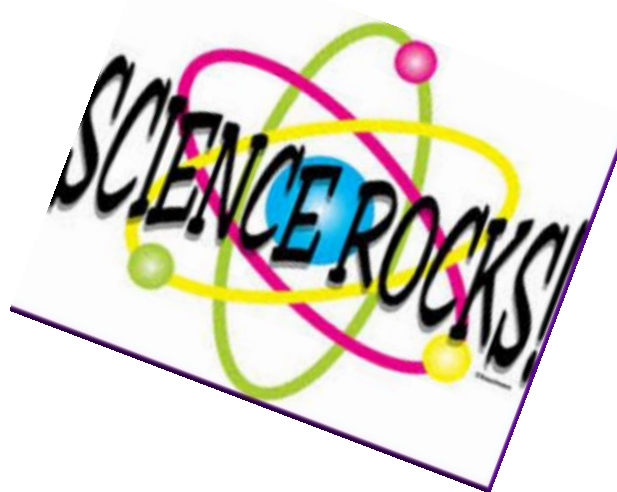


# SCIENCE



## ELECTIVE SUBJECTS: Across Two Semesters

### WHY STUDY SCIENCE?

Science provides an opportunity for students to answer questions about our physical, chemical and biological world and how it functions. In today's technologically advanced society, students are able to access the most up to date facts and evidence, to contest and refine their knowledge, to use inquiry skills and answer many of these scientifically orientated questions.

Science allows individuals and groups to be active citizens in their personal, social and economic lives. Students are able to develop and acquire knowledge, understanding and inquiry skills to question the direction which Science takes in society, the contributions of historical and cultural occurrences, current practices, contemporary issues and how many career choices involve science.

### COURSE AIMS:

In particular, students at the College in Science develop:

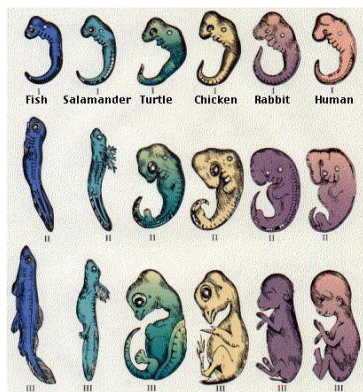
- a solid foundation of the nature of the biological, chemical, physical and earth sciences to prepare and build students with knowledge and skills to transition into senior school science.
- a key understanding of concepts offered in the discreet subjects of Biology, Chemistry and Physics at senior schooling level.
- inquiry skills through questioning, hypothesizing, planning, conducting experiments and investigations (based on ethical principles), collecting and analyzing data, evaluating results and drawing critical evidence-based conclusions. Emphasis will be placed on developing in text referencing skills for all inquiry research.
- an appreciation and understanding of social, cultural and historical factors as they consider the interactions between Science and current social practices.
- 21<sup>st</sup> century skills including: Literacy, Numeracy, ICT skills, critical and creative thinking skills, effective communication and cooperative skills.
- life skills and a futures perspective as they engage in a range of science activities as informed and active citizens in society.

### COURSE ORGANISATION:

The study of Science in Year 10 involves a selection of one or more elective subjects that have been developed to address Australian Curriculum requirements and to transition into senior school Science subjects. All units are organised using the *Australian Curriculum Science* and *Senior Science Syllabus*.

## Year 10 Units

### Semester 1 – SC742 Biology



Students will examine the makeup and functioning of cells, with particular reference to DNA structure, DNA replication, mitosis, meiosis, and protein synthesis. They will explain the genetic make-up of living organisms, analysing and comparing their evolutionary traits. Scientific theories of fossilisation, embryology and comparative anatomy will be explored.

**Inquiry skills:** Students will analyse the progression of theories involving the current DNA model, develop questions and hypotheses whilst undertaking laboratory experimentation. They will identify and manipulate relevant information to gain understanding of transcription and translation processes and associate these with appropriate scientific concepts and principles.

### Assessment

Students will complete 3 assessment tasks: an exam on DNA and protein synthesis, a comparative analysis essay on the rat and toad and an inquiry skills exam.

## Semester 2 – SC743 Biology

Students will explore the ways Biology is used to describe and explain the biodiversity within ecosystems, a range of biotic and abiotic components, species interactions, principles of population dynamics and how classification systems are used to identify organisms and aid scientific communication.

**Inquiry skills:** Students will describe and explain ecological and taxonomic concepts, theories, models and systems and their limitations. They will apply understanding of classification and ecological principles to communicate data about biodiversity and develop models of ecosystems. They will design experiments and investigations into the structure of and interactions within ecosystems.



## Assessment

Students will complete 3 assessment tasks: an exam on classification and ecological principles, an extended experimental investigation into an environmental issue and an inquiry skills exam.

## Semester 1 – SC745 Chemistry

Alkali Metals		Transition Metals																Noble Gases					
Alkaline Earth																		Halogens					
H	He																	He					
Li	Be																	B	C	N	O	F	Ne
Na	Mg																	Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe						
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn						
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub												
Lanthanides		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu								
Actinides		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr								

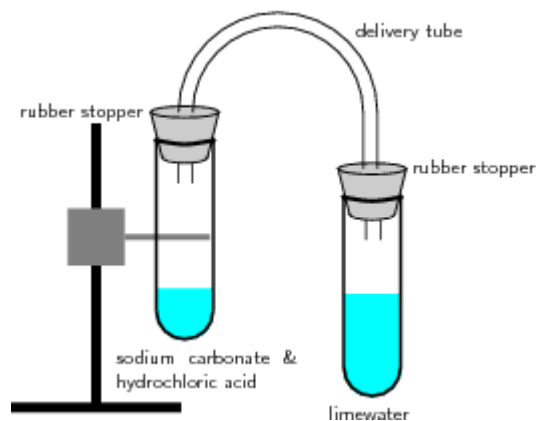
Students will analyse the periodic table and the arrangement of its elements to predict the structure and properties of particles during chemical reactions. They will explore chemical reactions and metal reactivity through an extended experimental investigation (EEI) and generate a report on their findings. Students will learn about the Mole, balanced equations and how to calculate reactant and product quantities in chemical reactions (stoichiometry).

**Inquiry skills:** Students analyse the periodic table, pose questions, select and design an experiment using qualitative volumetric techniques to analyse and calculate gas produced in a metal/acid reaction.

## Assessment

Students will complete 3 assessment tasks: a mid-term exam on atomic structure and bonding, an extended experimental investigation into metal reactivity and an end of semester exam on quantitative chemistry and previous content.

## Semester 2 – SC746 Chemistry



Students will explore the reversibility of reactions in a variety of chemical systems at different scales, acid-base equilibrium systems and their applications, the principals of oxidation and reduction reactions and the production of electricity from electrochemical cells. They will participate in experiments related to the principles of dynamic chemical equilibrium and how these can be applied to chemical processes and systems.

**Inquiry skills:** Students apply understanding to predict the effect of changes in temperature, concentration and pressure on equilibrium systems. They will conduct investigations in to the properties of acids and bases, redox reactions and electrochemical cells. They will analyse qualitative and quantitative data on chemical reactions.

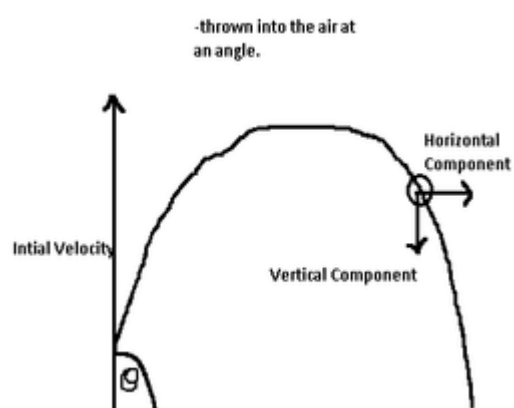
## Assessment

Students will complete 3 assessment tasks: a mid-term exam on thermochemistry, an environmental issues essay and an end of semester exam on redox reactions, electrolysis and previous content.

## Semester 1 – SC735 Physics

Students will explore the forces that occur in structures and construct various models to test their strength and investigate how the forces are distributed. Through analysis of the motion of various objects, students will ascertain information and use kinematics formulas to uncover the various components of the objects' motion, including displacement, velocity, acceleration. Following this, students will investigate wave motion and its effect on light, sound and heat.

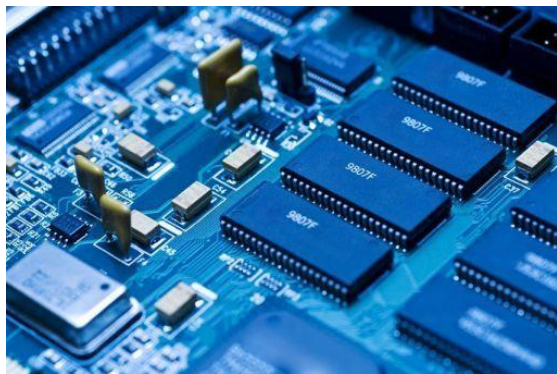
**Inquiry skills:** Students apply understanding of displacement, velocity, acceleration, force, energy, momentum, reflection, refraction and superposition of waves and their various implications to predict phenomena, solve problems and calculate unknowns.



## Assessment

Students will complete 2 assessment tasks: an extended experimental investigation into the design, construction and testing of a model bridge and an end of semester exam on content from the entire semester.

## Semester 2 – SC736 Physics



Students will assemble electrical circuits and explore the common concepts associated with electricity. In addition, students will develop an understanding of electromagnetism, electric motors, generators and turbines. Students will construct electronic models to investigate and understand how components (including switches, resistors, diodes, capacitors and relays) within electronics function as a collective to produce a desired outcome.

**Inquiry skills:** Students apply understanding of electromagnetic concepts, theories, models and systems within the limitations of these. Students will analyse quantitative and qualitative data using various mathematical equations and graphical representations. They will communicate understandings, findings, arguments and conclusions.

### Assessment

Students will complete 2 assessment tasks: an extended experimental investigation into designing a renewable energy source that will power a small generator to produce electricity and an end of semester exam on content from the entire semester.

## Semester 1 – SC729 General Science

Students will consider global interactions of our Earth. They will examine the lithosphere, plate tectonic movement associated with the earth's changing physical structure and natural cycles including water, carbon, nitrogen and phosphorus cycles. They will also examine the biosphere and investigate a chosen organism; its habitat, biotic and abiotic interactions and environmental adaptations.



**Inquiry skills:** Students apply understanding of Earth's processes and systems. They will conduct experiments and investigations into Earth's systems, features or phenomena, evaluate the outcome of experiments and communicate understandings, findings and conclusions.

### Assessment

Students will complete 3 assessment tasks: an exam on Earth's spheres and cycles, an extended experimental investigation into earth's composition and a report on interactions of an organism and their ecosystem.



Students will explore the Earth's atmosphere and hydrosphere and describe changes in our atmosphere and how this impacts on our weather systems. Students will explore the marine environment focussing on mangrove and reef ecosystems; the organisms that live there and the sustainable practices associated with these resources. Students will investigate physical features that allow us to classify aquatic organisms, describe and analyse the impact of human interaction on the Great Barrier Reef including the effects of Global Warming and 'The Enhanced Greenhouse Effect'.

**Inquiry skills:** Students will apply understanding of classification and ecological principles to communicate data about the impact of human interaction on various ecosystems. They will design experiments and investigations into the structure of and interactions within ecosystems. They will use primary and secondary data to analyse different ecosystems and evaluate human interactions.

### Assessment

Students will complete 3 assessment tasks: an exam on classifying reef organisms, a report on greenhouse gases and an extended experimental investigation into the effect of carbon dioxide on the environment.