Highfields State Secondary College

Semester 1 Course Overview

Faculty: Science

Subject: Physics

Year level: 12

Course Outline

At the core of all scientific endeavour is the inquiry into the nature of the universe. Science uses a systematic way of thinking, involving creative and critical reasoning, in order to acquire better and more reliable knowledge. Scientists recognise that knowledge is not fixed, but is fallible and open to challenge. As such, scientific endeavour is never conducted in isolation, but builds on and challenges an existing body of knowledge in the pursuit of more reliable knowledge.

This collaborative process, whereby new knowledge is gained, is essential to the cooperative advancement of science, technology, health and society in the 21st century. Tertiary study in any field will be aided by the transferable skills developed in this senior Science subject. It is expected that an appreciation of, and respect for, evidence-based conclusions and the processes required to gather, scrutinise and use evidence will be carried forward into all aspects of life beyond the classroom.

The purpose of senior Science subjects in Queensland is to introduce candidates to a scientific discipline. Candidates will be required to learn and apply aspects of the knowledge and skill of the discipline (thinking, experimentation, problem-solving and research skills), understand how it works and how it may impact society.

Upon completion of the course, candidates will have an appreciation for a body of scientific knowledge and the process that is undertaken to acquire this knowledge. They will be able to distinguish between claims and evidence, opinion and fact, and conjecture and conclusions.

Semester 1	
Unit 3	**Unit 4**
In Unit 3, students develop a deeper understanding of motion and its causes by using Newton's laws of motion and the gravitational field model to analyse motion on inclined planes, and the motion of projectiles and satellites. Field theories have enabled physicists to explain a vast array of natural phenomena and have contributed to the development of technologies that have changed the world, including electrical power generation and distribution systems, artificial satellites and modern communication systems. Students develop their understanding of field theories of gravity and electromagnetism through investigations of motion and electromagnetic phenomena. Finally, they will investigate the production of electromagnetic waves. Contexts that could be investigated in this unit include technologies such as artificial satellites, navigation devices, large-scale electrical power generation and distribution, motors and generators, electric cars, synchrotron science, medical imaging and astronomical telescopes such as the Square Kilometre Array, and related areas of science and engineering such as sports science, amusement parks, ballistics, forensics, black holes and dark matter. Participation in a range of experiments and investigations will allow students to develop skills in relating graphical representations of data to quantitative relationships between variables, using lines of force to represent vector fields, and interpreting interactions in two and three dimensions. Throughout the unit, students develop skills in planning and conducting investigations, interpreting results and evaluating the validity of primary and secondary data, as well as the communication of these evaluations to others in a range of formats.	In Unit 4, students examine observations of relative motion, light and matter that could not be explained by classical physics theories, and investigate how the shortcomings of existing theories led to the development of the special theory of relativity and the quantum theory of light and matter. The development of quantum theory and the theory of relativity fundamentally changed our understanding of how nature operates and led to the development of a wide range of new technologies, including those that revolutionised the storage, processing and communication of information. Students evaluate the contribution of the quantum theory of light to the development of the quantum theory of the atom, and examine the Standard Model of particle physics and how it relates to the Big Bang theory. Contexts that could be investigated in this unit include technologies such as GPS navigation, lasers, modern electric lighting, medical imaging, quantum computers and particle accelerators, and related areas of science such as space travel, the digital revolution and the greenhouse effect. Participation in a range of experiments and investigations will allow students to apply their understanding of relativity, black-body radiation, wave–particle duality and the quantum theory of the atom to make and/or explain observations of a range of phenomena such as atomic emission and absorption spectra, the photoelectric effect, lasers and Earth's energy balance. Throughout the unit, students develop skills in planning and conducting investigations, interpreting results, synthesising evidence to support conclusions, recognising and defining the realm of validity of physical theories and models, and communicating these conclusions to others in a range of formats.

Assessment	
IA1: Data test This assessment focuses on the application of a range of cognitions to multiple provided items — questions, scenarios and problems. **IA2: Student experiment** This assessment requires students to research a question or hypothesis through collection, analysis and synthesis of primary data.	**IA3: Research Investigation** (Disseminated and due in semester two)