Year Plan: 8 Science and 8 Foundation Science — Australian Curriculum: Science V8.3

Implementation year: 2012 (revised 2018) **School name: IGNATIUS PARK COLLEGE, TOWNSVILLE**

Identify curriculum

Year level description

YEAR 8:

The Australian Curriculum: Science has three (3) interrelated dimensions, namely Science Understanding (SU), Science as a Human Endeavour (SHE) and Science Inquiry Skills (SIS). In the practice of Science, these three dimensions are closely integrated, whereby together they provide students with knowledge, understanding and skills through which they can develop a scientific view of the world. Students are challenge to explore science, its concepts, nature and uses through clearly described inquiry processes. The work of scientists reflects the nature and development of science, is built around scientific inquiry and seeks to respond to and influence society's needs.

The **Science Inquiry Skills** and **Science as a Human Endeavour** strands are described across a two-year band. In their planning, schools and teachers refer to the expectations outlined in the Achievement Standard and also to the content of the **Science Understanding** strand for the relevant year level to ensure that these two strands are addressed over the two-year period. The three strands of the curriculum are interrelated and their content is taught in an integrated way. The **Science as a Human Endeavour** strand can provide relevant contexts in which science can be taught. The order and detail in which the content descriptions are organised into teaching/learning programs are decisions to be made by the teacher.

Over Years 7 to 10, students develop their understanding of microscopic and atomic structures; how systems at a range of scales are shaped by flows of energy and matter and interactions due to forces, and develop the ability to quantify changes and relative amounts. In Year 8, students are introduced to cells as microscopic structures that explain macroscopic properties of living systems. They link form and function at a cellular level and explore the organisation of body systems in terms of flows of matter between interdependent organs.
Similarly, they explore changes in matter at a particle level, and distinguish between chemical and physical change. They begin to classify different forms of energy, and describe the role of energy in causing change in systems, including the role of heat and kinetic energy in the rock cycle. Students use experimentation to isolate relationships between components in systems and explain these relationships through increasingly complex representations. They make predictions and propose explanations, drawing on evidence to support their views.

Achievement standard

By the end of Year 8, students compare physical and chemical changes and use the particle model to explain and predict the properties and behaviours of substances. They identify different forms of energy and describe how energy transfers and transformations cause change in simple systems. They compare processes of rock formation, including the time scales involved. They analyse the relationship between structure and function at cell, organ and body system levels. Students examine the different science knowledge used in occupations. They explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems.

Students identify and construct questions and problems that they can investigate scientifically. They consider safety and ethics when planning investigations, including designing field or experimental methods. They identify variables to be changed, measured and controlled. Students construct representations of their data to reveal and analyse patterns and trends, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their own scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate language and representations to communicate science ideas, methods and findings in a range of text types.

Course Organisation

"Ignatius Park College is proudly dedicated to boys: their spiritual, academic, social and physical growth as they approach maturity. As Townsville's only boys' school, we are uniquely placed to cater for their specific needs."(ipc.qld.edu.au, 2016) The Year 8 Science and Foundation Science course has been carefully developed and implemented using boy friendly pedagogies and assessment to suit the needs of young men, within the given parameters of the College's strategic directions, resources and timetable structure. There are six (6) laboratories that are shared between all Middle and Senior Science classes, which is approximately 45 classes in total. Within the cohort of Year 8 students, there are seven classes of approximately 25 students that are split according to camp organisation in Pastoral Houses. An additional class, titled as 'Foundation Science' caters to the students with verified learning disabilities and includes a maximum of 15 students requiring additional literacy and numeracy support. Over a fortnightly timetable, eight (8) classes of 50 minutes duration are allocated to Science, and each of the four (4) strands of Science are covered over the length of one (1) term as shown below. Of these eight (8) fortnightly lessons it is ensured that there is equitable distribution between the laboratory time and general classroom time for each class. This is dependent on the number of Senior Science classes and the number of Year 7 Science classes that may be running at the same time.

Key to General Capabilities and Cross-curriculum Priorities

Literacy | Numeracy | ICT capability | Critical and creative thinking | Ethical understanding | Personal and social capability | Intercultural understanding

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

Teaching and learning

YEAR 8 CONTENT DESCRIPTIONS

CHEMICAL SCIENCES (Term 2 ~10 wks) "Matter Matters"	EARTH & SPACE SCIENCES (Term 1 ~9 wks) "Science Rocks!"	BIOLOGICAL SCIENCES (Term 3 ~10 wks) "Cells and Body Systems"	PHYSICAL SCIENCES (Term 4 ~7 wks) "Never-ending Energy"
In this unit students are introduced to the particle model of matter and use it to explain and investigate the physical and chemical properties of materials and the relationship between these properties in the use of materials in everyday applications. They will plan and conduct fair tests, record observations and collect, represent and analyse qualitative and quantitative data. Students will be introduced to elements and simple compounds including their symbolic	***In this unit students will explore different types of rocks and the minerals of which they are composed. They compare the different processes and timescales involved in their formation as part of the rock cycle. Students construct, identify, interpret and investigate rock and mineral specimens, models and representations to aid in the analyses of patterns and relationships in data.***	***In this unit students will identify cells as the basic units of living things and their specialised structures. They will use microscopes and images to distinguish between multicellular and unicellular organisms of both animal and plant cells. Students will examine scientific work about cell formation and the processes of cell division via mitosis in organisms. They will analyse the development of the cell theory as a result of historical scientific work. Additionally, students will explore 4 major body systems, namely the digestive***	***In this unit students will classify energy forms. They will investigate different forms of potential energy, make predictions and conduct fair and safe experimental tasks. They will use models and representations to examine kinetic energy and its relationship with potential energy and heat. Students will communicate how energy is transferred and transformed through systems. They will recognise that energy can be transformed into usable and unusable forms and consider how this can impact on the efficiency of a system. Students will discuss***

		representation and the basic structure and development of periodic table of elements. They will identify, represent and explain chemical change using the particle model of matter.		***system, circulatory system, respiratory system and reproductive systems of animals and plants. The structure of organs in these systems is identified and the function of each organ in relation to the overall function of the organ system is also highlighted. The use of assisted technologies is examined and the impact these have on society and industries is investigated, with special consideration to the ethical issues and guidelines involved.***	***the use and influence of science on the utilisation of energy sources and consider how the efficiency of these sources in the production of energy could influence their use by society. They will perform experiments that investigate variables which effect the energy transformations involved with moving objects and use the scientific method in this process.***
	SCIENCE UNDERSTANDING (SU)	**The properties of the different states of matter can be explained in terms of the motion and arrangement of particles** (ACSSU151) **Differences between elements, compounds and mixtures can be described at a particle level** (ACSSU152) **Chemical change involves substances reacting to form new substances** (ACSSU225) <u>Suggested elaborations</u>: -explaining why a model for the structure of matter is needed -modelling the arrangement of particles in solids, liquids and gases -using the particle model to explain observed phenomena linking the energy of particles to temperature changes -modelling the arrangement of particles in elements and compounds -recognising that elements and simple compounds can be represented by symbols and formulae -locating elements on the periodic table -identifying the differences between chemical and physical changes -identifying evidence that a chemical change has taken place -investigating simple reactions such as combining elements to make a compound -recognising that the chemical properties of a substance, for example its flammability and ability to corrode, will affect its use	**Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales** (ACSSU153) <u>Suggested elaborations</u>: -representing the stages in the formation of igneous, metamorphic and sedimentary rocks, including indications of timescales involved -identifying a range of common rock types using a key based on observable physical and chemical properties -recognising that rocks are a collection of different minerals -considering the role of forces and energy in the formation of different types of rocks and minerals -recognising that some rock and minerals, such as ores, provide valuable resources	**Cells are the basic units of living things and have specialised structures and functions** (ACSSU149) **Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce** (ASCCU150) <u>Suggested elaborations</u>: -examining a variety of cells using a light microscope, by digital technology or by viewing a simulation -distinguishing plant cells from animal or fungal cells -identifying structures within cells and describing their function -recognising that some organisms consist of a single cell -describing mitosis as cell division for growth and repair -identifying the organs and overall function of key systems of a multicellular organism in supporting the life processes -describing the structure of each organ in systems and relating its function to the overall function of the system -examining the specialised cells and tissues involved in structure and function of particular organs -comparing similar systems in different organisms such as digestive systems in herbivores and carnivores, respiratory systems in fish and mammals -distinguishing between asexual and sexual reproduction -comparing reproductive systems of organisms	**Energy appears in different forms including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems** (ACSSU155) <u>Suggested elaborations</u>: -recognising that kinetic energy is the energy possessed by moving bodies -recognising that potential energy is stored energy, such as gravitational, chemical and elastic energy -investigating different forms of energy in terms of the effects they cause, such as gravitational potential causing objects to fall and heat energy transferred between material that have a different temperature -recognising that heat energy if often produced as a by-product of energy transfer, such as brakes on a car and light globes -using flow diagrams to illustrate changes between different forms of energy

Aboriginal and Torres Strait Islander Perspectives **KEY RESOURCE: 'ACHIEVE' SCIENCE BOOKLETS**	Science provides opportunities for students to strengthen their appreciation and understanding of Aboriginal peoples and Torres Strait Islander peoples and their living cultures. Specific content and skills within relevant sections of the curriculum can be drawn upon to encourage engagement with: • Aboriginal and Torres Strait Islander frameworks of knowing and ways of learning • Indigenous contexts in which Aboriginal and Torres Strait Islander peoples live • Aboriginal peoples' and Torres Strait Islander peoples' contributions to Australian society and cultures. Science provides opportunities to explore aspects of Australian Indigenous knowing with connection to, and guidance from, the communities who own them. Using a respectful inquiry approach, students have the opportunity to explore non-Indigenous science interpretations of Aboriginal and Torres Strait Islander lifestyles including knowledge of nature phenomena; native flora and fauna; and land water and waste management. Using an inquiry approach enables students to learn science in contexts that are valued by Aboriginal and Torres Strait Islander students, their peers and communities, acknowledging their values and approaches to learning.								
Key to General Capabilities and Cross-curriculum Priorities	Literacy Numeracy ICT capability Critical and creative thinking Ethical understanding Personal and social capability Intercultural understanding Aboriginal and Torres Strait Islander histories and cultures Asia and Australia's engagement with Asia Sustainability								
ASSESSMENT	**CHEMICAL SCIENCES (Term 2)** **"Matter Matters"**		**EARTH AND SPACE SCIENCES (Term 1)** **"Science Rocks"**		**BIOLOGICAL SCIENCES (Term 3)** **"Cells and Body Systems"**		**PHYSICAL SCIENCES (Term 4)** **"Never-ending Energy"**	
	Week	**Assessment instrument**	**Week**	**Assessment instrument**	**Week**	**Assessment instrument**	**Week**	**Assessment instrument**
	6 10	*FORMATIVE ACTIVITY FOR WRITING/PARAGRAPHING PRACTICE:* ***SHORT 'ELEMENT' RESEARCH INQUIRY – POSTER PRESENTATION*** ***(SHE criteria focus)*** *Pick one of the 1st 20 elements and present electronic printout using microsoft word (A3 portrait enlarged from A4) - detailing state, symbol, uses, properties, how it is relevant in scientific discovery, how it is used (elemental or compound forms) and how it impacts on human activity* ***SUMMATIVE –*** ***'MATTER MATTERS' WRITTEN EXAMINATION (2 x 45 minutes)*** *Topics include lab equipment, forms of data, graphing, scientific drawing, report components, states of matter, particle theory, elements, periodic table basics (1st 20), chemical and physical changes, indication of chemical reactions, compounds, mixtures, word and symbol equations, molecules, reactions*	8	***SUMMATIVE –*** ***ROCK CYCLE RESEARCH ASSIGNMENT*** *Includes describing rock features, contained resources (minerals/ores) and riches worth mining, explaining past and present processes, identifying a series of events with the 20 million year period, predicting future changes and influence by events such as natural disasters, exploration details of the rocks riches*	4-10	***SUMMATIVE –*** ***COLLECTION OF WORK*** *TASKS MAY INCLUDE:* 1. *microscope practical task* 2. *edible cell model and structures/functions table* 3. *stimulus response questions using peel paragraphing (stem cell research; digestive system comparison)* 4. *cells and systems supervised task (short and extended responses, data analysis, graphing questions – microscopes, body systems – circulatory, respiratory, reproductive systems)*	2-6 7/8	**FORMATIVE –** *Practice experimental design exercises (such as building kettles; energy in foods; mouse trap racers; insulation and glazing; solar cookers) where designing methods in groups and collecting valid data; writing up components of scientific reports; analysing data and energy transformations* ***SUMMATIVE -*** ***ENERGY TRANSFORMATION EXPERIMENTAL INVESTIVATION*** *In-class practical design in groups and scientific report under examination conditions (4-5 lessons)* *(access to IT – Microsoft word, excel for typing and data presentation for some report components)*

Make judgments and use feedback	**Moderation**	Term 2 CHM EXAM: Teachers develop tasks and plan units. Teachers perform informal moderation of research inquiry task through peer review and presentation of posters to class. Exam draft feedback from team and auditor to check final copy/criteria/solutions before proofing by FL; Solutions done prior to exam. Cross-marking in subject teams of 3 sample exams prior to marking of class sets OR Teachers mark allocation sections of each exam for the whole cohort.	Teachers develop tasks and plan units. Team meeting to review samples of drafts and gain consistency in expectations from standard elaborations. Mark 3 final assignments (select different LOAs) → cross-marking of these 3 samples in rotation of pairs in subject team prior to marking of full class set	Teachers develop tasks and plan units. Drafts of each task collected and returned progressively with a 1 week gap between each; Team meeting to review samples of drafts (after draft of task 1 submitted) to gain consistency in expectations from standard elaborations (and to set clear expectations of the paragraphing tasks) Mark 3 final assignments (select different LOAs) → cross-marking of these 3 samples in rotation of pairs in subject team prior to marking of full class set Final task: Exam draft feedback from team and auditor to check final copy/criteria/solutions before proofing by FL; Solutions done prior to exam.	Teachers develop tasks and plan units. Teachers perform informal moderation of practice scientific report task through peer review and feedback to individuals. Task draft feedback from team and auditor to check final copy/criteria before proofing by FL; practice run of data collection done to ensure appropriate data outcomes/trends; Cross-marking in subject teams of 3 sample reports prior to marking of whole class set and reporting of results.

Year 8 Science: review for balance and coverage of content descriptions

Science Understanding	1	2	3	4
TERM 1 2 3 4 **EARTH AND SPACE → CHEMICAL → BIOLOGICAL → PHYSICAL**				
The properties of the different states of matter can be explained in terms of the motion and arrangement of particles		✓		
Differences between elements, compounds and mixtures can be described at a particle level		✓		
Chemical change involves substances reacting to form new substances		✓		
Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales	✓			
Cells are the basic units of living things; they have specialised structures and functions			✓	
Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce			✓	
Energy appears in different forms including movement (kinetic energy), heat and potential energy, and energy transformations and transfers cause change within systems				✓

Science as a Human Endeavour	1	2	3	4
NATURE AND DEVELOPMENT OF SCIENCE				
Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE134)	✓		✓	✓
Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures (ACSHE226)		✠	✓	✠
USES AND INFLUENCE OF SCIENCE				
Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations (ACSHE135)	X	✓	✓	
People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE136)			✓	✓

Science Inquiry Skills	1	2	3	4
QUESTIONING AND PREDICTING				
Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS139)		✓	✓	✓
PLANNING AND CONDUCTING				
Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS140)		✓	✓	✓
Measure and control variables, select equipment appropriate to the task and collect data with accuracy (ACSIS141)		✓		✓
PROCESSING AND ANALYSING DATA AND INFORMATION				
Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate (ACSIS144)	✓	✓	✓	✓
Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions (ACSIS145)	✓	✓	✓	✓
EVALUATING				
Reflect on scientific investigations including evaluating the quality of the data collected, and identifying improvements (ACSIS146)		✓		✓
Use scientific knowledge and findings from investigations to evaluate claims based on evidence (ACSIS234)		✓		✓
COMMUNICATING				
Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate (ACSIS148)	✓	✓	✓	✓

Content descriptions (GCs for Rocks unit):

This unit provides opportunities for students to engage in the above Australian Curriculum Content descriptions.

General capabilities

Literacy

- Comprehending texts through listening, reading and viewing
- Composing texts through speaking, writing and creating
- Text knowledge
- Grammar knowledge
- Word knowledge
- Visual knowledge

Numeracy

- Recognising and using patterns and relationships

ICT capability

- Managing and operating ICT

Critical and creative thinking

- Inquiring - identifying, exploring and organising information and ideas
- Generating ideas, possibilities and actions
- Reflecting on thinking and processes
- Analysing, synthesising and evaluating reasoning and procedures

Personal and social capability

- Self-management
- Social management

Relevant prior curriculum

Students require prior experience from Year 4 with:

- Understanding that the Earth's surface changes over time as a result of natural processes and human activity

Students require prior experience from Year 6 with:

- Understanding that sudden geological changes or extreme weather conditions can affect Earth's surface

Students require prior experience from Year 7 with:

- application of science inquiry skills including: questioning and predicting, planning and conducting, processing and analysing data and information, evaluating, communicating

Curriculum working towards

The teaching and learning in this unit works towards the following in Year 9:

- understanding that the theory of plate tectonics explains global patterns of geological activity and continental movement

application of science inquiry skills including: questioning and predicting, planning and conducting, processing and analysing data and information, evaluating, communicating