Lae International School

IEA

Student Handbook
Upper Secondary

Department of Education

BSSS
AUSTRALIAN CAPITAL TERRITORY

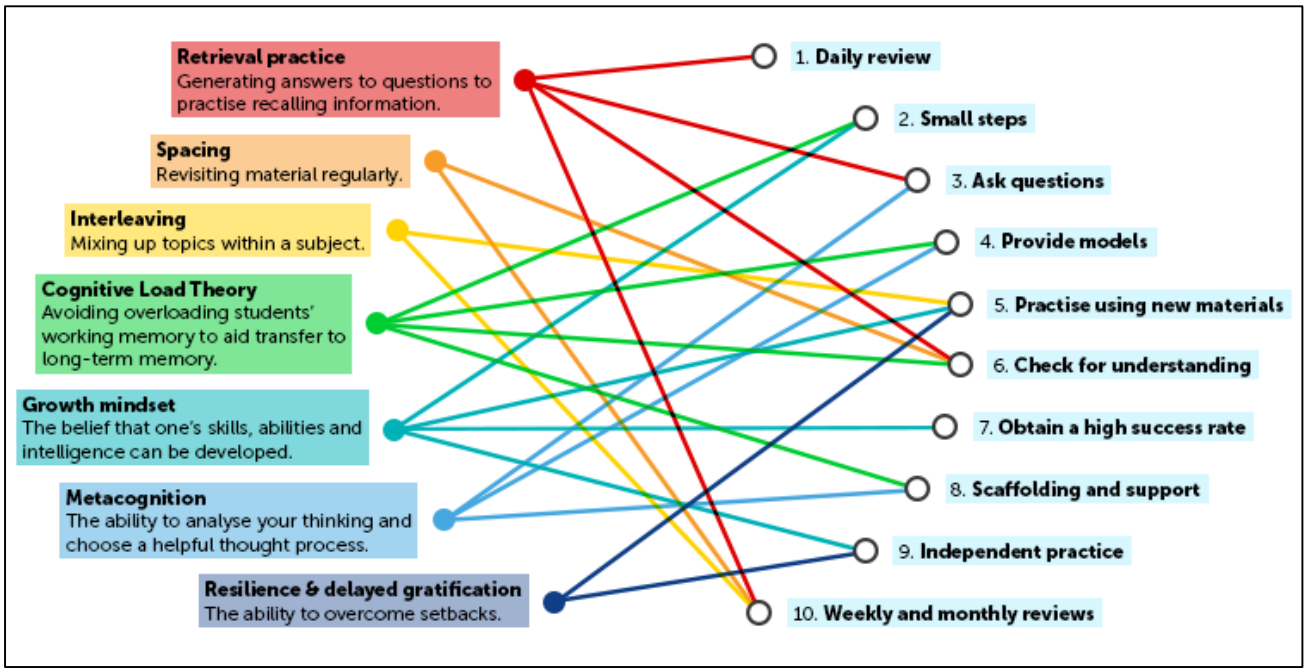
Contents

Aim and Purpose:

The purpose of this handbook is to provide an overview of the different courses covered within Grades 11 & 12 at Lae International School. The handbook also covers some important information regarding the assessment, homework, uniform, and behaviour expectations of the school.

At Lae International School we aim to ensure that all students reach their best potential. To do that we ensure that the delivery of subject content is founded in evidence and research. This handbook includes some further information regarding the psychology of learning and the latest research around methods that can support students in their development.

There are 10 principles of learning that underpin the quality teaching and learning that takes place in the school.



At Lae International School we use these principles of instructions to support the teaching and learning that happens during lessons.

Lae International School Quality Teaching Principles

Planning

- Draws on the teacher's excellent subject knowledge
- Predicts and addresses misconceptions
- Ensures learning sequences focus on depth of knowledge and application
- Ensures activities are carefully chosen to support learning
- Includes flexible planning of sequences, unrestrained by the duration of lessons to allow for responsive teaching
- Includes teaching key vocabulary through etymology, morphology and vocabulary in context
- Ensures teaching to the 'top' with effective scaffolds in place to enable lower attaining students to succeed
- Ensures students' needs are catered for through quality-first teaching using additional explanations, scaffolds and models for support, whilst ensuring all students have the opportunity to attempt work before support is made available
- Includes designing resources that break down and logically sequence the subject content.
- Includes clearly presented material to reduce cognitive load

Retrieval practice

- Is spaced and sequenced
- Ensures students are exposed to material that may have been taught weeks or months ago, as well as more recently
- 'Activates' prior knowledge which will be built on in the lesson
- Ensures all students are thinking and retrieving

Classroom management

- Consistently follows school rules and routines
- Marked by deliberate use of language to create a calm and purposeful environment
- Includes insisting on silence during independent work
- Includes clear transitions between tasks to ensure they are completed immediately with no time wasted
- Intolerant of disruption

Feedback

- Addresses and re-teaches misconceptions to close gaps
- Includes clear next steps and follow-up tasks
- Focuses on future improvement and development
- Uses whole class feedback for summative assessments
- Feedback is given close to the point of action
- Most feedback is 'live' and given in the lesson whilst circulating
- Is adaptive and based on the student's needs

Whilst all elements might not be observable in short periods of time these seven key areas should **underpin** all our lessons.

Explanations

- Breaks material down into smaller parts
- Anticipates the novelty of material by accounting for students' prior knowledge
- Includes explaining the meaning of key vocabulary
- Avoids missing links between ideas so each idea flows from one to another
- Includes diagrams, models, worked examples or concrete representations
- Includes 'thinking aloud' when explaining procedures
- Includes explicit links between current material and already learnt material

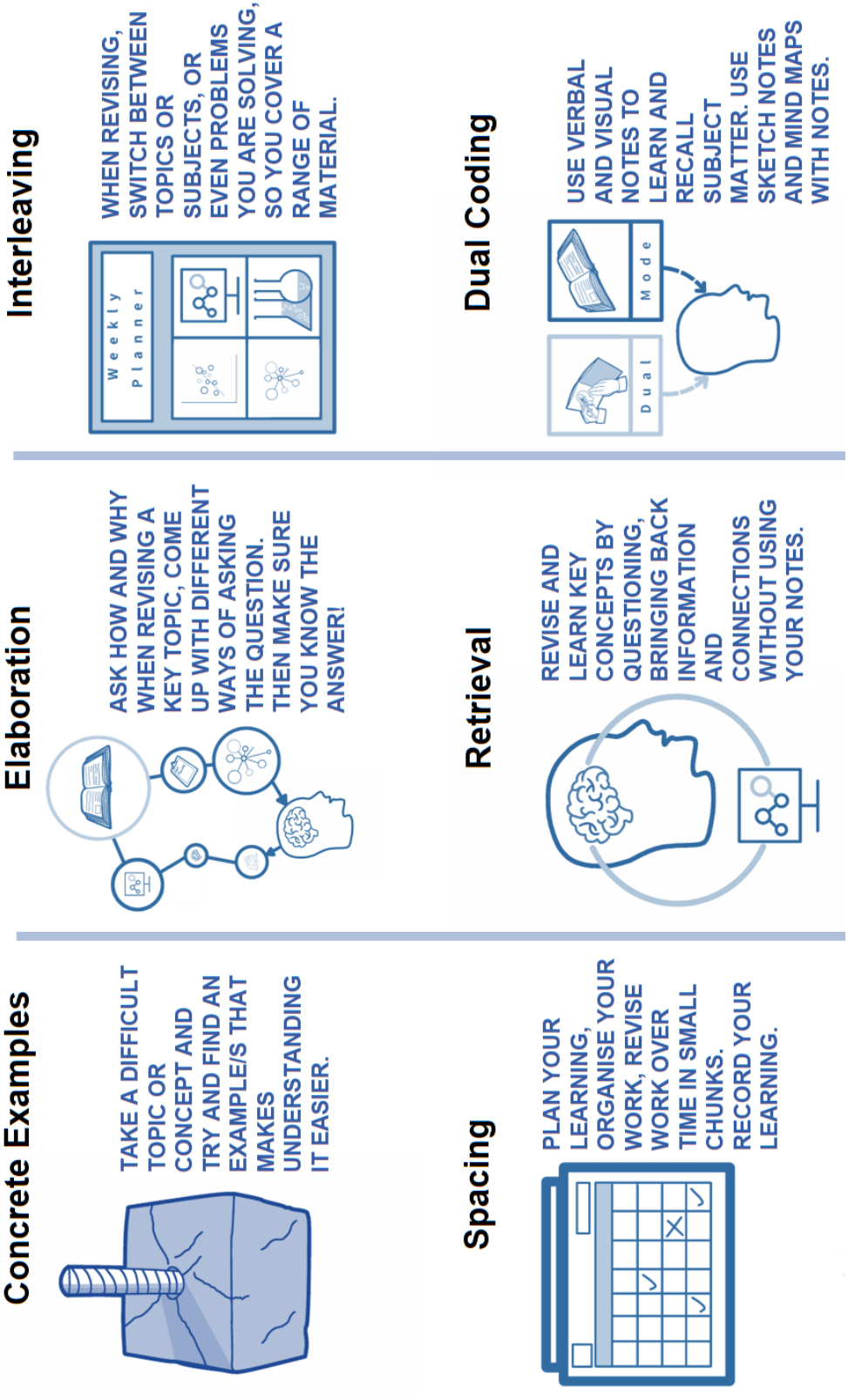
Modelling

- Demonstrates excellence so that exemplar material is of the highest standard
- Includes demonstrating processes and procedures by breaking models down into steps
- Includes live modelling to demonstrate processes and procedures in 'real time'
- Includes spoken language such as speaking in full sentences and demonstrating use of subject-appropriate and wider vocabulary
- Pre-empts and addresses student misconceptions and gaps in knowledge
- Reinforces expectations of presentation of student work

Questioning

- Includes 'call by name' as the default style
- Promotes answering in full sentences
- Allows for deeper thinking by asking for justifications of answers
- Does not accept 'I don't know' answers by scaffolding or revisiting
- Leads to the 'best' answer
- Includes as many students as possible in every lesson through the use of tools such as mini-whiteboards.
- Follows the Agree/Build/Challenge format of questioning to promote metacognition

How children learn



Above are some specific strategies that can support students when learning new content. Research spanning 40 years supports these strategies; at the school our quality teaching principles align with this.

Assessment Policy

Our assessment policy is included in the student diary of all students. Assessment in Grades 11 & 12 aims to be:

- Aligned with curriculum and pedagogy.
- Equitable for all students.
- Evidence-based, using established standards and continua to make defensible and comparable judgments about students' learning.
- Ongoing, with a range and balance of evidence compiled over time to reflect the depth and breadth of students' learning.
- Transparent, to ensure confidence in the processes used, the information obtained and the decisions made.
- Informative of where students are in their learning.

High-quality assessment is characterised by three attributes:

- Validity, through alignment with what is taught, learnt and assessed.
- Accessibility, so that each student is given opportunities to demonstrate what they know and can do.
- Reliability, so that assessment results are consistent, dependable or repeatable.

Questions regarding the policy should be directed to the **Heads of Campus**, **Deputy Principal** or **Principal**.

To ensure the assessment policy is consistently applied it will be revisited at the beginning of each semester in home room classes.

Key processes will be revisited:

- When the assessment calendar is published.
- When each task is handed to students.
- In the school's newsletter and by email in response to phases of the assessment cycle.

Students are expected to:

- Engage in the learning for the subject or course of study.
- Produce evidence of achievement that is authenticated as their own work.
- Submit responses to scheduled assessment **on or before the due date** (this includes written, spoken and produced tasks).

Due dates for final responses are published in the assessment calendar. Due dates for checkpoints, drafts and final submissions will be made explicit on all assessment tasks.

The assessment calendar will provide the due date of all summative tasks. These due dates will:

- Provide sufficient working time for students to complete the tasks.
- Be clear to teachers, students and parents/carers.
- Be consistently applied.
- Be clearly communicated by the end of Week 3 each term.

Students are responsible for:

- Recording due dates in their diaries.

- Planning and managing their time to meet the due dates.
- Informing the school as soon as possible if the due date for any assessment task is unlikely to be met so that appropriate procedures can be put in place.

Homework Expectations

Lae International School values the role of homework if further developing all of our students to ensure they all reach their best potential. There has been much research worldwide on the impact of homework in primary and secondary school. It is widely accepted that homework that is meaningful and time appropriate for different grade levels has a significant positive impact on the progress of students. The homework supplied is designed to promote forgetting and retrieval of information from the long term memory. Students may work on content that was taught during the week, the week before, or even the month before. This ensures that students are systematically strengthening their ability to retrieve the knowledge acquired in lessons throughout the year. Homework gives students the opportunity to develop the IEA key outcome of analysing and solving problems. Students will develop their independent self-regulation and metacognitive skills ensuring they are able assess their own progress whilst planning, doing, and evaluating performance on homework tasks.

Aims:

1. To encourage children to establish a routine of regular work.
2. To give children practice and immediate reinforcement of work conducted at school.
3. To give feedback to parents as to the type of work their child is doing at school and to gauge the success of that work.
4. To give a guide to the teacher if further assistance or teaching is required in that area.
5. Allow children to organise their time around other activities.

Types of homework:

Type	Definition	Example
Completion	In the event that there is incomplete work from the lessons student may asked to complete it at home.	Students have planned and begun to write a short story using their plan. The stories are unfinished but students are well equipped to complete the independently.
Practice	The homework is designed to practice the skills taught during the lesson.	Students have been taught a specific equation in science. The teacher supplies them with a question sheet with questions relating to the use of the equation.
Preparation	Homework is given to prepare students for the content to be taught in an upcoming course of lessons.	A teacher supplies students with a knowledge organiser that gives an overview of the different areas to be taught. This gives students some initial exposure to the learning prior to explanations and modelling.
Extension	Any homework that requires to students to further research the application of a current topic being taught. This type of homework is designed to expand on classroom learning. It often requires students to think critically, be creative, and problem solve.	Having learnt about rhythm in music. The teacher asks students to research and explore some examples of how the rhythm in popular music can impact a listeners emotions and feelings.

Guidance for homework time allocation throughout the school:

Grade	Time Recommended per evening
1	20 minutes and 15 minutes reading
2	20 minutes and 15 minutes reading
3	20 minutes and 15 minutes reading
4	40 minutes and 20 minutes reading
5	40 minutes and 20 minutes reading
6	40 minutes and 20 minutes reading
7	1.5 hours and 1 hour reading
8	1.5 hours and 1 hour reading
9	2 hours and 1 hour reading
10	2 hours and 1 hour reading
11	2.5 hours and 1 hour reading
12	2.5 hours and 1 hour reading

Advice to students:

- Students should inform their teachers if they are finding it difficult to cope with the homework demands. As stated above, any consideration of extension of deadlines requires advanced warning. If they simply do not complete the work, then it will be recorded as not completed.
- If students find it difficult to understand what is expected of them when the teacher sets the homework in class, they need to ensure they ask for the task to be re-explained. This will ensure all students have clarity of what they need for homework completion.
- Where work is set with a deadline that is several days or a week away, students are advised to record it and plan the days that they are going to use to complete it. This will prevent them leaving it to the last minute and having a large amount of work to complete.
- Students should maintain a good balance - sport, music and other interests are all important parts of their educational lives. However, school work should take precedence over other external activities.
- Students are encouraged to speak to their teachers about any uncertainties that they may have.

Advice to parents/carers:

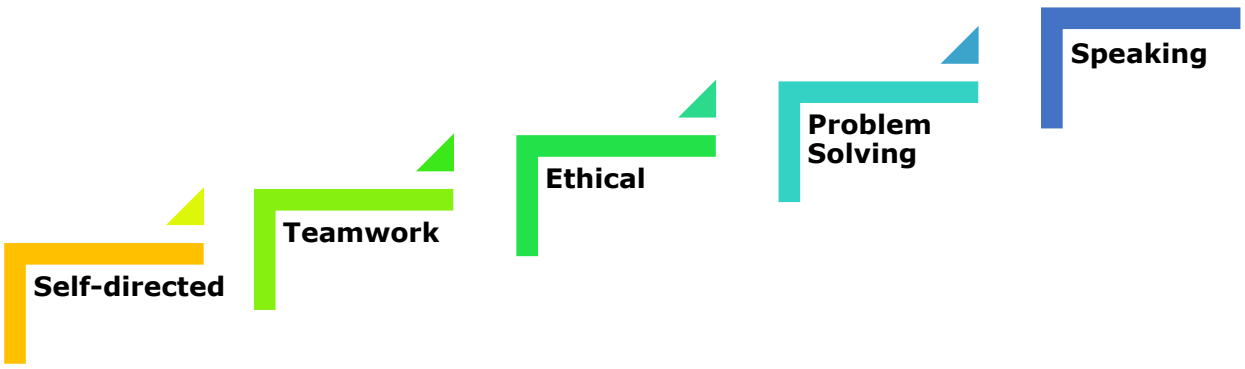
- Wherever possible, make sure that you have a set time when your child completes their homework, and monitor this period.
- Students who are distracted by other activities (such as computer, games etc) and start their homework late will finish it late.
- Try to remove distractions during this time - make sure that students have a quiet, well organised space to complete their work.
- Try to discuss your child's homework with them - discuss deadlines, how they are going to meet them, what is expected etc. Not only will this allow you to understand the demands of the curriculum, but you will also be better placed to help them if they run into trouble.
- It is vital that the students have the chance at home to focus on their school work.
- Encourage a balanced lifestyle. Students that have an opportunity to express themselves or to keep fit by playing sport are more likely to be able to focus on their work at home.
- Contact the teacher if you have any concerns. The best way to avoid problems is to open up dialogue sooner rather than later.

Behaviour Expectations

It is expected that all students attending the Lae International School follow the school's positive behaviour policy. This policy is aligned to the five IEA key outcomes:

1. Behave Ethically – We exhibit appropriateness in any given context and situation
2. Work Collaboratively – We develop good relationships with others and work cooperatively to achieve common goals
3. Communicate Effectively – We process received information and respond appropriately in a range of contexts
4. Self-Directing – We develop positive visions, initiate ideas and contribute meaningfully.
5. Analyse and Solve Problems – We are critical thinkers and adaptable to solve problems in increasingly complex ways

In the school we take the STEPS to success:



LIS students are expected to:

- Complete schoolwork in class and at home to the best of my ability
- Abide by the rules of the school as set by the LIS Positive Behaviour Policy
- Wear the correct school uniform in a neat and tidy manner both during school time and outside of school
- Speak in a respectful manner to my classmates and teachers
- Safe usage of computers and other technology devices as per the LIS Positive Behaviour Policy
- Submit mobile phones to the office if bought to school
- Refrain from alcohol, cigarettes, illegal drugs and any other banned substances during any school event
- Refrain from any form of bullying, teasing or intimidation of my classmates as per the LIS Positive Behaviour Policy.

Uniform Policy

A school's dress code can play an important role in promoting a positive image of the school and creating a sense of identity. Wearing the school uniform is expected of all students from Prep – Grade 12. Uniforms can be purchased through the school office.

Aims:

1. To foster and enhance the public image of the school
2. To assist in building school and team spirit and pride
3. To encourage equity amongst students
4. To assist students to understand that society has dress and safety codes

Implementation

It is a condition of enrolment that students will wear the correct uniform. Students who are unable to wear the uniform on any particular day should bring a note of explanation from their parent / guardian. A school cap / hat is available as part of the uniform and should be worn during sporting activities.

GIRLS	BOYS
School Shirt	School shirt
Navy Blue Skirt, Skort, Shorts or trousers	Navy Blue school shorts or trousers
White socks	White socks
Navy Blue school cap / hat (primary only)	Navy Blue school cap / hat (primary only)
Sports Uniform	Sports Uniform
Blue school shorts	Blue school shorts
Sports shirt (house colour)	Sports shirt (house colour)
White socks	White socks
Runners / Trainers	Runners / Trainers

Note:

- Students with PE on Friday should change into their house shirt.
- Uniforms are compulsory and students are encouraged to take pride in themselves and their uniform
- Appropriate footwear is essential and thongs are not permitted
- No T-shirts are to be visible underneath the uniform
- No bleached/faded shorts/shirts; missing buttons are to be replaced

Grooming:

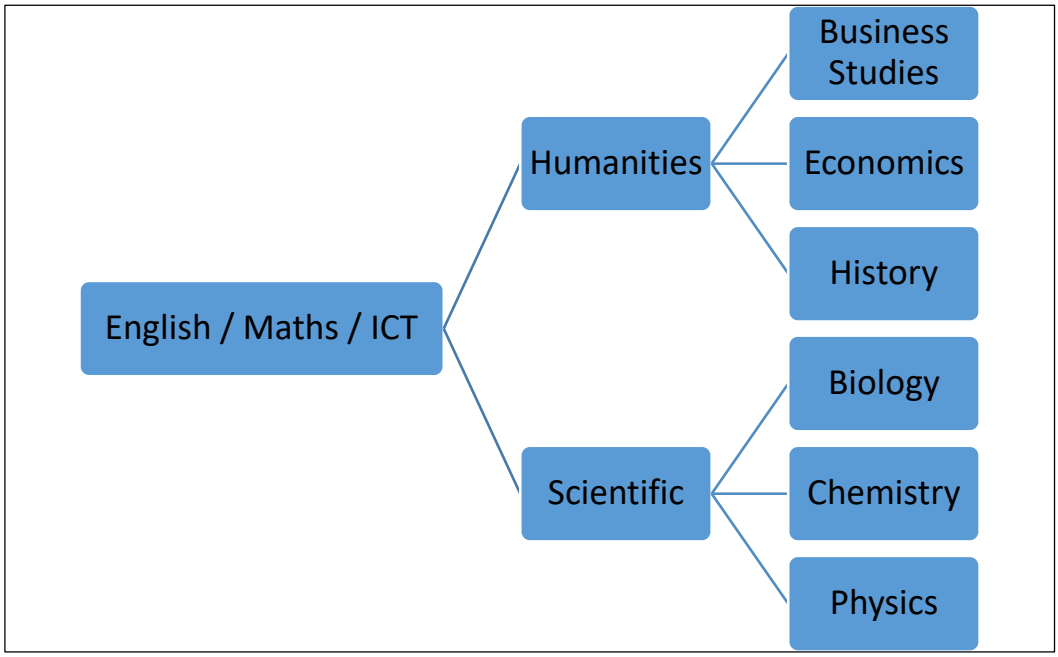
- Fingernails are to be clean; no nail polish
- Teeth must be brushed
- No make-up (of any kind) is to be worn
- Long hair (shoulder length or longer) is to be tied back
- Hair is to be trimmed neatly. No rasta, rats tails, etc.

Personal Accessories:

- One pair of earrings can be worn (studs or sleepers only)
- A watch may be worn
- No bracelets of any kind are to be worn including promotional rubber wrist bands
- No rings are to be worn
- A religious necklace such as a small cross or medal is permitted; Rosary beads or scapulas should not be seen; no beaded necklaces or bracelets.

Taught Curriculum

Throughout Grade 11 and 12 students follow a duel curriculum of the PNG National course and Australian Capital Territories (ACT) course. These two course have a humanities strand and a scientific strand. All students study both English, Mathematics, and ICT though those studying the scientific strand take a more advanced for of Mathematics. In the humanities strand students study Business Studies, Economics, History and ICT. In the scientific strand students study Biology, Chemistry, and Physics.



PNG Curriculum

English

The study of Applied English aims to:

- Equip students with the language and creative abilities to participate confidently and constructively in society.
- Equip individuals to work for the positive and sustainable development of themselves, their community, their nation, and the world.
- Develop the ability to envision imaginatively and express creatively.
- Enable students to understand a wide range of potential future pathways in life, and to choose a fulfilling and valuable option for themselves.
- Develop individuals' abilities to take in, process, and evaluate information, knowledge, beliefs and values.
- Develop individuals' abilities to express information, knowledge, beliefs and values.
- Improve students' technical command of the English language for use in a wide variety of situations and contexts.
- Develop understanding, tolerance, and positive appreciation of the global diversity of cultures and belief systems.
- Develop critical and original thinking, problem solving, planning, and organisation skills.
- Develop the ability to work proactively as individuals, and cooperatively within groups.
- Help students read and respond to texts in a wide range of contexts, and to analyse critically in relation to both their personal experiences and the experiences of different societies in Papua New Guinea.
- Help students develop analytical skills and their ability to make inferences, deductions and justifications.

The study of Applied English is focused on the following four strands:

- 'Reading and viewing'
- 'Listening'
- 'Speaking'
- 'Writing'

These strands can be seen in two ways. First, they are the media through which communication takes place, and secondly, they are skills that students need to learn in order to use English proficiently in their lives.

By reading and viewing a wide range of texts, students learn how language is used in context. They develop competency in taking in information and ideas and values.

In listening, students develop effective receptive skills as they listen to different samples of oral communication texts that are used in different settings for different purposes and recognise the distinct language features used in each of them.

In speaking, students develop competency in effective oral communication using correct and appropriate conventions of the English language.

In writing, students use the appropriate conventions in English to express and communicate their ideas on complex issues that they have drawn from the texts that they have read, viewed and listened to.

As English is a holistic means of communication, this syllabus is organised around themes. Language and thinking cannot be separated. Students learn the skills, knowledge and attitudes in the context of a theme.

The Applied English learning outcomes listed below identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. Students can:

1. Use and understand English structures and conventions.
2. Analyse language techniques, structures and conventions in order to apply language purposely and effectively.
3. Interpret and analyse literary texts and the use of figurative language features and other aspects of literary style.
4. Identify and evaluate the implications of information and values and suggest possible alternatives.
5. Analyse texts as culturally constructed forms.
6. Collect and evaluate information from a range of sources, including media.
7. Create texts in a variety of literary forms and conventions.

Components, weightings and tasks for Grade 11 units

Strands	Weighting		Tasks
Listening	30	10%	See outcomes and content sections and refer to Teacher Guide
Speaking	60	20%	See outcomes and content sections and refer to Teacher Guide
Reading and viewing	90	30%	See outcomes and content sections and refer to Teacher Guide
Writing and visual creation	120	40%	See outcomes and content sections and refer to Teacher Guide
Marks/percentage	**300/100%**		

Components, weightings and tasks for Grade 12 units

Strands	Weighting		Tasks
Listening	30	10%	See outcomes and content sections and refer to Teacher Guide
Speaking	60	20%	See outcomes and content sections and refer to Teacher Guide
Reading and viewing	90	30%	See outcomes and content sections and refer to Teacher Guide
Writing and visual creation	120	40%	See outcomes and content sections and refer to Teacher Guide
Marks/percentage	**300/100%**		

General Maths and Advanced Maths

General Maths is followed by students on the humanities strand and Advanced Maths is followed by our scientific strand.

The General Mathematics learning outcomes identify the knowledge, skills, attitudes and values that all students achieve or demonstrate at the end of Grade 12. The learning outcomes for General Mathematics are listed below. Students can:

1. Use knowledge of numbers and their relationships to investigate a range of different contexts.
2. Identify, interpret, describe and represent various functional relationships to solve problems in real and simulated contexts.
3. Measure and use appropriate techniques and instruments to estimate and calculate physical quantities.
4. Interpret, describe and represent properties of relationships between 2-dimensional shapes and 3-dimensional objects in a variety of orientations and positions.
5. Demonstrate the application of statistical knowledge and probability to communicate, justify, predict and critically analyse findings and draw conclusions.
6. Describe and explain the interrelationships between mathematical concepts.
7. Apply mathematical procedures including technological resources to solve practical problems in familiar and new contexts.
8. Communicate mathematical processes and results.
9. Undertake mathematical tasks individually and/or cooperatively in planning, organising, and carrying out mathematical activities.

Example Assessment Weightings:

Suggested components, weightings and tasks for Grade 11

Component	Weighting	Tasks
Tests and examinations	40%	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	40%	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be written or oral
Group work	20%	Should include group-based tasks, although it may incorporate individual elements in the reporting phase. The tasks can include written reports from group research, project, group presentations, multimedia presentations and meaningful participation
Marks	**300**	

Components, weightings and tasks for Grade 12		
Component	**Weighting**	**Tasks**
Tests and examinations	40%	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	40%	Tasks may include student research on aspects of a traditional activity. Tasks may be undertaken over a period of time. Reported through a written document
Group work	20%	Should include group-based tasks, although it may incorporate individual elements in the reporting phase. The tasks can include written reports from group research, seminars, group presentations, multimedia presentations and meaningful participation
Marks	**300**	

Units of Study

General Maths

Grade 11 units	Grade 12 units
11.1 Number and Application *10 weeks* • Basic numeracy • Units of measurement • Ratio and proportion • Basic algebra **11.2 Managing Money 1** *8 weeks* • Earnings and spending • Budgeting and loans **11.3 Statistics** *6 weeks* • Exploring data • Analysis of data **11.4 Geometry** *8 weeks* • Lines, angles, triangles and regular polygons • Geometric construction • Circles **11.5 Trigonometry** *8 weeks* • Trigonometry • Vectors	**12.1 Measurement** *6 weeks* • Scales and dimensions • Surveying **12.2 Managing Money 2** *8 weeks* • Interest and inflation • Consumer credit • Investments • Insurance • Using simple algebraic manipulation of financial formulae **12.3 Probability and Statistics** *6 weeks* • Probability • Correlation and regression **12.4 Algebra and Graphs** *6 weeks* • Equations • Graphs and functions **12.5 Applying Geometry in Papua New Guinean Arts** *4 weeks* • Tessellations and polyhedra

Advanced Maths

Grade	Weeks	Term	Unit	Essential resources for activities and assessment
11	10	1	Number and Application	Bathroom scale, measuring instruments (analogue or digital), mass sets, metre ruler, conversion tables, grid papers
11	12	2	Graphs and Functions	Scientific calculator, grid papers
11	10	3	Managing Data	Data from lower level government (LLG) and other government organisations, dice, deck of cards, dominoes
11	8	4	Geometry	Maths kit, trundle wheel, tape measure
12	10	1	Patterns and Algebra	Scientific calculators, grid papers
12	10	2	Trigonometry and Vectors	Tape measure, clinometer, measuring instruments (both analogue and digital, such as clocks)
12	10	3	Calculus	Grid papers, scientific calculators, pendulum, balls, string, tape measure

Assessment ideas for individual students or groups

Tests	Products or projects	Performances	Process skills
Essay Multiple-choice Matching Short answer	Graphs, charts, diagrams Inventions Models Posters Projects Proposals Research papers Results of surveys Displays Games Maps Questionnaires Simulation game Video tapes	Activities Cooperative learning, group activities Debates Demonstrations Discussions Experiments Explanations Field trips Presentations Reports Role-plays Surveys Warnings	Analysing Observing Evaluating Predicting Interpreting Hypothesising Investigating Explaining Classifying Experimenting Estimating Communicating Researching Designing Manipulating Collecting data Synthesising Critiquing Concept mapping Interviewing

ICT

Aims

Information Communication Technologies aims to enable students to:

- Make a worthwhile contribution to the social and economic development of the country through the use of ICT skills.
- Develop knowledge, skills, values and attitudes in ICT that will be transferable to their career paths and future life directions.
- Provide students with knowledge of ICT that enhances their personal and professional productivity.
- Break the geographical barriers of Papua New Guinea.
- Develop knowledge and skills to enable them to compete globally.

The study of Information Communication Technologies is described in the following strands:

Information

'Information literacy' is the ability to gather information from multiple sources, select relevant material and organise it into a form that will allow the user to make quality decisions or take specific actions. This strand identifies the information that is taken from data. Whatever data is encoded in the computer is interpreted in various ways to collect accurate and reliable information. This information comes in a variety of ways after processing, organising and analysing data to meet the needs of the end user. Students learn concepts in data input, processing and output to help them to make informed decisions on information found in all areas of their lives.

Communication

Communication deals with the process involved in the transfer of information from one place to another. This transfer can happen in a variety of ways. In computer communications, data travels electronically at very high speed. The speed of computer communication creates a big impact on computer users, in ways never imagined before. Continuous improvement in the use of satellite communications and the internet are making the world a smaller place. Students understand the use of a range of communications hardware and software devices. They develop an awareness of the opportunities provided by the growing need for communication.

Technology

Technology is about the knowledge and creative processes that are involved in the development of hardware and software tools, techniques and the use of materials. Technology is designed and produced to meet a range of human needs, from personal to business, education and government. Students learn about technologies that meet user needs and the impacts of those technologies.

The Information Communication Technologies learning outcomes identify the knowledge, skills, and attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Information Communication Technologies are listed below.

Students can:

1. Identify and describe computer hardware and software and their functions and capabilities.
2. Identify and describe a variety of information systems and how these are used within organisations.

3. Demonstrate knowledge and understanding of the legal and ethical issues of using and producing IT solutions and their effects on the society.
4. Describe suitable network designs to solve small business or organisational needs.
5. Demonstrate knowledge of procedures for protecting and keeping data securely on a computer or network.
6. Describe the hardware and software required for electronic communication between computers and computer systems including methods of connection.
7. Demonstrate understanding of the internet and e-mail and the issues involved.
8. Apply advanced skills and concepts in creating solutions to information problems using a range of information software.
9. Develop multimedia presentations using a range of hardware and software devices.

Components, weightings and tasks for Grade 11 units

Component	Weighting	Tasks
Tests and examinations	100	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication (including group work)	50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be oral, written or electronic
Practical work	150	Use a variety of application software to create solutions to information problems to meet the needs of users
Marks	**300**	

Components, weightings and tasks for Grade 12 units

Component	Weighting	Tasks
Tests and examinations	100	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be oral, written or electronic
Practical work	150	Use a variety of application software to create solutions to information problems to meet the needs of users
Marks	**300**	

PNG Humanities Strand

Business Studies

Aims

The aims of Business Studies are to enable students to:

- Gain knowledge and understanding of business management and practices and its technology.
- Help develop skills in entrepreneurship, language and oral and written communication, information management, problem solving and decision-making.
- Develop skills that will enable them to exercise initiative and readily participate in a range of business-related activities.
- Apply knowledge and skills in practical settings.
- Apply business management practices in more ethical and socially responsible ways.
- Discuss a range of issues affecting Papua New Guinea's economy and the global community.

The study of Business Studies is described in the following strands:

- 'Business organisation and management'
- 'Entrepreneurship'
- 'Business communication'

Business organisation and management

This strand focuses on the nature of business organisation in Papua New Guinea. The major aspects essential to this strand include forms of business and their roles in the local community and the broader economy. The need for businesses to adapt, to attain their goals in changing internal and external environment, is vitally important.

Entrepreneurship

Entrepreneurship within an ethical framework is essential to the future development of Papua New Guinea's economy. This strand enables students to develop an understanding and acquire practical entrepreneurial skills within that framework. Students are provided with opportunities to be creative and explore skills of production, management of resources and finance.

Business communication

This strand emphasises the roles and responsibilities of good management in examining verbal and non-verbal communication in the business environment. It emphasises the importance of effective listening and questioning techniques in the communication process, for complementing good client relations and fostering positive staff morale.

The Business Studies learning outcomes identify the knowledge and skills all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Business Studies are listed below.

Students can:

1. Demonstrate knowledge and understanding of the establishment and operations of small businesses.
2. Communicate ideas and information, using business terminology in a range of modes of

communication.

3. Demonstrate an understanding of skills necessary for business.
4. Evaluate the economic, social, environmental and ethical outcomes of specific business decisions.
5. Apply the knowledge and skills of business management in practical settings.
6. Describe and explain the effects of issues affecting the business community in Papua New Guinea as well as the global community.
7. Demonstrate an understanding of the knowledge and skills of different aspects of communication styles and strategies, operations management and human resource functions.

Components, weightings and tasks for Grade 11

Component	Weighting	Tasks
Tests and examinations	150	These may include multiple-choice items, short answers and extended responses
Research Assignment	50 50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time and presented using a variety of methods
Group work	50	Should include group-based tasks, although it may incorporate individual elements in the reporting phase. The tasks can include written reports from group research, seminars, group presentations, multimedia presentations
Marks	**300**	

Components, weightings and tasks for Grade 12

Component	Weighting	Tasks
Tests and examinations	150	These may include multiple-choice items, short answers and extended responses
Case study	100	Tasks may include student research on aspects of a topic, reported through a prepared essay or an in-class task or presentation
Interview and presentation	50	Statistical interpretation, graphical skills and calculations. These can utilise theoretical, contemporary or hypothetical situations
Marks	**300**	

Economics

Aims

Economics aims to enable students to:

- Understand the economic problems of choice and opportunity cost, and how individuals, groups and societies have organised economic systems to deal with these problems.
- Develop knowledge, understanding and skills of application of the concepts, models, and terminology used in the study of Economics.
- Investigate and analyse economic events and to evaluate and predict the impact of economic change locally, nationally and globally.
- Be aware of the impact of economic decisions and their outcomes that may be inconsistent with social, moral, and ethical values.
- Be engaged as informed citizens to promote economically, ecologically, culturally and socially just and sustainable futures.
- Help develop skills in entrepreneurship, language and oral and written communication, information, management, problem solving and decision making.
- Apply knowledge and skills in practical settings.
- Discuss a range of issues affecting Papua New Guinea's economy and the global community.

The study of Economics is described in the following strands:

'Traditional economics'

'Modern economics'

Traditional economics

This strand deals with the idea that the economic problem, expressed as resources that are limited and wants that are unlimited, is ever-present and involves choice and opportunity cost. Economic systems have been developed by societies to deal with the economic problem and have evolved over time because of social pressure for change. This change is particularly evident in the study of economies in transition, and students can reflect on the way in which economic systems have operated in the past, challenge the way in which systems operate currently, and develop preferred scenarios for the future. Students develop skills to recognise, predict and critically evaluate economic change and apply these skills to economic decisions made for both short-term and long-term outcomes, recognising the implications for future generations. Economic decisions are unavoidable and the outcome of an economic decision involves costs and benefits. The costs may affect those not involved in the making of the decision and are known as external costs; these may impact negatively on the environment. The full costs of economic decisions in different places may become evident in the future and are often not considered at the time when decisions are made. Students investigate, analyse, evaluate and make judgements about economic decisions in terms of sustainable development.

Modern economics

This strand deals with the idea that different economic systems reflect the diverse values of individuals, communities, and societies. Economic decisions have outcomes that may be inconsistent with the social, ethical, or moral values held by society. These outcomes may be modified so that they conform more closely to the values held. This strand recognises that government has the major role in changing outcomes. Students critically evaluate this role of government in a wide range of situations, including changing income distribution both nationally and globally. Trade between

nations means that there is reliance or interdependence between them, and this provides important links between different cultures. Students are involved in investigating economic issues in society and recognise the role of power groups in the economy in determining economic decisions and outcomes. All individuals are part of an economic system and economic decisions are made at individual, regional and national levels. The strand encourages students to examine critically the range of processes and institutions that operate within an economic system to enable decisions to be made. In doing so, students develop an understanding of the role of the individual in the decision-making process. Students also become aware of their own roles in the economic system as consumers of goods and services and as resource providers. Students analyse the roles and relationships of people and groups in an economic system through the use of models such as the circular-flow model. Students have opportunities to distinguish between fact and opinion and explain cause and effect. To become more effective participants in society, students are encouraged to make forecasts, evaluate change, and consider the consequences of a range of actions before deciding on their own response and action.

The learning outcomes for Economics identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12.

These learning outcomes are listed below.

Students can:

1. Demonstrate an understanding and application of concepts, principles, models, skills, and terminology used in the study of Economics.
2. Demonstrate an understanding of the role of economic systems in providing solutions to economic problems.
3. Analyse economic events, past and present, using economic models and the skills of economic inquiry.
4. Predict and evaluate the impact of economic change in local, national and global settings.
5. Explain and reconcile the way economic decisions involve costs and benefits and have outcomes that may be inconsistent with social, moral and ethical values.
6. Describe and explain the way outcomes may be changed by individuals, community groups, business and government.
7. Identify the effects of interdependence at individual, local, national and global levels.
8. Communicate economic information, ideas and issues in a variety of ways.

Components, weighting and tasks for Grade 11

Component	Weighting	Tasks
Tests and examinations	150	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	75	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be written or oral
Stimulus-based skills	25	Statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations
Group work	50	Should include group-based tasks, although it may incorporate individual elements in the reporting phase. The tasks can include written reports from group research, seminars, group presentations, multimedia presentations
Marks	**300**	

Components, weighting and tasks for Grade 12

Component	Weighting	Tasks
Tests and examinations	150	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	100	Tasks may include student research on aspects of a topic, reported through a prepared essay or an in-class task or presentation
Stimulus-based skills	50	Statistical interpretation, graphical skills and calculations. These can utilise theoretical, contemporary or hypothetical situations
Marks	**300**	

History

Aims

History aims to enable students to:

- Acquire knowledge and understanding of events and forces that shape Papua New Guinea and the world as a whole.
- Acquire a set of skills in order to evaluate and analyse historical evidence and make informed judgements and decisions.
- Perceive, understand, appreciate and evaluate the process of change and continuity in human affairs.
- Place issues and events in their historical perspective.
- Achieve a sense of identity and self-worth by studying their own local, regional and national societies.
- Develop empathy for and appreciation of people of other societies.
- Gain an understanding of historical themes and concepts.

Strands of history include:

Time, continuity and change

This strand deals with understanding and valuing the past, within and across societies, and with developing critical thinking for the present and the future. Concepts of time, continuity, change, causation, heritage and empathy with others are fundamental. The skills to be developed are those that enable students to critically analyse and evaluate various sources of information and use historical processes to expand their perspectives on current issues in a changing society.

Place, space and environment

This strand deals with understanding the complex interconnections and interactions among people and nations in local, regional and international settings. Students ask and answer questions about the experiences of people living in different places in the past and present, and form considered opinions about those in the future. They develop an appreciation of how local, regional and international relationships influence key social, political and economic aspects of human experience.

Power and politics

This strand deals with the critical examination of decision making at all levels, by asking and answering questions about power relations within society and the use of power and control of resources to maintain or influence change in society. Students inquire into political, legal and economic systems and institutions by testing hypotheses about rights and responsibilities, and roles and relationships, of people and groups in a variety of settings.

The learning outcomes identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes of History are listed below. At the end of Grade 12, students can:

1. Identify and understand events, issues and forces that have shaped their cultural, social, political and economic heritage.
2. Demonstrate an understanding of historical concepts and ideologies.
3. Describe and explain the origin, development and impact of change on societies and nations.
4. Analyse the role and impact of significant historical themes, events and individuals within

their societies and the world at large.

5. Interpret and critique historical evidence and information.
6. Identify and critique opinions, values, judgements, biases and contradictions.
7. Apply the historical skills of inquiry, observation, classification, recording and interpreting.

Components, weightings and tasks for Grade 11 units

Component	Weighting		Tasks
Tests and examinations	90	30%	These may include multiple-choice items, short answers and extended responses
Course work including individual or group investigations	150	50%	This assessment component is designed to assess all the learning outcomes Assessment tasks may include oral presentations and reports, audiovisual presentations, multimedia presentations, web pages, interviews, debates, essays and other suitable tasks
Evidence study (compulsory)	60	20%	Critical analysis and comparison of primary sources
Marks	**300**	**100%**	

Components, weightings and tasks for Grade 12 units

Component	Weighting		Tasks
Tests and examinations	100	30%	These may include multiple-choice items, short answers and extended responses
Course work including individual or group investigations	150	50%	This assessment component is designed to assess all the learning outcomes Assessment tasks may include oral presentations and reports, audiovisual presentations, multimedia presentations, web pages, interviews, debates, essays and other suitable tasks
Folio (compulsory)	50	20%	Achievements and contributions of significant individuals in the latter half of the 20th century
Marks	**300**	**100%**	

PNG Scientific Strand

Biology

Aims

The study of Biology enables students to:

- Think scientifically and apply biological knowledge and skills to make decisions about real problems and challenges in the context of their daily lives.
- Gain an appreciation of and respect for the natural world, its diversity, fragility and finite nature, especially when harvesting from the environment.
- Reflect on the underpinning biological principles and knowledge of living organisms and to be able to construct new knowledge for themselves through research and research-based information.
- Develop an understanding of the effects of human activities on living organisms, including the systems of the human body, for healthy living and maintaining healthy environment.
- Develop values and attributes that help them to consider issues and implications associated with biological techniques and technologies.

The study of Biology is described in the strand:

- 'Life and living'.

The 'Life and living' strand is about the diversity of living things and their interactions with each other and with the physical world. It considers the functions of various parts of living things and compares these in different ecosystems. This strand considers the way in which living things adapt to environments and change. It examines ecological habitats, roles of plants in ecosystems, life processes, and social and biological issues surrounding the survival of species. The study of the interdependence of living things includes consideration of the relationship of organisms within ecosystems. It also explores the effects of human activity on these systems. This strand provides students with an understanding of the interdependence of different life forms and the need to conserve the balance of nature.

The Biology learning outcomes identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Biology are listed below.

Students can:

1. Demonstrate an understanding of fundamental principles and models of biology.
2. Demonstrate an understanding of plant and animal physiology.
3. Demonstrate an understanding of interactions between organisms and their environment.
4. Analyse and interpret data, graphics and other forms of information.
5. Undertake investigations using scientific methodologies to solve biological problems.
6. Communicate biological investigation and findings in various ways using biological terms and conventions.
7. Analyse and evaluate past and present biology-related developments and their impacts on human beings and environment and be able to make informed and ethical decisions.
8. Demonstrate an understanding of traditional biological knowledge and practices and its relevance today.

Components, weightings and tasks for Grade 11

Component	Weighting	Tasks
Written tests	150	These may include multiple-choice items, short answers and extended responses, statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations
Practical tests on basic skills	100	Testing students' abilities, short practical techniques, scientific reports, models and assignments
Practical investigative skills	50	Practical work competency, conduct investigations, experiments, observing experiments, making inferences, presentation and communication
Marks	**300**	

Components, weightings and tasks for Grade 12

Component	Weighting	Tasks
Written tests	150	These may include multiple-choice items, short answers and extended responses, statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations
Practical tests on basic skills	100	Testing students' abilities, short practical techniques, scientific reports, models and assignments
Practical investigative skills	50	Practical work competency, conduct investigations, experiments, observing experiments, making inferences, presentation and communication
Marks	**300**	

Chemistry

Aims

The aims of the Chemistry syllabus are to develop in students:

- An understanding and appreciation of the methods and applications of chemistry and its development in the past, present and future contributions to life on earth and beyond.
- The skills to engage safely in investigation techniques.
- The capacity to work scientifically in the context of chemistry.
- The ability to observe, collect, analyse and interpret data to explain certain chemical principles and laws.
- An ability to manipulate and use laboratory apparatus effectively.
- Positive attitudes towards the study of matter and its interactions with the environment.
- A capacity to work as part of a team engaging in cooperative activities for the development of Papua New Guinea.
- Individual potential to make a useful contribution to society.
- An appreciation of traditional chemical practices.
- Proper responses with respect to opinions held by others while appreciating the importance of critically evaluating various scientific views.

The Chemistry learning outcomes identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Chemistry are listed below.

Students can:

1. Demonstrate an understanding of fundamental scientific principles and models.
2. Apply scientific thinking, motor and process skills to investigate and find solutions to problems.
3. Communicate findings of scientific investigations in different ways.
4. Analyse and interpret data, graphs and other forms of information relevant to topics studied.
5. Analyse and evaluate past and present scientific developments and their impacts on human beings and the environment and on the ethical decisions made.
6. Demonstrate an understanding of traditional knowledge and skills of chemistry practised over many years and explain their relevance today.

Components, weighting and tasks: Grade 11

Component	Weighting	Tasks
Written tests	150	May include multiple-choice items, short answers, extended responses
Practical testing skills (Laboratory practical report)	50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be written or oral
Practical investigative skills (Project)	100	Statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations. Should include group-based tasks, although it may incorporate individual elements in the reporting phase. The tasks can include written reports from group research, seminars, group presentations, multimedia presentations
Marks	**300**	

Components, weighting and tasks: Grade 12

Component	Weighting	Tasks
Written tests	150	May include multiple-choice items, short answers, extended responses
Practical testing skills (Laboratory practical report)	100	Tasks may include student research on aspects of a topic, reported through a prepared essay or an in-class task or presentation
Practical investigative skills (Project)	50	Statistical interpretation, graphical skills and calculations. These can utilise theoretical, contemporary or hypothetical situations
Marks	**300**	

Physics

Aims

Physics aims to enable students to:

- Understand and acknowledge the interrelationship between science, society and the environment, which will contribute to active debates and responsible decision making on issues related to technological development, environmental management, lifestyle choices, economics, human health, and social and human development.
- Critically evaluate the impacts of scientific and technological achievements that affect all aspects of our lives and ensure a better standard of living.
- Understand and appreciate the principles of physics in everyday life and use the principles to solve problems.

The Physics learning outcomes identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Physics are listed below.

Students can:

1. Demonstrate understanding of fundamental physics principles and models.
2. Apply scientific inquiry and reasoning skills to find solutions to problems.
3. Communicate scientific data and information from investigations and laboratory work in different ways.
4. Analyse and interpret data and information.
5. Analyse and evaluate developments in physics from the past and present and its impacts on people and the environment; and use the information to support and make informed decisions.
6. Relate relevant traditional knowledge, beliefs, and skills to principles and concepts of physics.

Components, weightings and tasks for Grade 11

Component	Weighting	Tasks
Written tests	50%	May include multiple-choice items, short answers, extended responses, statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations
Practical work	20%	Testing ability of students using laboratory skills and techniques, such as setting up logic circuits and checking behaviour, measuring diameter of a cylinder using vernier calipers and so on
Problem-solving assignments Project work	30%	Tasks include analytical skills in solving applied problems requiring understanding, recognition, analysis of data and use of appropriate concepts and equations, and calculations for given situations Project work Laboratory investigation and a report or research project and seminar presentation
Marks	**300**	

Components, weightings and tasks for Grade 12

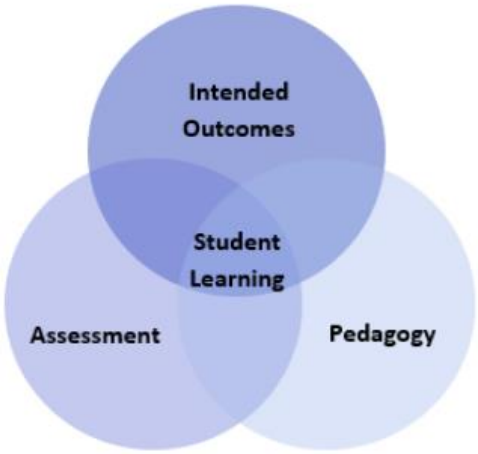
Component	Weighting	Tasks
Written tests	50%	May include multiple-choice items, short answers, extended responses, statistical interpretation, graphical skills, calculations. These can utilise contemporary or hypothetical situations
Practical work	20%	Testing ability of students using laboratory skills and techniques, such as setting up logic circuits and checking behaviour, measuring diameter of a cylinder using vernier calipers and so on
Problem-solving assignments Project work	30%	Tasks include analytical skills in solving applied problems requiring understanding, recognition, analysis and use of appropriate concepts, equations, calculations for given situations. Practical work competency and some ratings given on presentation and communication to be accommodated in projects that include laboratory investigation or research project and seminar
Marks	**300**	

ACT Curriculum

All our ACT courses are at T level, this means the course is at the university entrance level supporting students onto study in Australia and further abroad.

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:

Learning builds on existing knowledge, understandings and skills. (Prior knowledge)

1. 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)
2. Learning is facilitated when students actively monitor their own learning and consciously develop ways of organising and applying knowledge within and across contexts. (Metacognition)
3. Learners' sense of self and motivation to learn affects learning. (Self-concept)
4. Learning needs to take place in a context of high expectations. (High expectations)
5. Learners learn in different ways and at different rates. (Individual differences)
6. Different cultural environments, including the use of language, shape learners' understandings and the way they learn. (Socio-cultural effects)
7. Learning is a social and collaborative function as well as an individual one. (Collaborative learning)
8. 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)

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 behaviour
- Intercultural understanding

ACT Core Courses

English (T)

Organisation of Content:

Communication of Meaning

In this unit students explore how meaning is communicated through the relationships between language, text, purpose, context and audience. This includes how language and texts are shaped by their purpose, the audiences for whom they are intended and the contexts in which they are created and received. Through responding to and creating texts, students consider how language, structure and conventions operate in a variety of imaginative, interpretive and persuasive texts. Study in this unit focuses on the similarities and differences between texts and how visual elements combine with spoken and written elements to create meaning. Students develop an understanding of stylistic features and apply skills of analysis and creativity. They are able to respond to texts in a variety of ways, creating their own texts and reflecting on their own learning.

Representations Through Texts

In this unit, students analyse the representation of ideas, attitudes and voices in texts to consider how texts represent the world and human experience. Analysis of how language and structural choices shape perspectives in and for a range of contexts is central to this unit. By responding to and creating texts in different modes and mediums, students consider the interplay of imaginative, interpretive and persuasive elements in a range of texts and present their own analyses. Students examine the effect of stylistic choices and the ways in which these choices position audiences for particular purposes, revealing attitudes, values and perspectives. Through the creation of their own texts, students are encouraged to reflect on their language choices and consider why they have represented ideas in particular ways.

Comparative Texts

In this unit, students explore representations of themes, ideas and concepts through a Comparative of texts. They analyse and compare the relationships between language, genre and context, comparing texts within and/or across different genres and modes. Students recognise and analyse the conventions of genre in literary and non-literary texts and consider how those conventions may assist interpretation and how they may be challenged. Students compare and evaluate the effect of different mediums on the structure of texts and how audiences respond to them. Understanding of these concepts is demonstrated through the creation of imaginative, interpretive and analytical responses.

Perspectives

In this unit, students examine different interpretations and perspectives to develop further their knowledge and analysis of purpose and style. They challenge perspectives, values and attitudes in literary and non-literary texts, developing and testing their own interpretations though debate and argument. Through close study of individual texts, students explore relationships between content and structure, voice and perspective and the text and its context. This provides the opportunity for students to extend their experience of language and of texts and explore their ideas through their own reading and viewing. Students demonstrate understanding of the texts studied through creation of imaginative, interpretive and analytical responses. Content descriptions in each unit in English are grouped under an organising framework that presents key aspects of learning that

underpin each subject. Organisers vary between subjects according to the distinctive focus of each subject. The organising framework in English is:

- Texts in Contexts
- Language and Textual Analysis
- Engaging and Responding
- Creating Texts
- Reflecting

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 an understanding of:

- Responding
- Creating

Assessment Task Types

Criteria	Task Types
Responding	• Respond to fiction, nonfiction and/or multimodal texts. Students may respond in spoken, written or analytical multimodal forms such as: – short responses, essays, reports, reviews, articles, blogs, documentaries, seminars • Students must complete an independent investigation task each semester. An investigative task requires students to plan, research into and draw conclusions about key unit concepts. Students may respond in forms such as: – essays, reports, interviews, film making, oral presentation, writing for publication
Creating	• Create imaginative, persuasive, interpretative or informative texts. Students may create in spoken, written, non-written or creative multimodal forms such as: – short stories, letters, websites, character interviews, short films, theatrical scripts and poetry
Weightings in A/T/M 1.0 and 0.5 Units: No task to be weighted more than 60% for a standard 1.0 unit and half-standard 0.5 unit.	

Additional Assessment Information

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 are required to create a variety of texts in a range of modes and mediums (spoken, written and multimodal texts) in a course of study. Duration or length of student responses should be determined by the nature of the task and requirements of the Achievement Standards.
- At least one task in each of Year 11 and 12 must be delivered through speaking or speaking and listening tasks, such as: interviews, workshops, speeches, seminars, podcasts, debates, group discussion etc.
- Creative tasks must be supported by a critical explanation of creative choices, for example a rationale or a statement of aims.
- 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.

Mathematics for Scientific (T)

Organisation of Content

Mathematical Methods focuses on the development of the use of calculus and statistical analysis. The study of calculus in Mathematical Methods provides a basis for an understanding of the physical world involving rates of change, and includes the use of functions, their derivatives and integrals, in modelling physical processes. The study of statistics in Mathematical Methods develops the ability to describe and analyse phenomena involving uncertainty and variation.

Mathematical Methods is organised into four units. The topics broaden students' mathematical experience and provide different scenarios for incorporating mathematical arguments and problem solving. The units provide a blending of algebraic and geometric thinking. In this subject there is a progression of content, applications, level of sophistication and abstraction. The probability and statistics topics lead to an introduction to statistical inference.

	Unit 1	Unit 2	Unit 3	Unit 4
Mathematical Methods	• Functions and graphs • Trigonometric functions • Counting and probability	• Exponential functions • Arithmetic and geometric sequences and series • Introduction to differential calculus	• Further differentiation and applications • Integrals • Discrete random variables	• The logarithmic function • Continuous random variables and the normal distribution • Interval estimates for proportions

Unit 1: Mathematical Methods

Unit 1 begins with a review of the basic algebraic concepts and techniques required for a successful introduction to the study of functions and calculus. Simple relationships between variable quantities are reviewed, and these are used to introduce the key concepts of a function and its graph. The study of probability and statistics begins in this unit with a review of the fundamentals of probability, and the introduction of the concepts of conditional probability and independence. The study of the trigonometric functions begins with a consideration of the unit circle using degrees and the trigonometry of triangles and its application. Radian measure is introduced, and the graphs of the trigonometric functions are examined and their applications in a wide range of settings are explored.

Unit 2: Mathematical Methods

In Unit 2, exponential functions are introduced and their properties and graphs examined. Arithmetic and geometric sequences and their applications are introduced and their recursive definitions applied. Rates and average rates of change are introduced, and this is followed by the key concept of the derivative as an 'instantaneous rate of change'. These concepts are reinforced numerically (by calculating difference quotients), geometrically (as slopes of chords and tangents), and algebraically. This first calculus topic concludes with derivatives of polynomial functions, using simple applications of the derivative to sketch curves, calculate slopes and equations of tangents, determine instantaneous velocities, and solve optimisation problems.

Unit 3: Mathematical Methods

In Unit 3, the study of calculus continues by introducing the derivatives of exponential and trigonometric functions and their applications, as well as some basic differentiation techniques and the concept of a second derivative, its meaning and applications. The aim is to demonstrate to students the beauty and power of calculus and the breadth of its applications. The unit includes integration, both as a process that reverses differentiation and as a way of calculating areas. The fundamental theorem of calculus as a link between differentiation and integration is emphasised. Discrete random variables are introduced, together with their uses in modelling random processes involving chance and variation. The purpose here is to develop a framework for statistical inference.

Unit 4: Mathematical Methods

In Unit 4, the logarithmic function and its derivative are studied. Continuous random variables are introduced and their applications examined. Probabilities associated with continuous distributions are calculated using definite integrals. In this unit students are introduced to one of the most important parts of statistics, namely statistical inference, where the goal is to estimate an unknown parameter associated with a population using a sample of that population. In this unit, inference is restricted to estimating proportions in two-outcome populations. Students will already be familiar with many examples of these types of populations.

Unit 5: Mathematical Methods

Unit 5 combines Unit 3b and Unit 4a.

Assessment Task Types

Suggested tasks:

- project/assignment
- modelling projects
- portfolio
- journal
- validation activity
- presentation such as a pitch, poster, vodcast, interview
- practical activity such as a demonstration
- test/examination
- online adaptive tasks/quiz

Weightings in T 1.0 Units:
No task to be weighted more than 50% for a standard 1.0 unit.

Mathematics for Humanities (T)

Organisation of Content

Essential Mathematics focuses on using mathematics effectively, efficiently and critically to make informed decisions. It provides students with the mathematical knowledge, skills and understanding to solve problems in real contexts for a range of workplace, personal, further learning and community settings. This subject provides the opportunity for students to prepare for post-school options of employment and further training.

Essential Mathematics has four units each of which contains a number of topics. It is intended that the topics be taught in a context relevant to students' needs and interests. In Essential Mathematics, students use their knowledge and skills to investigate realistic problems of interest which involve the application of mathematical relationships and concepts.

	Unit 1	Unit 2	Unit 3	Unit 4
Essential Mathematics	• Calculations, percentages and rates • Measurement • Algebra • Graphs	• Representing and comparing data • Percentages • Rates and ratios • Time and motion	• Measurement • Scales, plans and models • Graphs • Data collection	• Probability and relative frequencies • Earth geometry and time zones • Loans and compound interest

Unit 1: Essential Mathematics

This unit provides students with the mathematical skills and understanding to solve problems relating to calculations, applications of measurement, the use of formulas to find an unknown quantity, and the interpretation of graphs. Teachers are encouraged to apply the content of all topics in contexts which are meaningful and of interest to their students. A variety of approaches could be used to achieve this. Two contexts which could be used in this unit are Mathematics and foods and Earning and managing money. However, these contexts may not be relevant for all students, and teachers are encouraged to find a suitable context that will make the mathematical topics of this unit relevant for their particular student cohort.

Unit 2: Essential Mathematics

This unit provides students with the mathematical skills and understanding to solve problems related to representing and comparing data, percentages, rates and ratios, and time and motion. Teachers are encouraged to apply the content of all topics in contexts which are meaningful and of interest to the students. A variety of approaches could be used to achieve this purpose. Two possible contexts which could be used in this unit to achieve this goal are Mathematics and cars and Mathematics and independent living. However, these contexts may not be relevant for all students, and teachers are encouraged to find a suitable context that will make the mathematical topics of this unit relevant for their particular student cohort.

Unit 3: Essential Mathematics

This unit provides students with the mathematical skills and understanding to solve problems related to measurement, scales, plans and models, drawing and interpreting graphs, and data collection. Teachers are encouraged to apply the content of all topics in contexts which are

meaningful and of interest to the students. A variety of approaches could be used to achieve this purpose. Two possible contexts which could be used in this unit to achieve this goal are Mathematics and design and Mathematics and medicine. However, these contexts may not be relevant for all students and teachers are encouraged to find a suitable context that will make the mathematical topics of this unit relevant for their particular student cohort.

Unit 4: Essential Mathematics

This unit provides students with the mathematical skills and understanding to solve problems related to probability, earth geometry and time zones, and loans and compound interest. Teachers are encouraged to apply the content of all topics in contexts which are meaningful and of interest to the students. A variety of approaches could be used to achieve this purpose. Two possible contexts which could be used in this unit are Mathematics of finance and Mathematics of travelling. However, these contexts may not be relevant for all students and teachers are encouraged to find a suitable context that will make the mathematical topics of this unit relevant for their particular student cohort.

Assessment Task Types

Suggested tasks:

- project/assignment
- modelling projects
- portfolio
- journal
- validation activity
- presentation such as a pitch, poster, vodcast, interview
- practical activity such as a demonstration
- test/examination
- online adaptive tasks/quiz

Weightings in A/T/M 1.0 Units:

No task to be weighted more than 50% for a standard 1.0 unit.

Additional Assessment Information Requirements for Mathematics

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 should experience a variety of task types (test and non-test) and different modes of communication to demonstrate the Achievement Standards.
- Students are required to undertake at least one problem solving investigation task each semester. This task may be completed individually or collaboratively. They are required to plan, enquire into and draw conclusions about key unit concepts. Students may respond in forms such as modelling projects, problem solving and practical activities.
- Assessment tasks for a standard (1.0) or half-standard (0.5) unit must be informed by the Achievement Standards.

Advice

- It is recommended that the total component of unsupervised tasks be no greater than 30%.
- For tasks completed in unsupervised conditions, schools need to have mechanisms to uphold academic integrity, for example, student declaration, plagiarism software, oral defence, interview, other validation tasks

ICT (T)

Our ICT curriculum is a blended curriculum of two separate courses from the ACT Networking and Security and Data Science.

Organisation of content

Networking and Cyber Security

In this unit, students learn about networking technologies and cyber security. They explore network traffic, flow, access, use, limitations, and vulnerabilities. The unit has a focus on developing skills including problem solving, communication, time management and teamwork. Students create design solutions for network traffic scenarios and application.

Network Administration and Security

In this unit, students learn designing and administering networks. They explore the process of designing a network, administering a network, securing a network and mitigating network vulnerabilities. This unit focuses on combining networking equipment and end devices. Students create design solutions for network set up and administration

Data Representation and Analysis

This unit explores the ways that digital information is encoded, represented, manipulated, stored, compressed and transmitted. Students develop an understanding of where data comes from, and how to manipulate it using computational tools. Through the interpretation and visualisation of data, students identify patterns and trends, and use these findings to develop narratives and arguments in a variety of contexts

Big Data Analysis and Techniques

The data-rich world that we live in introduces many complex questions related to public policy, law, ethics and social impact. The goals of this unit are to develop a well-rounded and balanced view about data in the world, including the positive and negative effects of it. Students will develop skills in using data analysis processes, relevant algorithms and techniques, and computational tools to analyse Big Data using a multidisciplinary approach.

Assessment Task Types

	Design Process	Design Solution(s)
	Suggested tasks: • design development • design documentation • essay • extended response • oral presentation • podcast • portfolio (design process) • project management • report • research task • return brief • review • seminar • short response • storyboard • web portfolio • workshop	**Suggested tasks:** • digital artefact • digital asset • major project • network • portfolio • product • prototyping • software application • storyboard • website
Weightings in A/V 1.0 and 0.5 units	30 - 70%	30 - 70%
Weightings in T/V 1.0 and 0.5 units	40 - 60%	40 - 60%

Additional Assessment Information

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.

- Assessment tasks for a standard (1.0) or half-standard (0.5) unit must be informed by the Achievement Standards.
- Students should experience a variety of task types and different modes of communication to demonstrate the Achievement Standards.

ACT Humanities Strand Subject Options

Business (T)

Organisation of Content

Business Opportunities

In this unit, students investigate the nature of businesses formed in response to economic, social, regulatory, local, national, and global contexts. They critically analyse business responses to the opportunities and challenges offered by the contemporary world, including a social enterprise, a First Nations Australian enterprise and an enterprise operating in the Asia-Pacific region. Students develop skills in communication and planning to support collaborative problem solving and project work. They refine their capacity to analyse numerical data that supports business decisions. In proposing solutions and conclusions, students consider ethical and sustainability factors and issues.

Business Marketing

In this unit, students investigate the principles, theories, and ethics of marketing. They critically analyse case studies of marketing campaigns, including social enterprise marketing. Students develop skills in digital and social media to support the creation of marketing campaigns and business solutions derived from principles and theories. Students refine their creativity, teamwork, and communication skills in the collaborative analysis of marketing problems and creation of marketing solutions. They refine skills in statistics that will support the analysis of marketing processes and product formulation.

Leading a Business

In this unit, students investigate the principles and theories related to leadership, and managing people, operations, and change. They critically analyse case studies of business leadership from contemporary local, national, and global businesses. Students evaluate contemporary management practices considering emerging challenges and opportunities, and in the context of intercultural, ethical, and regulatory requirements. They refine critical thinking and mathematical skills needed to undertake budgeting and financial analyses of enterprises and propose viable solutions. Students refine teamwork, creativity, and communication skills to create solutions to problems in leading a business.

Business Finance and Planning

In this unit, students investigate the principles and theories of business finance and planning. They investigate concepts and methodologies of finance and entrepreneurship that underpin business planning, including procurement. Students critically analyse case studies of business finance and planning in small, medium, and large businesses. They evaluate financial practices for different types of business organisations, including social enterprises. Students evaluate business finance practices and case studies using ethical and sustainability perspectives and considering the regulatory environment. They refine their mathematical skills necessary to use financial data and business statistics in making plans and recommendations.

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.

Assessment Task Types

Task types for assessing knowledge, understanding and skills
Tasks may include the following: • in-class essay/report • case study in an examination or take-home format • examination using a mix of questions and response types • collaborative projects • market day • policy debates in oral or written form • research assignment, essay, report • data collection and analysis, investigation • inquiry based task • business, marketing, or financial plan • oral presentation, seminar • round table policy discussion role play • presentation, podcast, vodcast • simulation, individually or collaboratively • interview response/viva voce • portfolio of practical exercises • problem solving scenario individually or collaboratively
Weighting: No task to be weighted more than 40% in a 1.0 unit, or 60% in a 0.5 unit

Additional Assessment Advice

For a standard unit (1.0), students must complete a minimum of three and a maximum of five assessment tasks.

For a half standard unit (0.5), students must complete a minimum of two and a maximum of three assessment tasks.

- Each assessment item must enable students to demonstrate higher order thinking.
- 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.
- Students are required to create a variety of disciplinary relevant texts in a course of study. Duration or length of student responses should be determined by the nature of the task and requirements of the Achievement Standards.

Economics (T)

Organisation of Content

Microeconomic Foundations

In this unit, students investigate the nature and purpose of a range of economic theories and concepts related to microeconomics to better understand human behaviour. In investigating scenarios in local, national, global economies, and developing societies, they evaluate theories, models, and numerical analyses. Students evaluate explanations of microeconomic phenomena provided by economists to draw conclusions about the nature and actions of economic agents.

Debates in Microeconomics

In this unit, students analyse complex scenarios in microeconomics to understand choices of policy makers. They will engage with debate in the discipline on explanations for contemporary economic dilemmas and the range of possible solutions to problems facing people. Students collaborate to make predictions and propose solutions to problems facing policy makers and citizens.

Macroeconomic Foundations

In this unit, students investigate the nature and purpose of a range of economic theories and concepts related to macroeconomics. They evaluate theories, models, and numerical analyses through investigating scenarios in local, national, global economies and developing societies to understand how policy makers foster prosperity. Students evaluate explanations of macroeconomic phenomena provided by economists to draw conclusions about the effectiveness of decision making.

Debates in Macroeconomics

In this unit, students critically analyse in-depth scenarios in macroeconomics to understand the functional role of economics in bettering lives. They will engage with debate in the discipline around explanations for contemporary economic dilemmas and the range of possible solutions to problems facing people. Students make predictions and propose solutions to problems facing policy makers and citizens.

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.

Assessment Task Types

Task types for assessing knowledge, understanding and skills
Tasks may include the following: • in-class essay/report • case study in an examination or take-home format • examination using a mix of questions and response types • collaborative projects • market day • policy debates in oral or written form • research assignment, essay, report • data collection and analysis, investigation • inquiry based task • business, marketing, or financial plan • oral presentation, seminar • round table policy discussion role play • presentation, podcast, vodcast • simulation, individually or collaboratively • interview response/viva voce • portfolio of practical exercises • problem solving scenario individually or collaboratively
Weighting: No task to be weighted more than 40% in a 1.0 unit, or 60% in a 0.5 unit

Additional Assessment Information

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.

- Assessment tasks for a standard (1.0) or half-standard (0.5) unit must be informed by the Achievement Standards.
- Students must experience a variety of task types and different modes of communication to demonstrate the Achievement Standards.
- Each assessment item must enable students to demonstrate higher order thinking.
- 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.
- Students are required to create a variety of disciplinary relevant texts in a course of study. Duration or length of student responses should be determined by the nature of the task and requirements of the Achievement Standards.

History (T)

Organisation of Content

In Modern History, students study the forces that have shaped the modern world and develop a broader and deeper comprehension of the world in which they live. The Modern History curriculum consists of four units. For each unit there are five to eight topic electives that focus on a particular nation-state, movement or development. Each unit includes a focus on key concepts that underpin the discipline of history, such as cause and effect, significance, and contestability.

Understanding the Modern World

This unit provides an introduction to significant developments in the modern period that have defined the modern world, and the ideas that underpinned them such as liberty, equality and fraternity.

Change in the 20th Century

This unit examines significant movements, developed in response to the ideas studied in Unit 1 that brought about change in the modern world and that have been subject to political debate. The unit focuses on the ways in which individuals, groups and institutions have challenged authority and transform society.

Modern Nations

This unit examines the 'nation' as the principal form of political organisation in the modern world; the crises that confronted nations in the 20th century; their responses to these crises, and the different paths they have taken to fulfil their goals.

The Modern World since 1945

This unit focuses on the distinctive features of the modern world that emerged in the period 1945-2010. It aims to build students' understanding of the contemporary world - that is, why we are here at this point in time.

The Modern History curriculum continues to develop student learning in history through the two strands of historical knowledge and understanding, and historical skills. This strand organisation provides an opportunity to integrate content in flexible and meaningful ways.

Historical knowledge and understanding

The strand of historical knowledge and understanding focuses on knowing about and understanding key events, ideas, movements, developments and people that have shaped the modern world. Historical understanding is developed through concepts that define history as a discipline, including evidence, continuity and change, cause and effect, significance, empathy, perspectives and contestability.

Historical skills

This strand presents historical skills includes skills that are used in historical inquiry. There are five key skill areas that build on those learned in the Foundation to Grade 10 curriculum and which continue to be developed in the Modern History curriculum. These include chronology, terms and concepts; historical questions and research; analysis and use of sources; perspectives and interpretations; and explanation and communication. There is an emphasis through this strand on

the development of informed and defensible responses to inquiry questions through a critical use of sources.

Relationship between the strands

The two strands are interrelated and the content has been written to enable integration of the strands in the development of a teaching and learning program. The historical knowledge and understanding strand provides the contexts through which particular skills are to be developed. The same set of historical skills has been included in each of the four units to provide a common focus for the teaching and learning of content in the historical knowledge and understanding strand.

Assessment Task Types

Suggested tasks:

- interview based report
- commentary
- annotated bibliography
- in-class essay
- debate
- portfolio
- field work
- lab research
- viva voce
- document/source analysis
- report
- role play
- research and design report
- test/exam
- oral (seminar)
- empathetic response
- writing task
- response to stimulus
- exposition
- extended response
- essay
- website
- multimodal
- creative response
- interview
- discussion forum
- practical project
- workshop

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

No task to be weighted more than 60% for a standard 1.0 unit and half-standard 0.5 unit.

Additional Assessment Information

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.

- Assessment tasks for a standard (1.0) or half-standard (0.5) unit must be informed by the Achievement Standards.
- Students should experience a variety of task types and different modes of communication to demonstrate the Achievement Standards

ACT Scientific Strand Options

Biology (T)

Organisation of Content

In Biology, students develop their understanding of biological systems, the components of these systems and their interactions, how matter flows and energy is transferred and transformed in these systems, and the ways in which these systems are affected by change at different spatial and temporal scales. There are four units:

Units 1 and 2 - Biodiversity and Interconnectedness / Cells and Multicellular Organisms

In these 2 units, students build on prior learning to develop their understanding of relationships between structure and function in a range of biological systems, from ecosystems to single cells and multicellular organisms. In Biodiversity and Interconnectedness, students analyse abiotic and biotic ecosystem components and their interactions, using classification systems for data collection, comparison and evaluation. In Cells and Multicellular Organisms, students investigate the interdependent components of the cell system and the multiple interacting systems in multicellular organisms.

Units 3 and 4 - Heredity and Continuity of Life / Maintaining the Internal Environment

In these units, students examine the continuity of biological systems and how they change over time in response to external factors. They examine and connect system interactions at the molecular level to system change at the organism and population levels. In Heredity and Continuity of Life, students investigate mechanisms of heredity and the ways in which inheritance patterns can be explained, modelled and predicted; they connect these patterns to population dynamics and apply the theory of evolution by natural selection in order to examine changes in populations. In Maintaining the Internal Environment, students investigate system change and continuity in response to changing external conditions and pathogens; they investigate homeostasis and the transmission and impact of infectious disease at cellular and organism levels; and they consider the factors that encourage or reduce the spread of infectious disease at the population level.

Each unit includes:

- Unit descriptions – short descriptions of the purpose of and rationale for each unit
- Learning outcomes – six to eight statements describing the learning expected as a result of studying the unit
- Content descriptions – descriptions of the core content to be taught and learned, organised into three strands:
    - Science Inquiry Skills
    - Science as a Human Endeavour
    - Science Understanding (organised in sub-units)

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.

Chemistry (T)

Organisation of Content

Chemical Fundamentals

In this unit, students use models of atomic structure and bonding to explain the macroscopic properties of materials and to predict the products and explain the energy changes associated with chemical reactions.

Molecular Interactions and Reactions

In this unit, they continue to develop their understanding of bonding models and the relationship between structure, properties and reactions, including consideration of the factors that affect the rate of chemical reactions. In Units 3 and 4, students further develop their knowledge of chemical processes introduced in Units 1 and 2, including considering energy transfers and transformations, calculations of chemical quantities, rates of reaction and chemical systems.

Equilibrium, Acids and Redox Reactions

In this unit, students investigate models of equilibrium in chemical systems; apply these models in the context of acids and bases and redox reactions, including electrochemical cells; and explain and predict how a range of factors affect these systems.

Structure, Synthesis and Design

In this unit, students use models of molecular structure, chemical reactions and energy changes to explain and apply synthesis processes, particularly with consideration of organic synthesis; and they consider current and future applications of chemical design principles.

Mathematical skills expected of students studying Chemistry

The chemistry curriculum requires students to use the mathematical skills they have developed through the Early Learning - Grade 10 Curriculum: Mathematics, in addition to the numeracy skills they have developed through the Science Inquiry Skills strand of the 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 their scientific arguments, claims or conclusions. In gathering and recording numerical data, students are required to make measurements with an appropriate degree of accuracy and to represent measurements using appropriate units. 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. Students may need to be taught to interpret logarithmic scales and to use a calculator to substitute a value to evaluate a logarithmic expression as they are required in pH calculations (Unit 3), but are not part of the Grade 10 Curriculum: Mathematics.

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.

Physics (T)

Organisation of Content

In Physics, students develop their understanding of the core concepts, models and theories that describe, explain and predict physical phenomena.

- Linear Motion and Waves
- Thermal, Nuclear and Electrical Physics
- Gravity and Electromagnetism
- Revolutions in Modern Physics

In Units 1 and 2 (Linear Motion and Waves and Thermal, Nuclear and Electrical Physics), students further investigate energy, motion and forces, building on the ideas introduced in the Early Years to Grade 10 curriculum: Science.

In Unit 1, students investigate energy production by considering heating processes, radioactivity and nuclear reactions, and investigate energy transfer and transformation in electrical circuits.

In Unit 2, students describe, explain and predict linear motion, and investigate the application of wave models to light and sound phenomena.

In Units 3 and 4, (Gravity and Electromagnetism and Revolutions in Modern Physics) students are introduced to more complex models that enable them to describe, explain and predict a wider range of phenomena, including, in Unit 4, very high-speed motion and very small-scale objects.

In Unit 3, students investigate models of motion in gravitational, electric and magnetic fields to explain how forces act at a distance and use the theory of electromagnetism to explain the production and propagation of electromagnetic waves.

In Unit 4, students investigate how shortcomings in existing theories led to the development of the Special Theory of Relativity, the quantum theory of light and matter, and the Standard Model of particle physics.

Science strand descriptions

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.

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. States and territories will determine whether there are any requirements related to an extended scientific investigation as part of their course materials.

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.

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.

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.

Staff contacts for further information

Further subject specific or school information can be provided from our teachers.

Mr Winas – Physics and Head of Secondary Campus jwinas@lis.iea.ac.pg

Mrs Kalenda – English bkalenda@lis.iea.ac.pg

Mr Popoi – Maths for Humanities ppopoi@lis.iea.ac.pg

Mr Manuel – Maths for Scientific dmanuel@lis.iea.ac.pg

Mrs Dagina – History jdagina@lis.iea.ac.pg

Mrs Pondikou – Chemistry and Physics apondikou@lis.iea.ac.pg

Mrs Isana – Biology kisana@lis.iea.ac.pg

Mr Oreng – Business and Economics eoreng@lis.iea.ac.pg

Mrs Lunga – ICT alunga@lis.iea.ac.pg

Mrs Tulasoi – English vtulasoi@lis.iea.ac.pg

Mr Lyng – Whole School Deputy Principal dlyng@lis.iea.ac.pg

Mr Neville – Principal gneville@lis.ies.ac.pg