

Physical Science

Albert Einstein said:

“The important thing is not to stop questioning. Curiosity has its own reason for existing.”

In Physical Science we endeavour to provide pupils with opportunities where they can develop their curiosity and then provide them with a knowledge and understanding of Physical Science that will enable them to enter our highly technological world with confidence.

Introduction

The subject Physical Science consists of the study of Physics and Chemistry. Physics is the study of the behaviour of matter and energy. Chemistry is the study of the composition, structure and properties of matter and its changes.

The practical component of the Physical Sciences is emphasized and forms an integral part of the curriculum. Pupils are taught the skills that will enable them to apply the knowledge gained in the classroom in the world outside.

Course Outline

The learning programme followed allows pupils to achieve the learning outcomes for Physical Science:

- Scientific Inquiry and Problem Solving Skills
The learner is able to use the scientific method to conduct scientific investigations and solve problems.
- Constructing and Applying Scientific Knowledge
The learner is able to understand and apply scientific principles.
- The Nature of Science and its relationship to Technology, Society and the Environment
The learner is able to identify and critically evaluate scientific knowledge claims and the impact of this knowledge on the quality of socio-economic, environmental and human development.

The learning outcomes are in accordance with the National Curriculum Statements for the FET band. The content covered is likewise outlined in the NCS. Pupils work through the content and are assessed according to the outcomes.

The topics covered during Grade 10 include:

Physics

- Principles of waves as in water waves and electromagnetic waves
- The reflection and refraction of light
- Electricity and Magnetism
- The principles of motion of objects
- Principles of lenses

Chemistry

- Atomic structure and the Periodic Table
- Properties of matter and materials
- Organic chemistry
- Chemical change
- Electrochemistry
- Electrolysis

The topics covered during Grade 11 include:

Physics

- Sound
- Electrostatics

- Electricity and Magnetism
- Newton's Laws and momentum
- The Kinetic Model of Matter

Chemistry

- Properties of materials – especially their radioactive and conducting natures.
- The properties of gases with reference to the atmosphere
- Quantitative aspects of chemical change
- Redox, acid-base and organic chemical reactions.

The topics covered during Grade 12 include:

Physics

- Projectile motion
- Conservation of momentum
- Waves – light and sound
- Doppler effect, sonic boom, diffraction and interference
- Electromagnetic radiation – the photoelectric effect
- Electrodynamics

Chemistry

- Organic substances
- Chemical change – rates of reaction and chemical equilibrium
- Chemical systems

Each year pupils compile a portfolio of their work. Examples of practical work, tests, projects and class work make up the portfolio.

Practical Component

Pupils carry out experiments that are designed to improve their understanding of the concepts that are being covered. They are given opportunities to develop skills in a variety of practical areas throughout the course. They are taught to handle apparatus safely and effectively, record measurements accurately and precisely, as well as evaluate and interpret their data. Practical tests and examinations are set so as to ensure that pupils have the necessary practical skills.

At all times the scientific method is emphasised and pupils are required to state an hypothesis, plan the experiment and draw conclusions from their own experiments so as to refine their method and incorporate necessary controls. Pupils can then prove or disprove their hypotheses with certainty.

Practical marks contribute 40% to pupils' portfolio marks and so it is essential that pupils master the practical skills of this subject. A research project forms 20% of the portfolio mark.

Homework, Assignments and Projects

Homework is given daily to ensure that pupils consolidate what is done in the classroom each day. Assignments are also done on a regular basis to ensure that the learner has an in-depth understanding of the work. Projects are given selectively to ensure that the learner has sufficient time to hand in work of a high standard. Homework, assignments and projects all form part of continuous assessment. Extensive use is made of computer programs and the Internet in teaching Science.

Assessment & Examinations

Assessment is planned in such a way as to motivate the learner. Letting the learners know what is being assessed and how the assessment will take place does this.

Assessment will focus on:

- the monitoring of progress
- suggestions for improvements
- the setting of different tasks to train the learner further or to expose her to different ideas

Assessment will include tests marks but as many other skills as possible will be assessed so as to obtain a fuller picture of the learner's abilities.

Examinations will take place twice a year for Grades 10 to 12.

Facilities

Two well-equipped Science laboratories are available. Both laboratories are equipped with interactive boards. A skilled Laboratory assistant manages these laboratories. Maximum use is made of laboratory work as a teaching tool.

We endeavour to keep up to date with available equipment and make use of electronic equipment as far as possible so that pupils leave school with up-to-date laboratory skills. Computers are used for data capture and analysis and this gives pupils the opportunity to become proficient in modern methods.

Special Events

Pupils are encouraged to participate in many events that are designed to stimulate their interest in science. These include:

- National Science Olympiad
- Engineering Festivals at the University of Pretoria and the University of the Witwatersrand

Outings and Field Trips

Pupils are taken on outings when possible in order to experience Science first hand and to see what scientists do in everyday life.

Imagination is more important than knowledge, said Albert Einstein. It is not possible to understand Science without imagination.