persist in the environment and have long-term effects on human health
• black lung, asbestosis and emphysema are chronic illnesses that result from exposure to mining and industrial particulate materials	• black lung, asbestosis and emphysema are chronic illnesses that result from exposure to mining and industrial particulate materials	• black lung, asbestosis and emphysema are chronic illnesses that result from exposure to mining and industrial particulate materials
• since the development of the atomic bomb and nuclear power there have been significant local and regional consequences to human health as a result of exposure to radiation	• since the development of the atomic bomb and nuclear power there have been significant local and regional consequences to human health as a result of exposure to radiation	
• malaria is a life-threatening disease, caused by Plasmodium parasites transmitted by a number of mosquito species	• malaria is a life-threatening disease, caused by Plasmodium parasites transmitted by a number of mosquito species	• malaria is a life-threatening disease transmitted by mosquitoes

A Course	T Course	M Course
• sanitation and water treatment are a major issue for large parts of urban populations in lower economically developed countries around the world and is the source of many water-borne illnesses such as cholera, *Giardia, Naegleria Fowleri* and a number of worm infections	• sanitation and water treatment are a major issue for large parts of urban populations in lower economically developed countries around the world and is the source of many water-borne illnesses such as cholera, *Giardia, Naegleria Fowleri* and a number of worm infections	• sanitation and water treatment may be used to reduce water-borne illnesses
• diseases can occur from contact with animals (e.g. rabies, bat lyssavirus, lyme disease, toxoplasmosis, Hendra virus, tetanus, anthrax, q fever)	• diseases can occur from contact with animals (e.g. rabies, bat lyssavirus, lyme disease, toxoplasmosis, Hendra virus, tetanus, anthrax, q fever)	• diseases can occur from contact with animals
• human mobility facilitates the rapid movement of pathogens in a global environment (for example zika virus)	• human mobility facilitates the rapid movement of pathogens in a global environment (for example zika virus)	• human mobility and climate change can lead to the spread disease
• climate change with shifting temperature bands will mean zoonotic diseases may become common	• climate change with shifting temperature bands will mean zoonotic diseases may become common	
• mental health can be affected by genetics, prenatal damage, infections, exposure to toxins, brain defects or injuries and chemical imbalances	• mental health can be affected by genetics, prenatal damage, infections, exposure to toxins, brain defects or injuries and chemical imbalances	• mental health can be affected by a range of factors
• poor nutrition and the physical environment can affect mental health	• poor nutrition and the physical environment can affect mental health	• poor nutrition and the physical environment can affect mental health
• alcohol consumption during pregnancy may lead to birth defects or mental impairment	• alcohol consumption during pregnancy may lead to birth defects or mental impairment	• alcohol consumption during pregnancy may lead to birth defects or mental impairment
• eating disorders (binge eating disorder, anorexia nervosa, and bulimia nervosa) are common forms of mental illness that impact the digestive and skeletal systems of the human body	• eating disorders (binge eating disorder, anorexia nervosa, and bulimia nervosa) are common forms of mental illness that impact the digestive and skeletal systems of the human body • statistical analysis is a useful tool for assessing trends in mental health	• eating disorders impact how the human body works

A guide to reading and implementing content descriptions

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions. The lens which the teacher uses to demonstrate the content descriptions may be either guided through provision of electives within each unit or determined by the teacher when developing their program of learning.

A program of learning is what a college provides to implement the course for a subject. It is at the discretion of the teacher to emphasis some content descriptions over others. The teacher may teach additional (not listed) content provided it meets the specific unit goals. This will be informed by the student needs and interests.

Assessment

Refer to pages 13-15.

Treating the Human Body — Value 1.0

Treating the Human Body a — **Value 0.5**

Treating the Human Body b — **Value 0.5**

Unit Description

In this unit, students study the exponential growth of research and knowledge about the functioning of the human body that informs the Western mode of treating illness, and also consider alternative ways of treating illness in Australia. The veracity of alternative diagnosis and treatment methods will be interrogated. Student learning will be further enhanced through interaction with professional practitioners, wherever practical.

Diagnosis of illness involves understanding a person's symptoms and signs in order to determine an appropriate treatment. Diagnosis can be challenging because many signs and symptoms are non-specific. The exploration of both non-invasive and invasive diagnostic techniques of illness will be explored. The field of medical isotopes will also be examined. New developments, such as ICT facilitated diagnostic (e.g. MRI and CAT scans) as well as treatment (e.g. nanosurgery and stentrodes) methods will be discussed and put in historical context. Some of the evolving areas of medicine that present ethical issues, such as the use of 'service robots' in patient care and the development of antibiotic resistance, will also be studied.

Students will explore how cultural context and environment may affect the diagnosis and treatment of patients. Students investigate how scientific knowledge is used to offer valid explanations and reliable predictions, and the ways in which scientific knowledge interacts with social, economic, cultural and ethical factors.

Students will use their scientific inquiry skills to explore the principles of diagnosis and treatment of illness, by investigating real world cases. They interpret data in order to make predictions about causation and outcomes as a result of applying diagnostic techniques to symptom sets.

Specific Unit Goals

This unit should enable students to:

A Course	T Course	M Course
• understand that proper diagnosis of illness and diseases requires scientific evaluation and review of the symptoms	• understand that proper diagnosis of illness and diseases requires scientific evaluation and review of the symptoms	• understand that diagnosis of illness requires a review of the symptoms
• understand that some holistic medical diagnosis and treatment have an underlying scientific basis	• understand that some holistic medical diagnosis and treatment have an underlying scientific basis	
• understand that medicine and new treatments are constantly being developed including significant advances by Australians	• understand that medicine and new treatments are constantly being developed including significant advances by Australians	• understand that medicine and new treatments are constantly being developed including significant advances by Australians
• use science inquiry skills to conduct and communicate investigations into the review of medical imaging, such as MRI and PET scan films	• use science inquiry skills to design, conduct, evaluate and communicate investigations into the review of medical imaging, such as MRI and PET scan films	• use science inquiry skills to conduct investigations

A Course	T Course	M Course
• compare the variety of medical isotopes and their use in the diagnosis and treatment of diseases	• evaluate, with reference to empirical evidence, the variety of medical isotopes and their use in the diagnosis and treatment of diseases	
• communicate human biological understanding using qualitative representations in appropriate modes and genres	• communicate human biological understanding using qualitative and quantitative representations in appropriate modes and genres	• communicate human biological understanding in a straightforward way

Content Descriptions

A Course	T Course	M Course
Science Inquiry Skills		
• identify and research questions for investigation; propose hypotheses; and predict possible outcomes	• identify, research and refine questions for investigation; propose hypotheses; and predict possible outcomes	• use data to respond to questions
• design investigations, including the procedure/s to be followed, the materials required, conduct risk assessments; and consider research ethics	• design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics	• follow instructions to conduct practicals
• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations, including monitoring body functions; using microscopy techniques; and performing dissections safely, competently and methodically for the collection of valid and reliable data	• conduct investigations safely, competently and methodically
• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships to make conclusions	• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions	• represent data
• interpret selected scientific and media texts, and evaluate claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• view selected scientific and media texts

A Course	T Course	M Course
• select and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate understanding, solve problems and make predictions	• select, construct and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate conceptual understanding, solve problems and make predictions	• use appropriate representations including labelled diagrams and images of various cells, tissues, to aid understanding
• communicate to a general audience using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to a general audience using appropriate language, about the topic
Science as a Human Endeavour		
• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise
• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of models requires a range of evidence
• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas
• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	
• the use of scientific knowledge may have beneficial and/or unintended consequences	• the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences	• the use of scientific knowledge may have beneficial or unintended consequences
• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	
Science Understanding		
• different cultures may have different belief system about the causes, diagnosis and treatment of illnesses	• different cultures may have different belief system about the causes, diagnosis and treatment of illnesses	• different cultures may have different belief system about the causes, diagnosis and treatment of illnesses

A Course	T Course	M Course
• the validity of ascribing causes to disease and the efficacy of treatments can be tested using the scientific method	• the validity of ascribing causes to disease and the efficacy of treatments can be tested using the scientific method	
• a range of non-invasive techniques are available to detect medical issues, including X-rays, CT scanning, PET scanning, ultrasound and MRI	• a range of non-invasive techniques are available to detect medical issues, including X-rays, CT scanning, PET scanning, ultrasound and MRI	• range of non-invasive techniques are available to detect medical issues
• invasive techniques are required for diagnosis under certain conditions	• invasive techniques are required for diagnosis under certain conditions	• invasive techniques are required for diagnosis under certain conditions
• blood tests, with the analysis of cells and chemicals, can be used to determine particular conditions	• blood tests, with the analysis of cells and chemicals, can be used to determine particular conditions	• blood tests can be used to determine particular conditions
• faecal samples help diagnose conditions of the digestive tract whereas urinalysis is used to monitor infections in the excretory and circulatory system	• faecal samples help diagnose conditions of the digestive tract whereas urinalysis is used to monitor infections in the excretory and circulatory system	• faecal samples and urinalysis help diagnose some conditions
• continued technological advances resulting in new treatments for a range of medical conditions (for example nanosurgery for brain tumours and stentrodes for mind-body control in paralysed patients)		• continued technological advances resulting in new treatments for a range of medical conditions
• nuclear medicine encompasses the use of radio isotopes for both diagnostic and treatment purposes (for example, Technetium-99, Iodine-101, Chromium-51)	• nuclear medicine encompasses the use of radio isotopes for both diagnostic and treatment purposes (for example, Technetium-99, Iodine-101, Chromium-51)	• nuclear medicine encompasses the use of radio isotopes for both diagnostic and treatment purposes
• treatments of illness and disease can have unintended negative long-term impacts (e.g. antibiotic resistance, thalidomide)	• treatments of illness and disease can have unintended negative long-term impacts (e.g. antibiotic resistance, thalidomide)	
• humans have long used biotechnology for a number of purposes such as food processing and preservation	• humans have long used biotechnology for a number of purposes such as food processing and preservation	• humans have long used biotechnology for a number of purposes such as food processing and preservation
• modern biotechnology provides a range of new developments around health care products and vaccines	• modern biotechnology provides a range of new developments around health care products, genetic testing and treatments and vaccines	• modern biotechnology provides a range of new developments around health care
• ethical issues arise as a result of the use of new technologies (for example, robots for patient care genome testing, gene editing and 3-D printing of body parts)	• ethical issues arise as a result of the use of new technologies (for example, robots for patient care genome testing, gene editing and 3-D printing of body parts)	

A guide to reading and implementing content descriptions

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions. The lens which the teacher uses to demonstrate the content descriptions may be either guided through provision of electives within each unit or determined by the teacher when developing their program of learning.

A program of learning is what a college provides to implement the course for a subject. It is at the discretion of the teacher to emphasis some content descriptions over others. The teacher may teach additional (not listed) content provided it meets the specific unit goals. This will be informed by the student needs and interests.

Assessment

Refer to pages 13-15.

Independent Study — Value 1.0

Independent Study a — **Value 0.5**

Independent Study b — **Value 0.5**

Prerequisites

Independent Study units are only available to individual students in Year 12. A student can only study a maximum of one Independent Study unit in each course. Students must have studied at least three standard 1.0 units from this course. An Independent Study unit requires the principal's written approval. Principal approval can also be sought by a student in Year 12 to enrol concurrently in an Independent Study unit and their third or fourth 1.0 unit in this course of study.

Unit Description

An Independent Study unit has an important place in senior secondary courses. It is a valuable pedagogical approach that empowers students to make decisions about their own learning. An Independent Study unit can be proposed by an individual student for their own independent study and negotiated with their teacher. The program of learning for an Independent Study unit must meet the unit goals and content descriptions as they appear in the course.

Specific Unit Goals

This unit should enable students to:

A Course	T Course	M Course
• analyse and evaluate and apply ideas, methodologies, concepts, issues and knowledge to formulate an investigation	• analyse and evaluate and apply ideas, methodologies, concepts, issues and knowledge to formulate an investigation	
• use science inquiry skills to conduct and communicate an investigation	• use science inquiry skills to conduct and communicate an investigation	• use science inquiry skills to conduct and communicate an investigation
• apply ethical frameworks that underpin science inquiry	• apply ethical frameworks that underpin science inquiry	
• reflect on the learning process	• reflect on the learning process	• reflect on the learning process
• demonstrate interpersonal and communication skills	• demonstrate interpersonal and communication skills	

Content Descriptions

All knowledge, understanding and skills below must be delivered:

A Course	T Course	M Course
Science Inquiry Skills		
• identify and research questions for investigation; propose hypotheses; and predict possible outcomes	• identify, research and refine questions for investigation; propose hypotheses; and predict possible outcomes	• use data to respond to questions

A Course	T Course	M Course
• design investigations, including the procedure/s to be followed, the materials required, conduct risk assessments; and consider research ethics	• design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics	• follow instructions to conduct practicals
• conduct investigations, safely, competently and methodically for the collection of valid and reliable data	• conduct investigations, safely, competently and methodically for the collection of valid and reliable data	• conduct investigations safely, competently and methodically
• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships to make conclusions	• represent data in meaningful and useful ways; organise and process data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions	• represent data
• interpret selected scientific and media texts, and evaluate claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	• view selected scientific and media texts
• select and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate understanding, solve problems and make predictions	• select, construct and use appropriate representations including labelled diagrams and images of various cells, tissues, to communicate conceptual understanding, solve problems and make predictions	• use appropriate representations including labelled diagrams and images of various cells, tissues, to aid understanding
• communicate to a general audience using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to a general audience using appropriate language, about the topic
Science as a Human Endeavour		
• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility	• science is a global enterprise

A Course	T Course	M Course
• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines	• development of models requires a range of evidence
• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas of science, technology and engineering	• advances in science understanding in one field can influence other areas
• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	• the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations	
• the use of scientific knowledge may have beneficial and/or unintended consequences	• the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences	• the use of scientific knowledge may have beneficial or unintended consequences
• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions	• scientific knowledge can enable scientists to offer valid explanations and make reliable predictions
• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	• scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability	
Science Understanding		
• negotiate with the teacher to identify a focus and formulate an inquiry program	• negotiate with the teacher to identify a focus and formulate an inquiry program	• negotiate with the teacher to identify a focus and formulate an inquiry program
• analyse theories, themes, models, researchers, ideas or issues informing the inquiry	• evaluate theories, themes, models, researchers, ideas or issues informing the inquiry	• discuss ideas or issues informing the inquiry
• reflect on learning, progress and apply feedback given throughout the inquiry process	• reflect on learning, progress and apply feedback given throughout the inquiry process	• reflect on learning
• select appropriate modes of communicating the inquiry and key findings	• evaluate and select appropriate modes of communicating the inquiry and key findings	• communicate findings

A guide to reading and implementing content descriptions

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions. The lens which the teacher uses to demonstrate the content descriptions may be either guided through provision of electives within each unit or determined by the teacher when developing their program of learning.

A program of learning is what a college provides to implement the course for a subject. It is at the discretion of the teacher to emphasis some content descriptions over others. The teacher may teach additional (not listed) content provided it meets the specific unit goals. This will be informed by the student needs and interests.

Assessment

Refer to pages 13-15.

Appendix A – Implementation Guidelines

Available course patterns

A standard 1.0 value unit is delivered over at least 55 hours. To be awarded a course, students must complete at least the minimum units over the whole minor, major, major/minor or double major course.

Course	Number of standard units to meet course requirements
Minor	Minimum of 2 units
Major	Minimum of 3.5 units

Units in this course can be delivered in any order.

Prerequisites for the course or units within the course

Students must have studied at least three standard 1.0 units from this course in order to access the Independent Study unit. An Independent Study unit requires the principal's written approval. Principal approval can also be sought by a student in Year 12 to enrol concurrently in an Independent Study unit and their third or fourth 1.0 unit in this course of study.

Arrangements for students continuing study in this course

Students who have completed a minor in their existing NARC Human Biology Type 1 course may study units in the Human Biology A/T/M Course providing that there is no duplication of content.

Duplication of Content Rules

Students cannot be given credit towards the requirements for a Senior Secondary Certificate for a unit that significantly duplicates content in a unit studied in another course. The responsibility for preventing undesirable overlap of content studied by a student, rests with the principal and the teacher delivering the course. Students will only be given credit for covering the content once.

Duplication of Units

Growth of Humans and Modern Medicine are variations of combinations of 0.5 units, Embryonic Development of tissue, Study of Human Tissue, Human Reproduction, Illness and Age, Environmental Health, Mental Health, Diagnosis and Treatment, Cutting Edge Medicine.

Units from other courses

No units from other courses can be included in this Human Biology course.

Relationship to other courses

Nil.

Guidelines for Delivery

Program of Learning

A program of learning is what a school provides to implement the course for a subject. This meets the requirements for context, scope and sequence set out in the Board endorsed course. Students follow programs of learning in a college as part of their senior secondary studies. The detail, design and layout of a program of learning are a college decision.

The program of learning must be documented to show the planned learning activities and experiences that meet the needs of particular groups of students, taking into account their interests, prior knowledge, abilities and backgrounds. The program of learning is a record of the learning experiences that enable students to achieve the knowledge, understanding and skills of the content descriptions. There is no requirement to submit a program of learning to the OBSSS for approval. The Principal will need to sign off at the end of Year 12 that courses have been delivered as accredited.

Content Descriptions

Are all content descriptions of equal importance? No. It depends on the focus of study. Teachers can customise their program of learning to meet their own students' needs, adding additional content descriptions if desired or emphasising some over others. A teacher must balance student needs with their responsibility to teach all content descriptions. It is mandatory that teachers address all content descriptions and that students engage with all content descriptions.

Half standard 0.5 units

Half standard units appear on the course adoption form but are not explicitly documented in courses. It is at the discretion of the college principal to split a standard 1.0 unit into two half standard 0.5 units. Colleges are required to adopt the half standard 0.5 units. However, colleges are not required to submit explicit documentation outlining their half standard 0.5 units to the BSSS. Colleges must assess students using the half standard 0.5 assessment task weightings outlined in the framework. It is the responsibility of the college principal to ensure that all content is delivered in units approved by the Board.

Moderation

Moderation is a system designed and implemented to:

- provide comparability in the system of school-based assessment
- form the basis for valid and reliable assessment in senior secondary schools
- involve the ACT Board of Senior Secondary Studies and colleges in cooperation and partnership
- maintain the quality of school-based assessment and the credibility, validity and acceptability of Board certificates.

Moderation commences within individual colleges. Teachers develop assessment programs and instruments, apply assessment criteria, and allocate Unit Grades, according to the relevant Course Framework. Teachers within course teaching groups conduct consensus discussions to moderate marking or grading of individual assessment instruments and unit grade decisions.

The Moderation Model

Moderation within the ACT encompasses structured, consensus-based peer review of Unit Grades for all accredited courses over two Moderation Days. In addition to Moderation Days, there is statistical moderation of course scores, including small group procedures, for T courses.

Moderation by Structured, Consensus-based Peer Review

Consensus-based peer review involves the review of student work against system wide criteria and standards and the validation of Unit Grades. This is done by matching student performance with the criteria and standards outlined in the Achievement Standards, as stated in the Framework. Advice is then given to colleges to assist teachers with, or confirm, their judgments. In addition, feedback is given on the construction of assessment instruments.

Preparation for Structured, Consensus-based Peer Review

Each year, teachers of Year 11 are asked to retain originals or copies of student work completed in Semester 2. Similarly, teachers of a Year 12 class should retain originals or copies of student work completed in Semester 1. Assessment and other documentation required by the Office of the Board of Senior Secondary Studies should also be kept. Year 11 work from Semester 2 of the previous year is presented for review at Moderation Day 1 in March, and Year 12 work from Semester 1 is presented for review at Moderation Day 2 in August.

In the lead up to Moderation Day, a College Course Presentation (comprised of a document folder and a set of student portfolios) is prepared for each A, T and M course/units offered by the school and is sent into the Office of the Board of Senior Secondary Studies.

The College Course Presentation

The package of materials (College Course Presentation) presented by a college for review on Moderation Days in each course area will comprise the following:

- a folder containing supporting documentation as requested by the Office of the Board through memoranda to colleges, including marking schemes and rubrics for each assessment item
- a set of student portfolios containing marked and/or graded written and non-written assessment responses and completed criteria and standards feedback forms. Evidence of all assessment responses on which the Unit Grade decision has been made is to be included in the student review portfolios.

Specific requirements for subject areas and types of evidence to be presented for each Moderation Day will be outlined by the Board Secretariat through the *Requirements for Moderation Memoranda* and Information Papers.

Visual evidence for judgements made about practical performances

It is a requirement that schools' judgements of standards to practical performances (A-T-M) be supported by visual evidence (still photos or video).

The photographic evidence submitted must be drawn from practical skills performed as part of the assessment process.

Teachers should consult the BSSS website for current information regarding all moderation requirements including subject specific and photographic evidence.

Appendix B – Course Developers

Name	College
Dinu Chellakudam	Narrabundah College
Joan Knowles	Narrabundah College
Cate Rosier	Narrabundah College
Bongiwe Tabi	Narrabundah College

Appendix C – Common Curriculum Elements

Common curriculum elements assist in the development of high-quality assessment tasks by encouraging breadth and depth and discrimination in levels of achievement.

Organisers	Elements	Examples
create, compose and apply	apply	ideas and procedures in unfamiliar situations, content and processes in non-routine settings
	compose	oral, written and multimodal texts, music, visual images, responses to complex topics, new outcomes
	represent	images, symbols or signs
	create	creative thinking to identify areas for change, growth and innovation, recognise opportunities, experiment to achieve innovative solutions, construct objects, imagine alternatives
	manipulate	images, text, data, points of view
analyse, synthesise and evaluate	justify	arguments, points of view, phenomena, choices
	hypothesise	statement/theory that can be tested by data
	extrapolate	trends, cause/effect, impact of a decision
	predict	data, trends, inferences
	evaluate	text, images, points of view, solutions, phenomenon, graphics
	test	validity of assumptions, ideas, procedures, strategies
	argue	trends, cause/effect, strengths and weaknesses
	reflect	on strengths and weaknesses
	synthesise	data and knowledge, points of view from several sources
	analyse	text, images, graphs, data, points of view
	examine	data, visual images, arguments, points of view
	investigate	issues, problems
organise, sequence and explain	sequence	text, data, relationships, arguments, patterns
	visualise	trends, futures, patterns, cause and effect
	compare/contrast	data, visual images, arguments, points of view
	discuss	issues, data, relationships, choices/options
	interpret	symbols, text, images, graphs
	explain	explicit/implicit assumptions, bias, themes/arguments, cause/effect, strengths/weaknesses
	translate	data, visual images, arguments, points of view
	assess	probabilities, choices/options
	select	main points, words, ideas in text
identify, summarise and plan	reproduce	information, data, words, images, graphics
	respond	data, visual images, arguments, points of view
	relate	events, processes, situations
	demonstrate	probabilities, choices/options
	describe	data, visual images, arguments, points of view
	plan	strategies, ideas in text, arguments
	classify	information, data, words, images
	identify	spatial relationships, patterns, interrelationships
	summarise	main points, words, ideas in text, review, draft and edit

Appendix D – Glossary of Verbs

Verbs	Definition
Analyse	Consider in detail for the purpose of finding meaning or relationships, and identifying patterns, similarities and differences
Apply	Use, utilise or employ in a particular situation
Argue	Give reasons for or against something
Assess	Make a judgement about the value of
Classify	Arrange into named categories in order to sort, group or identify
Compare	Estimate, measure or note how things are similar or dissimilar
Compose	The activity that occurs when students produce written, spoken, or visual texts
Contrast	Compare in such a way as to emphasise differences
Create	Bring into existence, to originate
Critically analyse	Analysis that engages with criticism and existing debate on the issue
Demonstrate	Give a practical exhibition an explanation
Describe	Give an account of characteristics or features
Discuss	Talk or write about a topic, taking into account different issues or ideas
Evaluate	Examine and judge the merit or significance of something
Examine	Determine the nature or condition of
Explain	Provide additional information that demonstrates understanding of reasoning and /or application
Extrapolate	Infer from what is known
Hypothesise	Put forward a supposition or conjecture to account for certain facts and used as a basis for further investigation by which it may be proved or disproved
Identify	Recognise and name
Interpret	Draw meaning from
Investigate	Planning, inquiry into and drawing conclusions about
Justify	Show how argument or conclusion is right or reasonable
Manipulate	Adapt or change
Plan	Strategize, develop a series of steps, processes
Predict	Suggest what might happen in the future or as a consequence of something
Reflect	The thought process by which students develop an understanding and appreciation of their own learning. This process draws on both cognitive and affective experience
Relate	Tell or report about happenings, events or circumstances
Represent	Use words, images, symbols or signs to convey meaning
Reproduce	Copy or make close imitation
Respond	React to a person or text
Select	Choose in preference to another or others
Sequence	Arrange in order
Summarise	Give a brief statement of the main points
Synthesise	Combine elements (information/ideas/components) into a coherent whole
Test	Examine qualities or abilities
Translate	Express in another language or form, or in simpler terms
Visualise	The ability to decode, interpret, create, question, challenge and evaluate texts that communicate with visual images as well as, or rather than, words

Appendix E – Glossary for ACT Senior Secondary Curriculum

Courses will detail what teachers are expected to teach and students are expected to learn for year 11 and 12. They will describe the knowledge, understanding and skills that students will be expected to develop for each learning area across the years of schooling.

Learning areas are broad areas of the curriculum, including English, mathematics, science, the arts, languages, health and physical education.

A **subject** is a discrete area of study that is part of a learning area. There may be one or more subjects in a single learning area.

Frameworks are system documents for Years 11 and 12 which provide the basis for the development and accreditation of any course within a designated learning area. In addition, frameworks provide a common basis for assessment, moderation and reporting of student outcomes in courses based on the framework.

The **course** sets out the requirements for the implementation of a subject. Key elements of a course include the rationale, goals, content descriptions, assessment, and achievement standards as designated by the framework.

BSSS courses will be organised into units. A unit is a distinct focus of study within a course. A standard 1.0 unit is delivered for a minimum of 55 hours generally over one semester.

Core units are foundational units that provide students with the breadth of the subject.

Additional units are avenues of learning that cannot be provided for within the four core 1.0 standard units by an adjustment to the program of learning.

An **Independent Study unit** is a pedagogical approach that empowers students to make decisions about their own learning. Independent Study units can be proposed by a student and negotiated with their teacher but must meet the specific unit goals and content descriptions as they appear in the course.

An **elective** is a lens for demonstrating the content descriptions within a standard 1.0 or half standard 0.5 unit.

A **lens** is a particular focus or viewpoint within a broader study.

Content descriptions refer to the subject-based knowledge, understanding and skills to be taught and learned.

A **program of learning** is what a college develops to implement the course for a subject and to ensure that the content descriptions are taught and learned.

Achievement standards provide an indication of typical performance at five different levels (corresponding to grades A to E) following completion of study of senior secondary course content for units in a subject.

ACT senior secondary system **curriculum** comprises all BSSS approved courses of study.

Appendix F – Course Adoption

Conditions of Adoption

The course and units of this course are consistent with the philosophy and goals of the college and the adopting college has the human and physical resources to implement the course.

Adoption Process

Course adoption must be initiated electronically by an email from the principal or their nominated delegate to bssscertification@ed.act.edu.au. A nominated delegate must CC the principal.

The email will include the **Conditions of Adoption** statement above, and the table below adding the **College** name, and circling the **Classification/s** required.

College:	
Course Title:	Human Biology
Classification/s:	A T M
Accredited from:	2017
Framework:	Science