

SCIENCE

In Science students explore the nature of science through contexts derived from the physical world, the biological world, the material world and planet earth and beyond. In doing so they are given opportunities to develop an understanding of science, so that they can participate as critical, informed and responsible citizens, in a world where science plays a significant role.

What is Science about?

Science is a way of investigating, understanding and our explaining natural, physical world and the wider universe. It involves generating and testing ideas, gathering evidence – including by making observations, carrying out investigations, modelling, and communicating and debating with others – in order to develop scientific knowledge, understanding, and explanations. Scientific progress comes from logical, systematic work and from creative insight, built on a foundation of respect for evidence. Different cultures and periods of history have contributed to the development of science.

Why study Science?

Science is able to inform problem solving and decision making in many areas of life. Many of the major challenges and opportunities that confront our world need to be approached from a scientific perspective, taking into account social and ethical considerations.

By studying science, students:

- develop an understanding of the world, built on current
- scientific theories;
- learn that science involves particular processes and ways of developing and organising knowledge and that these continue to evolve;
- use their current scientific knowledge and skills for problem solving and developing further knowledge;
- use scientific knowledge and skills to make informed decisions about the communication, application, and implications of science as these relate to their own lives and cultures and to the sustainability of the environment;
- use language, symbols, mathematics and graphical representation.

YEARS 7 to 10

In Year 7 and 8 students will explore Biology, Chemistry, Physics and Astronomy to develop an understanding of the scientific concepts involved, the nature of science and how science explains the world around us. Students will learn how to investigate, be an effective scientific communicator and be able to make informed decisions on scientific issues.

In Year 9 students will build upon the seeds of science sown in Year 7 and 8. They will continue to investigate science with a focus on the physical, biological and material world and planet earth and beyond. Students will use microscopes to observe life at a cellular level, as well as investigating how plants and animals obtain nutrients for growth. They will explore the behaviour of light and the role of energy in our world. Students will develop understandings of the composition and properties of matter and the changes it undergoes as new materials are made.

In Year 10, the students will further develop their understanding and application of science, in preparation for NCEA in Year 11. Students will then examine how variation arises, through the role of genes and they will investigate inheritance. In doing so, they will develop an understanding of basic genetics, which is studied in Biology in Year 11. Students will examine forces and their effect upon everyday life, explore motion and how to measure it. They will investigate the properties and behaviour of electricity and the reliance of humans upon it. This will prepare the students well for studying Physics in Year 11. Students will build upon their knowledge of Chemistry as well as explore the properties and behaviour of particles and the properties and uses of acids and bases and chemical reactions.



SCIENCE (LEVEL 1)

A full year Science course is compulsory in Year 11 at Baradene.

All students will choose to study:

- ONE of the Physical Science or Biological Science courses; **OR**
- The DOUBLE Science course which comprises of BOTH of the SINGLE Science courses; Physical Science and Biological Science

SINGLE SCIENCE COURSE

This comprises of the options of Physical Science **OR** Biological Science:

Physical Science (Physics and Chemistry)

This course is designed to cover the major aspects of PHYSICS and CHEMISTRY and enables students to develop the knowledge and skills that are needed for success in NCEA Level 2 Physics and Chemistry.

In the Physics aspect of this course students will study forces and motion, and magnetism and electricity. In the Chemistry aspect of this course students will explore the structure, properties, and reactions of elements and compounds. Students will also study qualitative analysis and use techniques to identify unknown solutions.

This course is intended for those students who wish to study NCEA Level 2 Physics and / or Chemistry. Students who take this course as a SINGLE option may still study Level 2 Biology, without having studied Level 1 Biology, although it is beneficial to have studied Level 1 Biology.

Biological Science (Biology and Chemistry)

This course is designed to cover key aspects of BIOLOGY and CHEMISTRY. It enables students to develop the knowledge and skills needed to embark on Level 2 Biology and Chemistry.

In the Biology aspect of this course, students will study aspects of genetics and patterns of inheritance and explore micro-organisms and their effects. They will also perform an investigation in a scientific context. In the Chemistry units, students will study atomic structure and bonding of substances, and how materials behave. They will explore the acid-base nature of chemicals and investigate how the rate of chemical reactions can be controlled.

This course is intended for those students who wish to study Level 2 Biology and / or Level 2 Chemistry but it not suitable for those wishing to study Level 2 Physics.

DOUBLE SCIENCE COURSE

This comprises of BOTH the Physical Science AND Biological Science options. This extension course provides the depth of knowledge and skills for students intending to study Level 2 Biology, Chemistry and Physics.

Students are advised to follow this pathway if they have a strong interest in science and are intending to study more than one of the Level 2 sciences; Chemistry, Physics and Biology with a view to a career in the sciences.

Students should be aware of the requirements for entry into the Level 2 Chemistry and Physics courses when selecting Level 1 courses.



BIOLOGY

BIOLOGY (LEVEL 2)

Description

Biology develops an understanding of the Living World. Students study plant and animal relationships through ecology, explore details of the cell, the structure of animals and plants, and genetics and evolution. Internal assessment involves practical work and a field trip. External assessment is through examination.

Students intending to follow a science career with a focus on Biology are advised to also study Level 2 Chemistry. Many biological courses at tertiary level require knowledge of Level 2 Chemistry.

Leads to Level 3 Biology, Level 3 Physical Education and Level 3 Chemistry.

BIOLOGY (LEVEL 3)

Description

Biology at this level introduces students to the new world that is opening up in this subject. It explores DNA and how it works, the new techniques associated with DNA fingerprinting and genetically modified organisms. Other areas studied include plant and animal behaviour, homeostasis and human evolution. Field trips and practical work are part of the course.

Students taking Level 3 Biology and intending to follow a science career should also take another science. Many biological courses at tertiary level require knowledge of Level 2 Chemistry and above and so students are advised to continue on to Level 3 Chemistry or study Level 2 Chemistry if they have not already done so.

Prerequisites

Preference will be given to students with a minimum of 14 credits in NCEA Level 2 Biology or at least 15 credits in NCEA Level 2 Chemistry. Discretionary entry will be offered by Head of Faculty.

BIOLOGY SCHOLARSHIP

Description

This course will extend the Level 3 Biology programme by adding depth and breadth to the student's knowledge. Extra-curricular tuition and workshops will prepare the students for the critical and analytical nature of the end-of-year examination. Scholarship students are expected to use knowledge of biology to demonstrate high level critical thinking by analysing and integrating biological information in a range of biological contexts.

Prerequisites

Preference will be given to students who have a majority of Excellence grades at Level 2 Biology, however discretionary entry will be offered by the Head of Faculty.

Assessment Scholarship

External: Three hour written examination.

CHEMISTRY

CHEMISTRY (LEVEL 2)

Description

This course builds upon the knowledge and understanding of the chemistry developed in Level 1 Science, through both practical and theoretical application of the subject. The course covers various types of chemical reactions with an emphasis on the relevance of chemistry to everyday life and technology. Students will develop their scientific skills, challenge their thinking skills and become more effective scientific communicators.

The course is designed to prepare students for Level 3 Chemistry and is a pre-requisite for many science based careers e.g. medicine, pharmacy, physiotherapy, dentistry, engineering, dietetics, nutrition, food technology, health and environmental science. Students intending to follow a science career should take Chemistry, Mathematics and either Physics and/or Biology.

Prerequisites

Preference will be given to students with a minimum of 14 credits in Level 1 Science; from 11SCP or 11SCB (including 4 external credits in a NCEA Level 1 Chemistry standard). Discretionary entry will be offered by Head of Faculty.

CHEMISTRY (LEVEL 3)

Description

The course continues to build on and develop understanding of chemical concepts studied at Level 2.

Students are encouraged to further develop their thinking skills, challenge their understanding of the subject and investigate how chemistry relates to our society.

Level 3 chemistry is a pre-requisite for many science based careers e.g. medicine, pharmacy, physiotherapy, dentistry, engineering, dietetics, nutrition, food technology, health and environmental science. Students intending to follow a science career should take Chemistry, Mathematics and either Physics and/or Biology.

Prerequisites

Preference will be given to students with a minimum of 14 credits in Level 2 Chemistry and a minimum of 10 credits of Level 2 Mathematics. Discretionary entry will be offered by Head of Faculty.

CHEMISTRY SCHOLARSHIP

Description

This course will extend the Level 3 Chemistry programme by adding depth and breadth to the student's knowledge. Extra-curricular tuition and workshops will prepare the students for the critical and analytical nature of the end-of-year examination. Scholarship students are expected to use knowledge of chemistry to demonstrate the ability to integrate and apply chemical principles and skills to a wide range of situations, to analyse problems from a chemical perspective and present coherent and well-reasoned answers.

Prerequisites

Preference will be given to students who have a majority of Excellence grades at Level 2 Chemistry, however discretionary entry will be offered by the Head of Faculty.

Assessment Scholarship

External: Three hour written examination.

PHYSICS

PHYSICS (LEVEL 2)

Description

This course builds upon the understanding of Physics developed in Level 1 Science.

Topics that are externally assessed include: mechanics - the study of motion, force and energy.; electricity and magnetism – DC circuits, generation and magnetism

Internal assessments are based on a research assignment relating to a physics context and a physics investigation, involving practical skills in measurement and graphing to establish mathematical relationships.

Prerequisites

Preference will be given to students with a minimum of 8 credits in NCEA Level 1 Physics from external examinations. Discretionary entry will be offered by Head of Faculty.

Leads to Level 3 Physics. This course is essential for students interested in a career in engineering or architecture and is highly recommended for medical sciences. Students intending to follow a science career should also take Chemistry, as this is difficult to pick up at tertiary level.

PHYSICS (LEVEL 3)

Description

The course continues to build on the knowledge and understanding of level 2 physics. Internal and external assessment will be selected from the following:

- Waves - superposition, interference, diffraction and Doppler Effect.
- Mechanics - momentum in 2 dimensions, circular motion and gravity, rotational motion, SHM.
- Electrical Systems - DC circuits, capacitors, inductors, AC circuits.
- Atomic and nuclear physics - photoelectric effect, atomic spectra, nuclear equations.
- Practical investigation - uncertainties in measurement and graphical analysis of data

Prerequisites

Preference will be given to students with a minimum of 14 credits in Level 2 Physics and a minimum of 10 credits in Level 2 Mathematics. Discretionary entry will be offered by Head of Faculty.

Career Opportunities

This course is essential for students interested in a career in engineering and architecture, but is also useful for optometry, medical sciences, electronics, engineering,

PHYSICS SCHOLARSHIP

Description

This course will extend the Level 3 Physics programme by adding depth and breadth to the student's knowledge. Extra-curricular tuition and workshops will prepare the students for the critical and analytical nature of the end-of-year examination. Scholarship students are expected to use their knowledge of physics to extract relevant information from physical situations in order to solve complex problems and give clear explanations or analyses.

Prerequisites

Preference will be given to students who have a majority of Excellence grades at Level 2 Physics, however discretionary entry will be offered by the Head of Faculty.

Assessment Scholarship

External: Three hour written examination.