Physics

Subject Guide

Physics seeks to understand and explain the physical world. Physicists gain a better understanding of the underlying laws of nature by looking at the way matter and energy interact. An important feature of undertaking VCE Physics is the opportunity for students to engage in a range of inquiry tasks and key science skills to allow them to interrogate the links between theory and practice.

VCE Physics provides students with opportunities to explore questions related to the natural and constructed world. Physics is a science based on observations, measurements, experiments and mathematical analysis. Its purpose is to find quantitative explanations for phenomena occurring from the subatomic scale through to the planets, stellar systems and galaxies in the universe.

Physicists are employed in a range of settings, such as acoustics, astrophysics, cosmology, energy research, optics, engineering and radiography. They also work in areas such as climate change, neuroscience and forensic medicine.

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Unit focus areas

Unit 1 – What ideas explain the physical world?

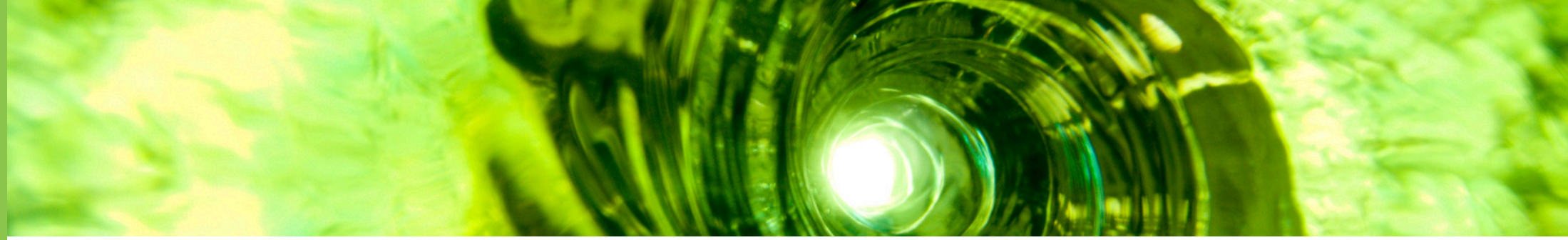
In this unit, students investigate how physics explains basic light phenomena and electricity. They also examine the connections between matter and energy, as well as research and present an infographic relating to an area of Physics of their choosing.
This includes:

- explore the characteristics and behaviour of light as a wave as it travels through different media
- investigate and apply a basic DC circuit model to battery-operated devices and household electrical systems
- explore how energy is harnessed from the nucleus
- investigate and apply physics knowledge to develop and communicate an informed response to a selected physical option.

Unit 2 – What do experiments reveal about the physical world?

Students observe and describe motion of everyday objects in terms of Newton's Laws, momentum and energy. They also explore how physics can be used to improve performance in ball sports. Additionally, students design and conduct their own practical investigation.
This includes:

- analyse the motion of particles and bodies and explore the effects of balanced and unbalanced forces on motion
- investigate the application of motion concepts through a case study, for example, through motion in sport, vehicle safety, a device or a structure
- model and describe qualitatively the flight of spinning sports balls with reference to the Magnus effect
- apply the physics concepts specific to the selected practical investigation and explain their significance, including definitions of key terms, and physics representations.



Unit focus areas continued

Unit 3 – How do fields explain motion and electricity?

In this unit, students will investigate the importance of energy in explaining and describing the physical world. They examine the production of electricity and its delivery to homes.
This includes:

- examine similarities and differences between gravitational, electric and magnetic fields
- explain how different fields can be used to explain the operation of motors
- use Newton's Laws in one and two dimensions, analyse the behaviour of simple projectiles and uniform circular motion in various contexts
- Examine how magnetic fields are used to generate and distribute the electricity used to power the modern world.

Unit 4 – How have creative ideas and investigation revolutionised thinking in physics?

Students investigate the use of wave and particle theories to model the properties of light and matter.
This includes:

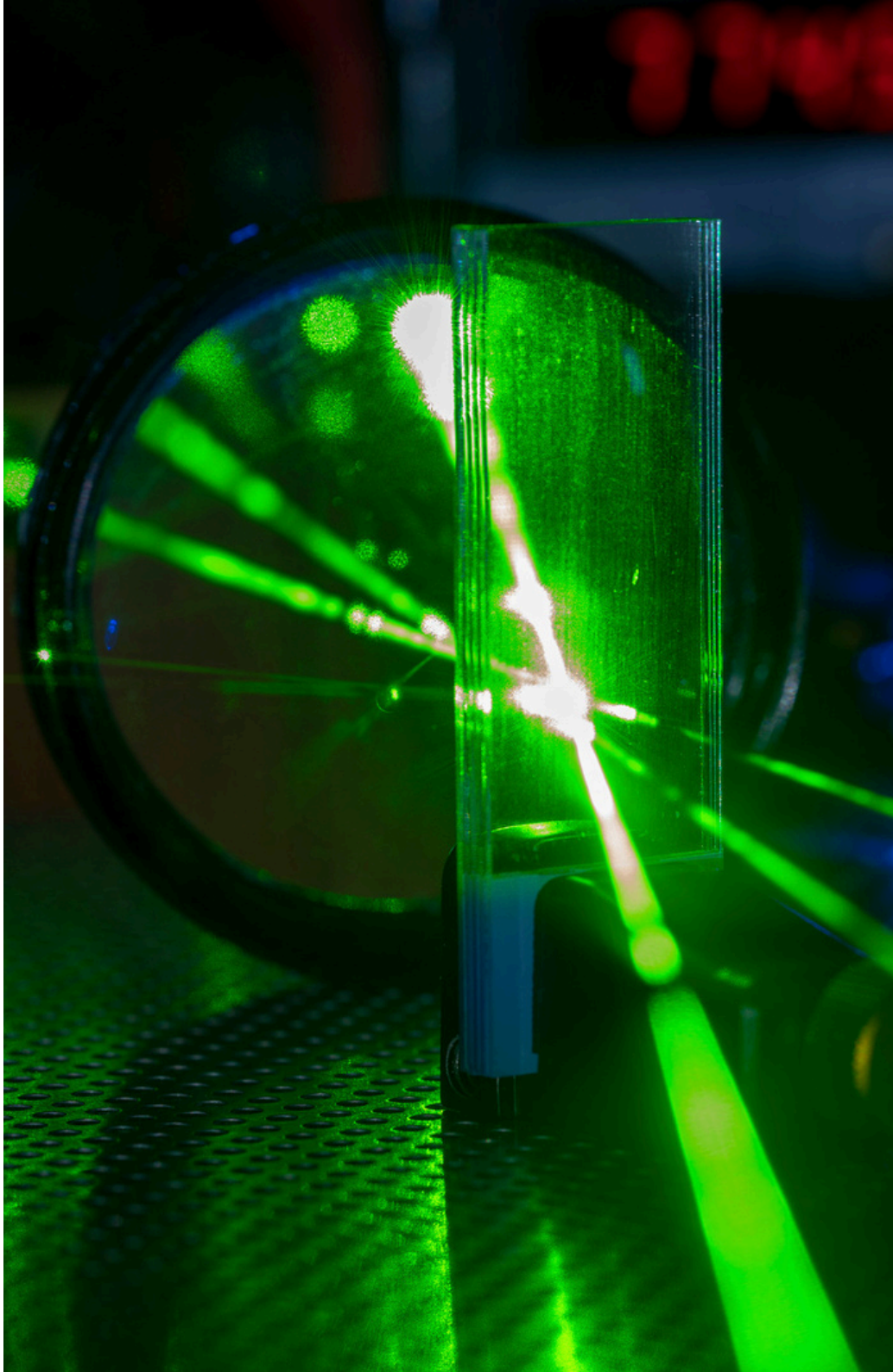
- examine the development of wave and particle models for the behaviour of light
- learn how wave–particle duality arises from the experimental evidence associated with the behaviour of both light and electrons
- analyse data and evidence on the nature of light and matter
- explore Einstein's relationship between energy and mass and the behaviour of matter travelling close to the speed of light
- undertake a student-designed practical investigation.

Pre-requisites

Students undertaking Units 1 and 2 Physics need to have completed Year 10 Science (or equivalent).

Students undertaking Units 3 and 4 Physics need to have completed Units 1 and 2 Physics.

Assessment

Outcomes for Physics Units 1 and 2 will be assessed by a variety of tasks, including written reports, scientific posters, data analysis, research activities and tests. An examination is held at the end of each semester.

Students complete School-Assessed Coursework for Units 3 (30%) and 4 (20%), and a two-and-a-half-hour end-of-year external examination (50%).