



Area of Study

Science

2019 Handbook

Contents

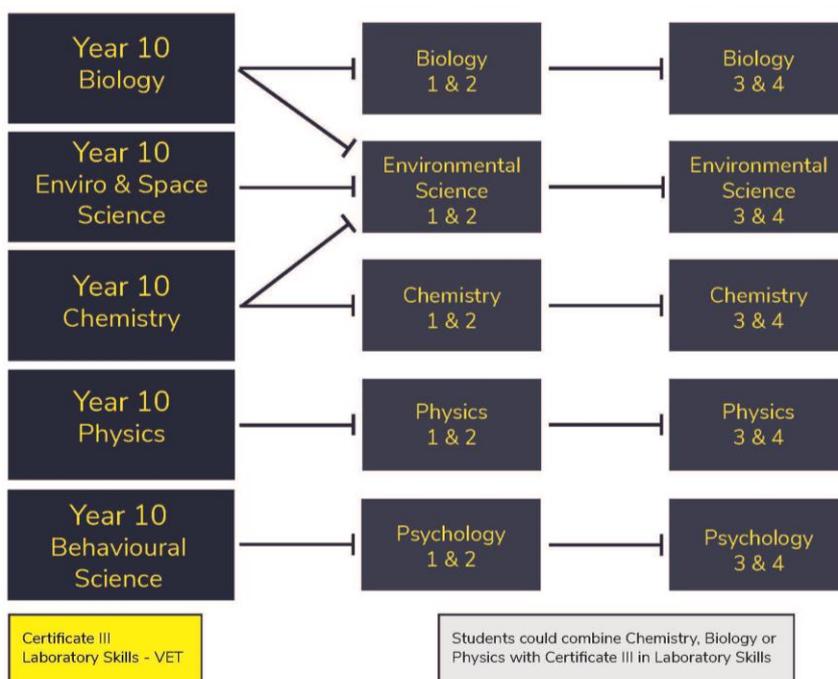
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Why Study Science

Studying Science promotes a greater understanding of the world around you as you explore the impacts of scientific knowledge on society. It also creates growth in a range of skills including:

- Literacy
- Numeracy
- Problem solving
- Communication
- Time management
- Questioning and critical thinking
- Practical skills

Pathways



Year 10 Curriculum

Science – Behavioural Science

Semester: Semester 1 or 2
Teacher: Mrs Williams or Mrs Bormanis

Recommended Previous Studies:

Successful completion of Year 9 Science is required.

Course Content:

- How the nervous system functions including the structure of the brain and how it works
- How research into conditions and diseases of the brain and nervous system impact society
- Ethical considerations of scientific research
- Why people behave the way they do

In this subject, students will study the structure and function of the brain and nervous system. They will also investigate injuries, conditions and diseases of the brain and nervous system using case studies and profiles.

An understanding of human behaviours will be gained through learning and applying scientific research methods in a student designed investigation.

Review of past studies such as Milgram's research into obedience to authority and Zimbardo's Stanford prison experiment in the context of ethical guidelines that govern psychologists' research / experiments today.

Students will have the opportunity to engage in practical activities and research in this course which are designed to complement the theory covered in the classroom.

Assessed Coursework:

Assessment in this subject will include:

- Topic tests
- Practical Reports
- Research tasks
- Student Designed Investigation

Where does Behavioural Science lead to?

Behavioural Science provides a foundation for VCE Units 1-4 Psychology. Students who enjoy this subject should also consider studying, Biology and Health and Human Development.

Science - Biology

Semester: Semester 1 or 2
Teacher: Ms Swazbrick or Mrs Williams

Recommended Previous Studies:

Successful completion of Year 9 Science is required.

Course Content:

Ever wondered why you have your father's eyes but your mother's hair colour?

This Unit introduces students to the role of DNA and genetics in the inheritance of our physical characteristics. Students will explore how our physical traits are passed from parent to offspring, learn about the patterns of this inheritance and investigate the risks of genetic abnormalities in babies. This then leads to the theory of evolution by natural selection, where students investigate the diversity of living things and interpret a range of scientific evidence of evolution.

This is a practical based unit, incorporating laboratory work and field work.

Assessed Coursework:

Assessment in this subject will include:

- Topic tests
- Practical reports
- Research tasks

Where does Year 10 Biology lead to?

Year 10 Biology provides a foundation for VCE Units 1-4 Biology. Students who enjoy Biology should also consider studying Health and Human Development, Physical Education, Psychology, Environmental Science, VET Allied Health or VET Laboratory Skills.

Science - Chemistry

Semester: Semester 1 or 2
Teacher: Ms Sutton or Ms McAllister

Recommended Previous Studies:

Successful completion of Year 9 Science is required.

Course Content:

This Unit introduces students to the elements of the Periodic Table and how they are organised. Students will explore the physical structure and chemical properties of these elements, learn about the types of reactions that can occur, what will affect these reactions and the impact that they may have on the environment.

Students will have the opportunity to engage in practical activities designed to complement the theory covered in the class room and will enable them to practise the skill of experimental report writing.

Assessed Coursework:

Assessment in this subject will include:

- Topic Tests
- Practical Reports
- Exam

Where does Year 10 Chemistry lead to?

Year 10 Chemistry provides a foundation for VCE Units 1-4 Chemistry and Environmental Science. Students who enjoy Chemistry should also consider studying Environmental Science or VET Laboratory Skills.

Science – Enviro and Space Science

Semester: Semester 1 or 2

Teacher: Mrs Williams

Recommended Previous Studies:

Successful completion of Year 9 Science is required.

Course Content:

- What factors are needed to support life in an ecosystem?
- How does the carbon cycle impact life on earth?
- Where else in the universe could humans survive?

This unit combines various Science disciplines as it looks at how life is sustained, both on Earth and beyond.

The features of our universe are explored in this unit including galaxies, stars, and solar systems. The big bang theory is investigated and students use their knowledge of what sustains life on earth to explore the possibilities of life in space.

Students investigate the cycling of key elements that help sustain life, and plan and conduct a fieldwork study in a local ecosystem. This study will investigate the role that abiotic factors such as air, soil and water play in the functioning of an ecosystem.

Students will have the opportunity to engage in practical activities and fieldwork in this course which are designed to complement the theory and research tasks covered in the class room.

Assessed Coursework:

Assessment in this subject will include:

- Topic tests
- Practical Reports
- Fieldwork investigation
- Research tasks

Where does Environmental and Space science lead to?

Environmental and Space Science provides a foundation for VCE Units 1-4 Environmental Science. Students who enjoy this subject should also consider studying Chemistry, Biology or VET Laboratory Skills.

Science - Physics

Semester: Semester 1 or 2

Teacher: Mr Judd

Recommended Previous Studies:

Successful completion of Year 9 Science is required.

Course Content:

- How do electrical circuits work?
- The measurement of motion
- Energy conversions

In this unit students will study series and parallel circuits and investigate a range of different electrical components. Students will complete a practical investigation on Ohm's Law and examine the safety features of household electrical circuits.

Newton's laws of Motion are studied, where students derive motion equations by producing and analysing motion graphs. Motion software is used to analyse video recorded motion and to design a practical investigation.

Energy conversions will also be explored in this subject including gravitational, kinetic, potential and elastic energy.

Students will have the opportunity to engage in practical activities and research in this course which are designed to complement the theory covered in the classroom.

Assessed Coursework:

Assessment in this subject will include:

- Topic tests
- Practical reports
- Research tasks

Where does Year 10 Physics lead to?

Year 10 Physics provides a foundation for VCE Units 1-4 Physics. Students who enjoy Physics should also consider studying Mathematical Methods, Specialist Mathematics, Chemistry, Systems Engineering, VET Electro Technology or VET Engineering.

VCE Curriculum

Biology Unit 1

Semester: Semester 1
Teacher: Mr Rathbone, or Mrs Swasbrick

Recommended Previous Studies:

Successful completion of Biology at Year 10 is recommended.

Course Content:

This unit examines the challenges to an organism in sustaining life. Students investigate cells, energy transformations and functioning systems. They will also study biodiversity and the structure of the ecosystem.

Students will also design and undertake an investigation related to the survival of an organism or species, and draw conclusions based on evidence from collected data.

Assessed Coursework

- Laboratory journal
- Topic tests
- Exam
- Bioinformatics exercise
- Field work activities
- Student designed investigation

Biology Unit 2

Semester: Semester 2
Teacher: Mr Rathbone, or Mrs Swasbrick

Recommended Previous Studies:

Successful completion of VCE Biology Unit 1 is recommended.

Course Content:

In this unit students focus on cell reproduction and the transmission of biological information from generation to generation. They will investigate DNA, the role of stem cells in the growth and repair of humans and their potential use in medical therapies. Students will also use classical genetics to investigate the inheritance of characteristics through the generations. Social and ethical issues associated with gene screening will be examined. A student-directed investigation into an issue related to reproduction science and/or inheritance will be undertaken.

Assessed Coursework

- Laboratory journal
- Topic tests
- Exam
- Bioinformatics exercise
- Field work activities
- Student directed investigation of an issue

Biology Units 3 & 4

Semester: Semesters 1 & 2
Teacher: Mr Rathbone or Mrs Swasbrick

Recommended Previous Studies:

Successful completion of VCE Biology Units 1 & 2 is recommended.

Course Content:

Unit 3 - How do cells maintain life?

In this unit students investigate the workings of the cell from several perspectives. Students examine the key molecules and biochemical pathways involved in cellular processes both within the cell and between cells. At this molecular level students study the human immune system and the interactions between its components to provide immunity to a specific antigen.

Unit 4 – How does life change and respond to challenges over time?

In this unit students consider the continual change and challenges to which life on Earth has been subjected. They examine change in life forms, explore the human fossil record, investigate the relatedness between species and consider the impact of various change events on a population's gene pool. The biological consequences, and social and ethical implications, of manipulating the DNA molecule and applying biotechnologies are explored for both the individual and the species.

Student Investigation – A student investigation related to biological change and/or continuity is undertaken in either Unit 3 or Unit 4, or across both Unit 3 and Unit 4. The findings of the investigation are presented in a scientific poster format.

Assessed Coursework:

The Victorian Curriculum and Assessment Authority will supervise the assessment of all students undertaking Units 3 and 4. In the study of VCE Biology the student's level of achievement will be determined by School-assessed Coursework as specified in the VCE Biology study design and external assessment.

Percentage contributions to the study score in VCE Biology are as follows:

- Unit 3 School-assessed Coursework: 16 per cent
- Unit 4 School-assessed Coursework: 24 per cent
- End-of-year examination: 60 per cent.

Chemistry Unit 1

Semester: Semester 1
Teacher: Ms Sutton or Ms McAllister

Recommended Previous Studies:

Successful completion of Year 10 Chemistry and Year 10 Introduction to Maths Methods is recommended.

Course Content:

This unit begins with analysing the trends of the periodic table and using these to explain the properties of matter. The role of mathematics in chemistry is highlighted with the introduction and application of the mole concept. The diversity of materials is explained using the structure and properties of metals, ionic compounds and molecular substances. Organic chemistry is introduced in this Unit.

Assessment Procedures:

In Chemistry Unit 1, student progress will be monitored and assessed through the use of:

- Topic tests
- Research tasks / poster presentation
- Practical report
- An examination

Additional Information:

It is strongly recommended that Chemistry be studied as a Unit 1 and 2 sequence, and that Unit 1 and 2 be completed before attempting the Unit 3 and 4 sequence.

Chemistry Unit 2

Semester: Semester 2
Teacher: Ms Sutton or Ms McAllister

Recommended Previous Studies:

Successful completion of VCE Chemistry Unit 1 is recommended.

Course Content:

This unit focuses on the unique properties of water and how substances interact with it. Acid base reactions and redox reactions in water are investigated. Students are introduced to more complex chemical calculations as volumetric and instrumental techniques are introduced to qualitatively and quantitatively measure and analyse substances in water.

Assessed Coursework:

In Chemistry Unit 2, student progress will be monitored and assessed through the use of:

- Topic tests
- Practical report
- An extended practical investigation / poster presentation
- An examination

Additional Information:

It is strongly recommended that Chemistry be studied as a Unit 1 and 2 sequence, and that Units 1 and 2 be completed before attempting the Unit 3 and 4 sequence.

Chemistry Units 3 & 4

Semester: Semesters 1 & 2

Teacher: Ms Sutton

Recommended Previous Studies:

Successful completion of VCE Chemistry Units 1 & 2 and Mathematical Methods Units 1 & 2 is recommended.

Course Content:

Students will continue to develop their understanding and use of the language and mathematics of Chemistry. Complex chemical calculations are a major component of this course.

Unit 3: Students compare fuels quantitatively and evaluate energy resources. Knowledge of the electrochemical series is used to design, construct and test galvanic cells. Reaction rate and equilibrium principles predict how the rate and extent of reactions can be optimised.

Unit 4: Students investigate the structural features, bonding, typical reactions and uses of the major families of organic compounds including those found in food. They process data from instrumental analyses of organic compounds to confirm or deduce organic structures. Volumetric analyses are used to determine the concentration of organic chemicals in mixtures.

Assessed Coursework:

Unit 3, student progress will be monitored and assessed through:

- Student-designed Investigation
- Practical Report
- Test

Unit 4, student progress will be monitored and assessed through:

- Structured scientific poster
- Practical Report
- Test

Additional Information:

It is strongly recommended that Chemistry Unit 1 and 2 be completed before attempting the Unit 3 and 4 sequence.

Environmental Science Unit 1

Semester: Semester 1
Teacher: Mrs Williams

Recommended Previous Studies:

Successful completion of Year 10 Enviro and space science, or Year 10 Chemistry or Biology is recommended.

Course Content:

In this unit students examine Earth as a set of four interacting systems: the atmosphere, biosphere, hydrosphere and lithosphere. Students apply a systems perspective when exploring the physical requirements for life in terms of inputs and outputs, and consider the effects of natural and human-induced changes in ecosystems. They investigate the physical environment and its components, the function of local ecosystems and the interactions that occur in and between ecological components over different timescales. Students consider how the biotic and abiotic components of local ecosystems can be monitored and measured

Assessed Coursework:

In Environmental Science Unit 1, student progress will be monitored and assessed through the use of:

- Practical activities
- Topic tests
- Research reports
- Fieldwork and reports
- An examination

Environmental Science Unit 2

Semester: Semester 2
Teacher: Mrs Williams

Recommended Previous Studies:

Completion of VCE Unit 1 Environmental Science is recommended.

Course Content:

In this unit students explore the concept of pollution and associated impacts on Earth's four systems through global, national and local perspectives. They distinguish between wastes, contaminants and pollutants and examine the characteristics, measurement and management of pollution. They analyse the effects of pollutants on the health of humans and the environment over time. Students consider the rules for use, treatment and disposal of pollutants and evaluate the different perspectives of those who are affected by pollutants. They explore the significance of technology, government initiatives, communities and individuals in redressing the effects of pollutants, and consider how values, beliefs and evidence affect environmental decision making.

Assessed Coursework:

In Environmental Science Unit 2, student progress will be monitored and assessed through the use of:

- Practical activities
- Topic tests
- Research reports
- Fieldwork and reports
- An examination

Environmental Science Units 3 & 4

Semester: Semester 1 & 2

Teacher: Mrs Williams

Recommended Previous Studies:

Successful completion of VCE Environmental Science Units 1 & 2 is recommended.

Course Content:

In Unit 3, students focus on environmental management through the examination and application of sustainability principles. They explore the value and management of the biosphere by examining the concept of biodiversity and the services provided to all living things. They analyse the processes that threaten biodiversity and apply scientific principles in evaluating biodiversity management strategies for a selected threatened endemic species.

In Unit 4 students analyse the social and environmental impacts of energy production and use on society and the environment. They explore the complexities of interacting systems of water, air, land and living organisms that influence climate, focusing on both local and global scales, and consider long-term consequences of energy production and use. Students examine scientific concepts and principles associated with energy, compare efficiencies of the use of renewable and non-renewable energy resources, and consider how science can be used to reduce the impacts of energy production and use. They distinguish between natural and enhanced greenhouse effects and discuss their impacts on living things and the environment, including climate change.

Assessed Coursework:

In Environmental Science Units 3 & 4, student progress will be monitored and assessed through the use of:

- School Assessed Coursework (SACs) worth 50% of your study score which includes:
- An Extended Practical and/or Written Report
- A Written Response to an Issue
- An end-of-year examination worth 50% of your study score

Physics Units 1

Semester: Semester 1

Teacher: Mr Judd

Recommended Previous Studies:

Successful completion of Introduction to Methods & Physics at Year 10 is recommended.

Course Content:

The Unit 1 course poses the question: “What ideas explain the physical world?” This unit focuses upon the topics of “Thermodynamics and Climate Change”, “Electricity” and “Origins of the atom”. Students will apply thermodynamic principles to analyse, interpret and explain changes in thermal energy, and describe the environmental impact of human activities with reference to thermal effects and climate science concepts.

Students will investigate and apply a basic DC circuit model to simple battery-operated devices and household electrical systems, apply mathematical models to analyse circuits, and describe the safe and effective use of electricity by individuals and the community.

- Area of Study 1: How can thermal effects be explained?
- Area of Study 2: How do electric circuits work?
- Area of Study 3: What is matter and how is it formed?

Assessed Coursework:

In Physics Unit 1, student progress will be monitored and assessed through the use of:

- Topic tests
- Practical reports
- Research assignments
- An examination.

Physics Unit 2

Semester: Semester 2

Teacher: Mr Judd

Recommended Previous Studies:

Successful completion of VCE Physics Unit 1 is recommended.

Course Content:

The Unit 2 course poses the question: “What do experiments reveal about the physical world?” This unit focuses upon the topics of “Motion”, “Student Options” and “Practical Investigation”.

Students will be able to investigate, analyse and mathematically model the motion of particles and bodies.

Students will choose a topic from twelve possible options for Area of Study 2. Each option is based on a different observation of the physical world.

Students will be able to design and undertake an investigation of a physics question related to the scientific inquiry processes of data collection and analysis, and draw conclusions based on evidence from collected data.

- Area of Study 1: How can motion be described and explained?
- Area of Study 2: Options
- Area of Study 3: Practical Investigation

Options(from): What are stars?, Beyond Earth’s Solar System, Forces on the human body, AC to DC conversion, Aerodynamics, Energy from the nucleus, Radiation and the human body, Particle accelerators, Light, Sound, Motion of ball sports & Electrical signals in the human body.

Assessed Coursework:

In Physics Unit 2, student progress will be monitored and assessed through the use of:

- Topic tests
- Student designed practical investigation
- Practical reports
- Research assignment
- An examination

Additional Information:

It is strongly recommended that Physics be studied as a Unit 1 & 2 sequence, and that Unit 1 & 2 be completed before attempting the Unit 3 & 4 sequence.

Physics Units 3 & 4

Semester: Semesters 1 & 2

Teacher: Mr Judd

Recommended Previous Studies:

Successful completion of VCE Physics Units 1 & 2 and VCE Mathematics Units 1 & 2 is highly recommended

Course Content:

Unit 3 poses the question: “How do fields explain motion and electricity?” In answering this focus question, students consider three additional questions:

- How do things move without contact?
- Students examine the similarities and differences between fields: gravitational, electric and magnetic.
- How are fields used to move electrical energy?
- Students use models of electricity and magnetism to explain how electricity is produced and delivered to homes.
- How fast can things go?
- Students study Newton’s laws of motion and Einstein’s theory of special relativity.

Unit 4 poses the question: “How can two contradictory models explain both light and matter?” In answering this focus question, student consider two additional questions:

How can waves explain the behaviour of light?

- Students examine wave theory to describe transfers of energy.
- How are light and matter similar?
- Students examine the development of theories to describe light and matter.

Students have to also undertake a student-designed practical investigation related to waves, fields or motion.

Assessed Coursework:

In these Units, student progress will be monitored and assessed through the use of:

- annotations of at least two practical activities from a practical logbook
- a report of a student investigation
- a report of a physics phenomenon
- data analysis
- media analysis/response
- design, building, testing and evaluation of a device or model
- an explanation of the operation of a device or model
- a proposed solution to a scientific or technological problem
- a response to structured questions
- a reflective learning journal or blog related to selected activities or in response to an issue
- a test (short answer and extended response)
- Students will also be required to sit a 2.5 hour end of year examination

Additional Information:

It is strongly recommended that Physics be studied as a Unit 1 and 2 sequence, and that Unit 1 and 2 be completed before attempting the Unit 3 and 4 sequence.

Psychology Unit 1

Semester: Semester 1
Teacher: Mrs Bormanis.

Recommended Previous Studies:

Successful completion of Year 10 Behavioural Science

Course Content:

The discipline of Psychology is introduced as the scientific study of behaviour and mental processes.

The three outcomes for this unit are:

- How does the brain function?
- What influences psychological development?
- Student-directed research investigation

Students learn about key science skills and how they are applied in psychological research, including adherence to prescribed ethical principles. They study the structure and function of the brain and nervous system, including neuronal functioning and brain plasticity, and psychological development, including attachment in infants, cognitive and psychosocial development across the lifespan, as well as mental health and mental disorders, with a focus on schizophrenia.

Assessed Coursework:

Assessment tasks contribute 60% towards the final grade, and may be selected from the following:

For Outcomes 1 and 2

- a report of a practical activity involving the collection of primary data
- a research investigation involving the collection of secondary data
- a brain structure modelling activity
- a logbook of practical activities
- analysis of data/results including generalisations/conclusions
- media analysis/response
- problem solving involving psychological concepts, skills and/or issues
- a test comprising multiple choice and/or short answer and/or extended response
- a reflective learning journal/blog related to selected activities or in response to an issue

For Outcome 3

- a report of an investigation into brain function and/or development that can be presented in various formats, for example digital presentation, oral presentation, or written report

A written examination contributes 40% towards the final grade for this unit

Psychology Unit 2

Semester: Semester 2
Teacher: Mrs Bormanis.

Recommended Previous Studies:

Successful completion of Unit 1 Psychology.

Course Content:

The three outcomes for this unit are:

- What influences a person's perception of the world?
- How are people influenced?
- Student-directed practical investigation

Students develop key science skills and how they are applied in psychological research, including adherence to prescribed ethical principles. The processes involved in sensation and perception are studied, in particular vision and taste, including the biological, psychological and social factors that impact on these senses. They are introduced to social psychology, focusing on social cognition and social influences on behaviour, including attributions, attitudes and stereotyping that may lead to prejudice and discrimination. Classic experiments on the effects of status and power, conformity and obedience on individual behaviour are studied, as well as factors that influence helping behaviour and bullying, including positive and negative effects of the media.

Assessed Coursework:

Assessment tasks contribute 60% towards the final grade, and may be selected from the following:

For Outcomes 1 and 2

- a report of a practical activity involving the collection of primary data
- a research investigation involving the collection of secondary data
- a logbook of practical activities
- analysis of data/results including generalisations/ conclusions
- media analysis/response
- problem solving involving psychological concepts, skills and/or issues
- a test comprising multiple choice and/or short answer and/or extended response
- a reflective learning journal/blog related to selected activities or in response to an issue

For Outcome 3

- a report of an investigation into internal and/or external influences on behaviour that can be presented in various formats, for example digital presentation, oral presentation, scientific poster or written report

A written examination contributes 40% towards the final grade for this unit.

Psychology Units 3 & 4

Semester: Semesters 1 & 2

Teacher: Mrs Bormanis.

Recommended Previous Studies:

Completion of VCE Psychology Units 1 and/or 2 is HIGHLY recommended.

Course Content:

The outcomes for Unit 3 are:

- How does the nervous system enable psychological functioning?
- How do people learn and remember?

The outcomes for Unit 4 are:

- How do levels of consciousness affect mental processes and behaviour?
- What influences mental wellbeing?
- Practical investigation

Key science skills in the conducting of research, analysing and interpreting data, and reporting findings are developed; ethical standards and guidelines are integrated throughout the course. These Units of Psychology focus on the following areas: structure and function of the human nervous system; learning and memory.

Unit 3: Students learn about the various divisions of the nervous system and their role in responding to, processing and integrating information, the role of the neuron and neurotransmitters in the functioning of the nervous system and the effects of interference to neurotransmitter function, illustrated by Parkinson's disease; also stress as a bio-psychological process, including models of stress and coping strategies. The neural basis of learning and memory is studied, followed by models to explain learning, and process and reliability of memory.

Unit 4: This unit addresses consciousness as a psychological construct, contrasting normal waking consciousness with altered states, including sleep. Mental health is studied with reference to factors that contribute to the development and progression of mental disorders and ethical implications of research into mental health. The bio-psychosocial framework is applied to explain specific phobia and its management. A practical investigation on a research topic related to mental processes and psychological functioning is undertaken, whereby students devise and conduct an experiment before analysing and evaluating the gathered data, and finally reporting their research on a scientific poster.

School-based assessment:

School Assessed Coursework for Units 3 and 4 contribute 40% to the Study Score.

Tasks may be selected from:

- annotations of at least two practical activities from a practical logbook
- evaluation of research
- a report of a student investigation
- media analysis/response
- a reflective blog/learning journal related to selected activities or in response to an issue
- a test

Compulsory task for Unit 4 - Outcome 3:

- a structured scientific poster according to the VCAA template

External assessment:

The level of achievement for Units 3 and 4 is also assessed by an end-of-year examination that contributes 60% to the final Study Score.