# Physics

## Course Description

Physics seeks to understand and explain the physical world. It examines models and ideas used to make sense of the world and which are sometimes challenged as new knowledge develops. By looking at the way matter and energy interact through observations, measurements and experiments, physicists gain a better understanding of the underlying laws of nature. VCE Physics provides students with opportunities to explore questions related to the natural and constructed world. The study provides a contextual approach to exploring selected areas within the discipline including atomic physics, electricity, fields, mechanics, thermodynamics, quantum physics and waves. Students also have options for study related to astrophysics, bioelectricity, biomechanics, electronics, light, medical physics, nuclear energy, nuclear physics, optics, sound and sports science. Students examine classical and contemporary research, models and theories to understand how knowledge in physics has evolved and continues to evolve in response to new evidence and discoveries. An understanding of the complexities and diversity of physics leads students to appreciate the interconnectedness of the content areas both within physics, and across physics and the other sciences.

## Course Structure

### *Unit 1 – How is energy useful to society?*

This unit will focus on students  examining some of the fundamental ideas and models used by physicists in an attempt to understand and explain energy. Models used to understand light, thermal energy, radioactivity, nuclear processes and electricity are explored. Students apply these physics ideas to contemporary societal issues: communication, climate change and global warming, medical treatment, electrical home safety and Australian energy needs.

*Area of Study*

1. How are light and heat  explained?
2. How is energy from the nucleus utilised?
3. How can electricity be used to transfer energy?

### *Unit 2 – How does physics help us to understand the world?*

This unit will focus on students exploring the power of experiments in developing models and theories. They investigate a variety of phenomena by making their own observations and generating questions, which in turn lead to experiments. Students make direct observations of physics phenomena and examine the ways in which phenomena that may not be directly observable can be explored through indirect observations. In the core component of this unit students investigate the ways in which forces are involved both in moving objects and in keeping objects stationary.

*Area of Study*

1. How is  motion understood?
2. Options: How does physics inform contemporary issues and applications in society?
3. How do physicists investigate questions?

### *Unit 3 – How do fields explain motion and electricity?*

This unit will focus on students exploring the importance of energy in explaining and describing the physical world. They examine the production of electricity and its delivery to homes. Students consider the field model as a construct that has enabled an understanding of why objects move when they are not apparently in contact with other objects. Applications of concepts related to fields include the transmission of electricity over large distances and the design and operation of particle accelerators. They explore the interactions, effects and applications of gravitational, electric and magnetic fields.

*Area of Study*

1. How do physicists explain motion in two dimensions?
2. How do things move without contact?
3. How are fields used in electricity generation?

### *Unit 4 – How have creative ideas and investigation revolutionised thinking in Physics?*

This unit will focus on the complex interplay that exists between theory and experiment in generating models to explain natural phenomena including light. Wave theory has classically been used to explain phenomena related to light; however, continued exploration of light and matter has revealed the particle-like properties of light. On very small scales, light and matter – which initially seem to be quite different – have been observed as having similar properties.

*Area of Study*

1. How has understanding about the physical world changed?
2. How is scientific inquiry used to investigate fields, motion or light?

## Entry and Recommendations

There are no prerequisites for entry to Units 1, 2 and 3. Students must undertake Unit 3 prior to undertaking Unit 4. Students entering Unit 3 without Units 1 and/or 2 may be required to undertake additional preparation as prescribed by their teacher.

## Assessment

### *Satisfactory Completion*

Demonstration of achievement of outcomes and satisfactory completion of a unit are determined by evidence gained through the assessment of a range of learning activities and tasks.

### *Level of Achievement*

*Unit 1 and 2*

- Tests
- Practical activities
- Scientific research
- Examination

*Unit 3 and 4*

- Unit 3 School-based Assessment (30%)
    - Practical activities
    - Investigations Reports
    - Scientific Poster
- Unit 4 School-based Assessment (20%)
    - Practical activities
    - Investigations
- Examination (50%)