

VCE Physics Study Design Summary of Changes

The *VCE Physics Study Design* has been reviewed, revised and accredited for the period 2009–2012.

Overview of changes

Entry requirements have changed in that there are no prerequisites for entry into Units 1, 2 and 3. However, students entering Unit 3 without Units 1 and/or 2 may be required to undertake additional reading as prescribed by their teacher.

A set of key skills applicable to each unit has been developed and placed at the start of the study design. These skills are integral to each area of study and must be assessed.

The outcome statements and key knowledge dot points listed under each outcome in each unit have been edited, where required, to provide greater clarity for teachers as to the depth to which concepts are to be covered. In some instances the wording has been made more explicit and a number of dot points have been divided for clarity. Relevant formulas have been specified where quantitative analysis is required.

The order of the Areas of Study 1 and 2 in Units 1 and 2 has been changed. Teachers may now choose one of six detailed studies in Area of Study 3 in each of Units 1 and 2, provided that a different detailed study is selected in each unit.

The 'Advice for teachers' section of the study design includes a list of the fourteen verbs that are used in the key knowledge and skills dot points. They have been placed in a hierarchy of complexity and are accompanied by definitions and typical learning examples. They provide teachers with a guide as to the depth in which the content should be studied.

The 'Advice for teachers' section of the study design also contains a list of relevant employability skills which may be demonstrated through assessment tasks commonly undertaken within the study.

An updated resources list includes textbooks, study aids, websites, applets, audiovisual materials, excursions, conceptual understanding guides, investigations and kits relevant as general Physics references and/or to each area of study.

Key skills

A set of key skills considered essential to Physics has been included in the revised study design. These skills apply across Units 1 to 4. In designing teaching and learning programs for each unit, teachers must ensure that students are given the opportunity to develop, use and apply these

skills and to demonstrate them in a variety of contexts. As the complexity of key knowledge increases from Units 1 to 4, students should demonstrate the skills at a progressively higher level.

These key skills are the ability to:

Investigate and inquire scientifically

- identify and select questions for investigation, formulating hypotheses and identifying and addressing possible sources of uncertainty;
- design and conduct first-hand investigations that include collecting, processing, recording, analysing, synthesising and evaluating qualitative and quantitative data;
- select and use equipment and materials appropriate to the investigation;
- draw conclusions consistent with the question under investigation and the information collected, identifying errors and evaluating investigative procedures and reliability and accuracy of data;
- identify and apply safe and responsible work practices when designing and completing independent or collaborative investigations.

Analyse and apply physics understanding

- identify and describe relevant scientific information, ideas and concepts, and the connections between them;
- select first-hand and second-hand data and evidence to demonstrate how physics concepts, theories and models have developed and been modified over time;
- explain how models are used by physical scientists to organise and understand observed phenomena, identifying limitations of the models;
- apply graphical, numerical and algebraic models to first-hand data collected during practical investigations, and to second-hand data;
- model scientific ideas and processes;
- calculate quantities, and analyse and solve qualitative and quantitative problems;
- apply understanding of concepts to explain qualitative and quantitative data in both familiar and new contexts;
- identify and explain alternative interpretations of qualitative and quantitative data;
- analyse issues and implications for humans and the environment relating to scientific and technological developments;
- analyse and evaluate the reliability of physics-related information and opinions presented in the public domain.

Communicate physics information and understanding

- interpret, explain and communicate physics data, information and ideas accurately and effectively, using communication modes appropriate for different audiences and purposes;
- apply scientific language and conventions correctly, including scientific formulas, symbols, equations and units of measurement.

Structure of Units 1 and 2

The areas of study to be taught in each unit have changed in the new study design.

The revised order of units is:

Unit 1

Area of study 1: Nuclear physics and radioactivity

Area of study 2: Electricity

Area of study 3: one of six detailed studies

Unit 2

Area of study 1: Motion

Area of study 2: Wave-like properties of light

Area of study 3: one of six detailed studies (but different from that studied in Unit 1)

Rather than a prescribed detailed study to be undertaken in each unit in Units 1 and 2, teachers now have the choice of any of the six detailed studies to be covered. A different detailed study must be covered in each of Units 1 and 2.

The study design contains information about which detailed study may build on areas of study covered in Units 1 and 2 in the 'Advice for teachers' section of the study design.

Structure of Units 3 and 4

No changes have been made to the structure of Units 3 and 4.

Renaming of Areas of Study in Units 1–4

Some of the titles of areas of study have changed:

Unit 1 and 2

Nuclear and radioactivity to physics	to	Nuclear physics and radioactivity
Movement	to	Motion
Investigations: Aerospace	to	Investigations: Flight
Investigations: Alternative energy sources	to	Investigations: Sustainable energy sources

Unit 3

Investigating materials and their use in structures	to	Materials and their use in structures
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Unit 4

No changes

Content changes

Unit 1

Nuclear physics and radioactivity

The key knowledge dot points have been made more explicit by providing more detailed descriptions of content. Some dot points have been divided to make them clearer.

Electricity

The term 'potential difference' is included instead of 'voltage' as a better description of the concept.

Unit 2

Motion

There has been some reordering of key knowledge dot points and some have been reworded to reflect a more conceptual understanding. Formulas are added where a more quantitative approach is expected.

Wave-like properties of light

This area of study now places more emphasis on comparing and evaluating models of light. The key knowledge dot points have been made more explicit.

Unit 1 and 2 Detailed studies

Astronomy

Some changes in wording have been made to better indicate the depth of study required. Some dot points have been modified for clarity.

Astrophysics

Some changes in wording have been made to better indicate the depth of study required and the content has been reordered.

Energy from the nucleus

Some of the key knowledge dot points have been made more explicit by dividing them into separate and more specific dot points.

Investigations: Flight

This detailed study is largely unchanged although computer modelling has been removed.

Investigations: Sustainable energy sources

Wording has been modified and content is more specific.

Medical Physics

Some changes in wording have been made to better indicate the depth of study required.

Unit 3

Motion in one and two dimensions

The 'absolute nature of space and time' has been removed. Circular motion has been broadened by including vertical circles which are only to be considered at the top and bottom positions in terms

of Newton's 2nd law. A qualitative description of air resistance in projectile motion has been specified as have been the concepts of apparent weight, apparent weightlessness and weightlessness. These ideas have been included to allow the area of study to be better related to real world applications.

Electronics and photonics

The wording 'potential difference' has been used instead of 'voltage drop' to better describe the concept. The transistor amplifier has been removed to better ensure the currency of the course. The study of amplifiers in terms of voltage characteristics, voltage gain and clipping has been retained. Modulation and demodulation have been elaborated. The thermistor has been included as a circuit component.

Einstein's special theory of relativity and Materials and their use in structures

Changes have been made to the wording of the key knowledge dot points in both of these areas of study for clarity.

Further electronics

Changes have been made to the wording of the key knowledge dot points for clarity.

The dot point related to how circuit components affect ripple voltage has been made more explicit.

Unit 4

Electric Power

Changes have been made to the wording of the key knowledge dot points for clarity.

Interactions of light and matter

The dot point regarding the production of incoherent light has been moved to Photonics. The other key knowledge dot points have been modified for clarity.

Synchrotron and its applications

This detailed study was modified to relate it more closely to The Australian Synchrotron. Key knowledge dot points have been developed that provide the background physics related to the synchrotron more clearly and specifically.

Photonics

The first key knowledge dot point in the current study 'Interactions of light and matter' has been moved to Photonics. The other key knowledge dot points have been modified to enhance clarity.

Sound

Changes have been made to the wording of the key knowledge dot points for clarity.

Assessment changes

Assessment has largely been unchanged. The student-designed practical investigation in Unit 3 no longer stipulates the number and type of variables to allow more flexibility in student independent investigations.

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