Accreditation Period

Units 1 and 2

2017–2021

Units 3 and 4

2018–2021

Victorian Certificate of Education

PHYSICAL EDUCATION

STUDY DESIGN

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Important information

Accreditation period

Units 1 and 2: 1 January 2017 – 31 December 2021
Units 3 and 4: 1 January 2018 – 31 December 2021

Implementation for Units 1 and 2 of this study commences in 2017.
Implementation for Units 3 and 4 of this study commences in 2018.

Other sources of information

The *VCAA Bulletin* is the only official source of changes to regulations and accredited studies. The *Bulletin* also regularly includes advice on VCE studies. It is the responsibility of each VCE teacher to refer to each issue of the *Bulletin*. The *Bulletin* is available as an e-newsletter via free subscription on the VCAA's website at: www.vcaa.vic.edu.au

To assist teachers in developing courses, the VCAA publishes online the *Advice for teachers*, which includes teaching and learning activities for Units 1–4, and advice on assessment tasks and performance level descriptors for School-assessed Coursework in Units 3 and 4

The current *VCE and VCAL Administrative Handbook* contains essential information on assessment processes and other procedures.

VCE providers

Throughout this study design the term 'school' is intended to include both schools and other VCE providers.

Copyright

Introduction

Scope of study

VCE Physical Education explores the complex interrelationships between anatomical, biomechanical, physiological and skill acquisition principles to understand their role in producing and refining movement, and examines behavioural, psychological, environmental and sociocultural influences on performance and participation in physical activity.

The assimilation of theoretical understanding and practice is central to the study of VCE Physical Education. Students participate in practical activities to examine the core concepts that underpin movement and that influence performance and participation in physical activity, sport and exercise.

Through integrated physical, written, oral and digital learning experiences, students apply theoretical concepts and reflect critically on factors that affect all levels of performance and participation in sport, exercise and physical activity.

Rationale

The study of VCE Physical Education enables students to integrate a contemporary understanding of the theoretical underpinnings of performance and participation in physical activity with practical application. Through engagement in physical activities, VCE Physical Education enables students to develop the knowledge and skills required to critically evaluate influences that affect their own and others' performance and participation in physical activity.

This study equips students with the appropriate knowledge and skills to plan, develop and maintain their involvement in physical activity, sport and exercise across their lifespan and to understand the physical, social, emotional and cognitive health benefits associated with being active. The study also prepares students for employment and/or further study at the tertiary level or in vocational education and training settings in fields such as exercise and sport science, health science, education, recreation, sport development and coaching, health promotion and related careers.

Aims

This study enables students to:

- use practical activities to underpin contemporary theoretical understanding of the influences on participation and performance in physical activity, sport and exercise
- develop an understanding of the anatomical, biomechanical, physiological and skill acquisition principles, and of behavioural, psychological, environmental and sociocultural influences on performance and participation in physical activity across the lifespan
- engage in physical activity and movement experiences to determine and analyse how the body systems work together to produce and refine movement
- critically evaluate changes in participation from a social-ecological perspective and performance in physical activity, sport and exercise through monitoring, testing and measuring of key parameters.

Structure

The study is made up of four units.

Unit 1: The human body in motion

Unit 2: Physical activity, sport and society

Unit 3: Movement skills and energy for physical activity

Unit 4: Training to improve performance

Each unit deals with specific content contained in areas of study and is designed to enable students to achieve a set of outcomes for that unit. Each outcome is described in terms of key knowledge and key skills.

A glossary defining terms used across Units 1 to 4 in the *VCE Physical Education Study Design* is included in the companion document *Advice for teachers*.

Entry

There are no prerequisites for entry to Units 1, 2 and 3. Students must undertake Unit 3 prior to undertaking Unit 4. Units 1 to 4 are designed to a standard equivalent to the final two years of secondary education. All VCE studies are benchmarked against comparable national and international curriculum.

Duration

Each unit involves at least 50 hours of scheduled classroom instruction over the duration of a semester.

Changes to the Study Design

During its period of accreditation minor changes to the study will be announced in the *VCAA Bulletin*. The *Bulletin* is the only source of changes to regulations and accredited studies. It is the responsibility of each VCE teacher to monitor changes or advice about VCE studies published in the *Bulletin*.

Monitoring for quality

As part of ongoing monitoring and quality assurance, the VCAA will periodically undertake an audit of VCE Physical Education to ensure the study is being taught and assessed as accredited. The details of the audit procedures and requirements are published annually in the *VCE and VCAL Administrative Handbook*. Schools will be notified if they are required to submit material to be audited.

Safety and wellbeing

It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students undertaking the study. Principals and teachers must ensure that appropriate precautions and safety measures are taken to minimise any potential risk to students. The implementation of effective safety management plans and processes should ensure that all activities are conducted safely. This includes ensuring that all rules and regulations for the conduct of sporting activities are rigorously followed. Teachers should refer to the Department of Education and Training's School Policy and Advisory Guide at www.education.vic.gov.au/school/principals/spag/Pages/spag.aspx.

Employability skills

This study offers a number of opportunities for students to develop employability skills. The *Advice for teachers* companion document provides specific examples of how students can develop employability skills during learning activities and assessment tasks.

Legislative compliance

When collecting and using information, the provisions of privacy and copyright legislation, such as the Victorian *Privacy and Data Protection Act 2014* and *Health Records Act 2001*, and the federal *Privacy Act 1988* and *Copyright Act 1968*, must be met.

Assessment and reporting

Satisfactory completion

The award of satisfactory completion for a unit is based on the teacher's decision that the student has demonstrated achievement of the set of outcomes specified for the unit. 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.

Teachers must develop courses that provide appropriate opportunities for students to demonstrate satisfactory achievement of outcomes.

The decision about satisfactory completion of a unit is distinct from the assessment of levels of achievement. Schools will report a student's result for each unit to the VCAA as S (Satisfactory) or N (Not Satisfactory)

Levels of achievement

Units 1 and 2

Procedures for the assessment of levels of achievement in Units 1 and 2 are a matter for school decision. Assessment of levels of achievement for these units will not be reported to the Victorian Curriculum and Assessment Authority. Schools may choose to report levels of achievement using grades, descriptive statements or other indicators.

Units 3 and 4

The VCAA specifies the assessment procedures for students undertaking scored assessment in Units 3 and 4. Designated assessment tasks are provided in the details for each unit in VCE study designs.

The student's level of achievement in Units 3 and 4 will be determined by School-assessed Coursework (SACs) and/or School-assessed Tasks (SATs) as specified in the VCE study designs, and external assessment.

The VCAA will report the student's level of achievement on each assessment component as a grade from A+ to E or UG (ungraded). To receive a study score the student must achieve two or more graded assessments and receive S for both Units 3 and 4. The study score is reported on a scale of 0–50; it is a measure of how well the student performed in relation to all others who took the study. Teachers should refer to the current *VCE and VCAL Administrative Handbook* for details on graded assessment and calculation of the study score. Percentage contributions to the study score in VCE Physical Education are as follows:

- Unit 3 School-assessed Coursework: 25 per cent
- Unit 4 School-assessed Coursework: 25 per cent
- End-of-year examination: 50 per cent.

Details of the assessment program are described in the sections on Units 3 and 4 in this Study Design.

Authentication

Work related to the outcomes of each unit will be accepted only if the teacher can attest that, to the best of their knowledge, all unacknowledged work is the student's own. Teachers need to refer to the current *VCE and VCAL Administrative Handbook* for authentication procedures.

Unit 1: The human body in motion

In this unit students explore how the musculoskeletal and cardiorespiratory systems work together to produce movement. Through practical activities students explore the relationships between the body systems and physical activity, sport and exercise, and how the systems adapt and adjust to the demands of the activity. Students investigate the role and function of the main structures in each system and how they respond to physical activity, sport and exercise. They explore how the capacity and functioning of each system acts as an enabler or barrier to movement and participation in physical activity.

Using a contemporary approach, students evaluate the social, cultural and environmental influences on movement. They consider the implications of the use of legal and illegal practices to improve the performance of the musculoskeletal and cardiorespiratory systems, evaluating perceived benefits and describing potential harms. They also recommend and implement strategies to minimise the risk of illness or injury to each system.

Area of Study 1

How does the musculoskeletal system work to produce movement?

In this area of study students examine the musculoskeletal system of the human body and how the muscles and bones work together to produce movement. Through practical activities they explore the major components of the musculoskeletal system and their contributions and interactions during physical activity, sport and exercise.

Students evaluate the social, cultural and environmental influences on movement, and how the capacity and functioning of the muscular and skeletal systems may act as an enabler or barrier to participation in physical activity. Sedentary behaviour, overtraining and participation at the elite and recreational level are investigated as possible causes of illness and injury to the musculoskeletal system. Students consider a variety of legal and illegal practices and substances used to enhance performance from an ethical and a biophysical perspective.

Outcome 1

On completion of this unit students should be able to collect and analyse information from, and participate in, a variety of practical activities to explain how the musculoskeletal system functions and its limiting conditions, and evaluate the ethical and performance implications of the use of practices and substances that enhance human movement.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 1.

Key knowledge

- the concepts of physical activity, sport and exercise
- social, cultural and environmental enablers and barriers to movement such as family, peers, socioeconomic status, level of education, cultural values, geographic location and access to facilities
- the structure and function of the skeletal system including bones of the human body, classification of joints and joint actions
- the major muscles of the human body
- characteristics and functions of muscle fibres including fibre arrangement and type (fast twitch and slow twitch)
- types of muscular actions (isoinertial, isometric and isokinetic)
- agonists, antagonists and stabilisers and the concept of reciprocal inhibition
- control of muscles including the recruitment (size principle) and activation (all or nothing principle) of motor units in relation to force production

- interactions of muscles and bones to produce movement in physical activity, sport and exercise
- causes of potential acute and chronic injuries and illness associated with the muscular and skeletal systems such as arthritis, osteoporosis and other musculoskeletal conditions
- physiological strategies to prevent musculoskeletal injuries such as physical preparation of athletes, warm ups and cool downs
- the role of physical aids that support the musculoskeletal system such as protective equipment, taping and braces
- actual and perceived benefits and potential harms of legal and illegal substances and methods that enhance performance of the musculoskeletal system, such as training, nutritional supplements, creatine supplementation and hormones (including steroids and growth hormones)
- the ethical and sociocultural considerations of legal and illegal practices associated with enhancing the performance of the musculoskeletal system in sport.

Key skills

- define and participate in a range of physical activities, sports and exercise
- describe the social, cultural and environmental influences on movement
- use and apply correct anatomical terminology to the working of the musculoskeletal system in producing human movement
- perform, observe and analyse a variety of movements used in physical activity, sport and exercise to explain the interaction between bones, muscles, joints and joint actions responsible for movement
- describe the role of agonists, antagonists and stabilisers in movement
- describe the relationship between motor unit recruitment, activation and force production
- examine a variety of causes of musculoskeletal injuries
- describe and implement the correct application of techniques and physiological strategies in a variety of sporting activities to maintain optimal functioning of the musculoskeletal system
- investigate, evaluate and critically analyse a range of performance enhancing practices from a physiological perspective
- discuss the ethical considerations and sociocultural influence on the use of legal and illegal practices associated with improving the function of the musculoskeletal system.

Area of Study 2

How does the cardiorespiratory system function at rest and during physical activity?

In this area of study students examine the cardiovascular and respiratory systems of the human body and how the heart, blood vessels and lungs function at rest and during physical activity. Through practical activities students explore the structure and function of the cardiorespiratory system and their contributions and interactions during physical activity, sport and exercise. Enablers and barriers to the capacity and functioning of the cardiovascular and respiratory systems are investigated from a sociocultural, environmental and physical perspective. Students explore the ethical and performance considerations of the use of a variety of legal and illegal practices and substances specific to each system.

Outcome 2

On completion of this unit students should be able to collect and analyse information from, and participate in, a variety of practical activities to explain how the cardiovascular and respiratory systems function and the limiting conditions of each system, and discuss the ethical and performance implications of the use of practices and substances to enhance the performance of these two systems.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 2.

Key knowledge

- the structure and function of the cardiovascular system, including the structure and function of the heart and blood vessels and blood flow around the body at rest and during exercise
- components of blood, including red blood cells, white blood cells, platelets and plasma and their function at rest and during exercise
- the role of the cardiovascular system in thermoregulation: homeostasis, hyperthermia and hypothermia
- vasodilation and vasoconstriction of the blood vessels to regulate blood distribution at rest and during exercise
- the relationship between stroke volume, heart rate and cardiac output at rest and during submaximal and maximal exercise
- the structure and function of the respiratory system, including the structure and function of the lungs, mechanics of breathing and gaseous exchange at the alveoli/capillary and the capillary/muscle interface
- the interrelationship of the cardiovascular and respiratory systems to transport oxygen around the body at rest and during exercise
- physiological, social, cultural and environmental enablers and barriers of cardiovascular health (such as atherosclerosis, coronary heart disease, high cholesterol levels, hypertension and stroke) and respiratory health (such as chronic obstructive pulmonary disease)
- the role of physical activity, sport and exercise to enhance the capacity and functioning of the cardiovascular and respiratory systems
- actual and perceived benefits and potential harms to the athlete of legal and illegal substances and methods that enhance performance of the cardiorespiratory system, such as altitude training, erythropoietin (EPO), beta-blockers and blood doping
- ethical and sociocultural considerations associated with the use of illegal practices associated with improving the function of the cardiorespiratory system.

Key skills

- use and apply correct anatomical terminology to identify the structures and function of the cardiovascular and respiratory systems
- describe the role and function of blood components
- examine the role of the cardiovascular system in thermoregulation
- analyse the relationship between stroke volume, heart rate and cardiac output at rest and during submaximal and maximal exercise
- describe the process of gaseous exchange
- perform, measure and report on changes to the cardiovascular and respiratory systems at rest compared with exercise
- assess enablers and barriers to cardiorespiratory health and investigate strategies to enhance the capacity and functioning of cardiorespiratory system
- critically analyse the physiological effects of legal and illegal strategies that enhance the performance of the cardiorespiratory system on the individual
- discuss the ethical, social and cultural considerations associated with the use of legal and illegal practices associated with improving the function of the cardiorespiratory system.

Assessment

The award of satisfactory completion for a unit is based on whether the student has demonstrated the set of outcomes specified for the unit. Teachers should use a variety of learning activities and assessment tasks that provide a range of opportunities for students to demonstrate the key knowledge and key skills in the outcomes.

The areas of study, including the key knowledge and key skills listed for the outcomes, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

All assessments at Units 1 and 2 are school-based. Procedures for assessment of levels of achievement in Units 1 and 2 are a matter for school decision.

For this unit students are required to demonstrate two outcomes. As a set these outcomes encompass the areas of study in the unit.

The core assessment task for Outcomes 1 and 2 is:

- a written report analysing participation in at least four physical activities that demonstrate how the musculoskeletal and cardiorespiratory systems work together to produce movement.

Additionally, at least one task for the assessment of each of Outcomes 1 and 2 is to be selected from the following:

- a practical laboratory report linking key knowledge and key skills to a practical activity or practical activities
- a case study analysis
- a data analysis
- a critically reflective folio/diary of participation in practical activities
- a visual presentation such as a graphic organiser, concept/mind map, annotated poster, presentation file
- a multimedia presentation, including two or more data types (for example, text, still and moving images, sound) and involving some form of interaction or simulation
- a physical simulation or model
- an oral presentation such as podcast, debate
- a written report
- structure questions.

Where teachers allow students to choose between tasks they must ensure that the tasks they set are of comparable scope and demand.

Unit 2: Physical activity, sport and society

This unit develops students' understanding of physical activity, sport and society from a participatory perspective. Students are introduced to types of physical activity and the role participation in physical activity and sedentary behaviour plays in their own health and wellbeing as well as in other people's lives in different population groups.

Through a series of practical activities, students experience and explore different types of physical activity promoted in their own and different population groups. They gain an appreciation of the level of physical activity required for health benefits. Students investigate how participation in physical activity varies across the lifespan. They explore a range of factors that influence and facilitate participation in regular physical activity. They collect data to determine perceived enablers of and barriers to physical activity and the ways in which opportunities for participation in physical activity can be extended in various communities, social, cultural and environmental contexts. Students investigate individual and population-based consequences of physical inactivity and sedentary behaviour. They then create and participate in an activity plan that meets the physical activity and sedentary behaviour guidelines relevant to the particular population group being studied.

Students apply various methods to assess physical activity and sedentary behaviour levels at the individual and population level, and analyse the data in relation to physical activity and sedentary behaviour guidelines. Students study and apply the social-ecological model and/or the Youth Physical Activity Promotion Model to critique a range of individual- and settings-based strategies that are effective in promoting participation in some form of regular physical activity.

Area of Study 1

What are the relationships between physical activity, sport, health and society?

In this area of study students focus on the role of physical activity, sport and society in developing and promoting healthy lifestyles and participation in physical activity across the lifespan. Students explore the social, cultural and historical influences on participation in various forms of physical activity, including sport. They investigate at the individual and population levels the physical, social, mental and emotional benefits of participation in regular physical activity and the potential negative physical, social, mental and emotional consequences of physical inactivity and sedentary behaviour, including hypokinetic diseases such as Type 2 diabetes and obesity.

Students investigate sociocultural factors that influence physical activity and consider opportunities and barriers to participation for various population groups and settings. They develop an understanding of the use of subjective and objective methods for assessing physical activity and sedentary behaviour at the individual and population level and compare these to physical activity and sedentary behaviour guidelines. Students identify and describe the components of a social-ecological model and/or the Youth Physical Activity Promotion Model to assist in the critique and creation of strategies aimed at increasing physical activity and/or reducing sedentary behaviour within a given population. Students create and implement an individual activity plan that meets the physical activity and sedentary behaviour guidelines.

Outcome 1

On completion of this unit the student should be able to collect and analyse data related to individual and population levels of participation in physical activity and sedentary behaviour to create, undertake and evaluate an activity plan that meets the physical activity and sedentary behaviour guidelines for an individual or a specific group.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 1.

Key knowledge

- forms of physical activity such as play, games, sports, transportation, chores, exercise and recreational activities
- the concepts of physical activity, physical inactivity and sedentary behaviour
- sociocultural influences on participation in physical activity across the lifespan such as historical, social, cultural, environmental, geographic and personal factors
- prevalence and trends of physical activity, sport and sedentary behaviour in the population
- physical, social, mental and emotional benefits of regular participation in physical activity
- the increased health risks associated with being physically inactive, including Type 2 diabetes and obesity
- physical activity and sedentary behaviour guidelines for different age groups and population groups
- subjective and objective methods of assessing physical activity and sedentary behaviour such as recall surveys or diaries, pedometry, accelerometry, inclinometry, observation tools (including digital tools such as smart phone and tablet apps) and personal activity trackers
- enablers and barriers of physical activity behaviours including demographic, social, cultural and environmental factors
- components of the social-ecological model (individual, social environment, physical environment and policy) and/or the Youth Physical Activity Promotion Model
- a range of physical activity promotion and sedentary behaviour reduction initiatives and strategies that target different populations based on factors such as age, sex, gender, people with disabilities, cultural and indigenous groups
- settings based approaches (schools, workplaces and community) to reducing sedentary behaviour and promoting physical activity
- principles of an individual activity plan including frequency, intensity, time and type of activity (FITT).

Key skills

- participate in and reflect on a variety of different forms of physical activity, including a variety of culturally diverse physical activities
- define and identify forms of physical activity, physical inactivity and sedentary behaviour
- analyse sociocultural influences on physical activity participation across the lifespan
- participate in physical activity, and collect, analyse and reflect on information related to the physical, social, mental and emotional health benefits of physical activity
- explain the health consequences of physical inactivity and sedentary behaviour
- describe the physical activity and sedentary behaviour guidelines for different stages across the lifespan
- investigate and determine factors that influence an individual's participation in physical activity across the lifespan
- collect, analyse and interpret primary and secondary data related to trends in participation in physical activity
- use appropriate methods to measure and analyse physical activity and sedentary behaviour levels at the individual and population level
- apply a social-ecological model and/or the Youth Physical Activity Promotion Model to critique physical activity initiatives and strategies aimed at increasing physical activity and/or reducing sedentary behaviour for a range of populations in a variety of settings
- apply the principles of frequency, intensity, time and type appropriately to an individual activity plan
- create, implement and evaluate an activity plan for an individual or a specific group to increase physical activity and decrease sedentary behaviour in relation to the guidelines.

Area of Study 2

What are the contemporary issues associated with physical activity and sport?

In this area of study students focus on a range of contemporary issues associated with physical activity and/or sport at the local, national and global level. They investigate in detail one issue relevant to physical activity and/or sport. Possible issues suitable for investigation include declining levels of physical activity across the lifespan, active transport, gender equity in physical activity and sport, cultural diversity and inclusion in physical activity, risk management and safety in physical activity and sport, children and competitive sport, the community and recreation, access to physical activity for population groups such as children, rural and remote communities, cultural groups, Aboriginal and Torres Strait Islanders and people with disabilities.

Students select and explore one issue from a social-ecological perspective to evaluate the affect of individual, social, policy and physical environmental factors on participation in physical activity. Students develop an understanding of the historical, and current perspectives of the issue and forecast future trends. They form conclusions in relation to the impact these factors have on physical activity and sport in society.

Outcome 2

On completion of this unit the student should be able to apply a social-ecological framework to research, analyse and evaluate a contemporary issue associated with participation in physical activity and/or sport in a local, national or global setting.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 2.

Key knowledge

- the role of the social-ecological model and/or the Youth Physical Activity Promotion Model in evaluating physical activity promotion and sedentary behaviour reduction initiatives and strategies
- the key concepts associated with the selected contemporary issue associated with participation in physical activity and/or sport in society
- individual, social, policy and environmental influences on participation in physical activity and/or sport in reference to the selected issue
- local, national and/or global perspectives of the selected issue
- historical, current and future implications of the selected issue
- government, community and/or personal strategies or programs designed to promote participation in physical activity and/or sport.

Key skills

- identify contemporary issues associated with participation in physical activity and sport
- participate in and reflect on physical activities that illustrate the participatory perspective of the selected issue
- collect information on a selected issue related to physical activity and/or sport in society from a range of sources such as primary data, and print and electronic material
- analyse the historical, current and future implications on the issue identified
- apply the social-ecological or Youth Physical Activity Promotion Model model to analyse and evaluate strategies and programs associated with the selected issue
- draw informed conclusions and report in a suitable format on the socio-cultural and environmental influences that impact on participation in physical activity and/or sport based on research findings.

Assessment

The award of satisfactory completion for a unit is based on whether the student has demonstrated the set of outcomes specified for the unit. Teachers should use a variety of learning activities and assessment tasks that provide a range of opportunities for students to demonstrate the key knowledge and key skills in the outcomes.

The areas of study, including the key knowledge and key skills listed for the outcomes, should be used for course design and the development of learning activities and assessment tasks. Assessment must be a part of the regular teaching and learning program and should be completed mainly in class and within a limited timeframe.

All assessments at Units 1 and 2 are school-based. Procedures for assessment of levels of achievement in Units 1 and 2 are a matter for school decision.

For this unit students are required to demonstrate two outcomes. As a set these outcomes encompass the areas of study in the unit.

The assessment task for Outcome 1 is:

- a written plan and a reflective folio demonstrating participation in a program designed to either increase physical activity levels and/or reduce sedentary behaviour based on the physical activity and sedentary behaviour guidelines for an individual or a selected group.

Suitable tasks for assessment of Outcome 2 may be selected from the following:

- a visual presentation such as a graphic organiser, concept/mind map, annotated poster, presentation file
- a multimedia presentation, including two or more data types (for example, text, still and moving images, sound) and involving some form of interaction or simulation
- an oral presentation
- a written report.

Where teachers allow students to choose between tasks they must ensure that the tasks they set are of comparable scope and demand.

Unit 3: Movement skills and energy for physical activity

This unit introduces students to the biomechanical and skill acquisition principles used to analyse human movement skills and energy production from a physiological perspective. Students use a variety of tools and techniques to analyse movement skills and apply biomechanical and skill acquisition principles to improve and refine movement in physical activity, sport and exercise. They use practical activities to demonstrate how correct application of these principles can lead to improved performance in physical activity and sport.

Students investigate the relative contribution and interplay of the three energy systems to performance in physical activity, sport and exercise. In particular, they investigate the characteristics of each system and the interplay of the systems during physical activity. Students explore the causes of fatigue and consider different strategies used to postpone fatigue and promote recovery.

Area of Study 1

How are movement skills improved?

In this area of study students examine the biomechanical and skill acquisition principles that can be applied when analysing and improving movement skills used in physical activity and sport. Through coaching and involvement in a variety of practical activities, students investigate and analyse movements to develop an understanding of how the correct application of biomechanical and skill acquisition principles leads to greater efficiency and accuracy in movement skills.

Outcome 1

On completion of this unit the student should be able to collect and analyse information from, and participate in, a variety of physical activities to develop and refine movement skills from a coaching perspective, through the application of biomechanical and skill acquisition principles.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 1.

Key knowledge

- classification of movement skills including fundamental movement skills, sport specific skills, open and closed skills, gross and fine skills, and discrete, serial and continuous motor skills
- influences on movement including individual, task and environmental constraints on motor skill development
- the link between motor skill development and participation and performance
- qualitative movement analysis principles (preparation, observation, evaluation and error correction)
- biomechanical principles for analysis of human movement including:
  - angular and linear kinetic concepts of human movement: Newton's three laws of motion, inertia, mass, force, momentum and impulse
  - angular and linear kinematic concepts of human movement: distance, displacement, speed, velocity, acceleration and projectile motion (height, angle and speed of release)
  - equilibrium and human movement: levers (force, axis, resistance and the mechanical advantage of anatomical levers), stability and balance (centre of gravity, base of support and line of gravity)
- direct and constraints based approaches to coaching and instruction

- sociocultural factors that have an affect on skill development, and the characteristics of the three stages of learning (cognitive, associative and autonomous)
- practice strategies to improve movement skills including amount, distribution (massed and distributed) and variability (blocked and random)
- feedback including type (intrinsic, augmented, knowledge of results and knowledge of performance) and frequency.

Key skills

- analyse and classify movement skills
- analyse individual, task and environmental factors influencing movement skill development
- analyse the link between motor skill development and participation and performance
- perform a qualitative analysis of a movement skill using video and systematic observation to analyse and improve a variety of movement skills
- analyse, interpret and apply graphical, visual and physical representations of biomechanical principles to improve movement skills in a coaching context
- explain and apply theories of learning to practical coaching situations
- explain sociocultural factors that influence movement skill development at different stages of learning
- discuss how skill classification affects the selection of appropriate practice strategies
- participate in, observe and record the characteristics of different types of practice strategies
- perform, observe, analyse, and report on the role of feedback in improving performance through practical-based activities.

Area of Study 2

How does the body produce energy?

In this area of study students explore the various systems and mechanisms associated with the production of energy required for human movement. They consider the cardiovascular, respiratory and muscular systems and the roles of each in supplying oxygen and energy to the working muscles. They examine the way in which energy for activity is produced by the three energy systems and the associated fuels used for activities of varying intensity and duration. Students also consider the many factors contributing to fatigue as well as recovery strategies used to return to pre-exercise conditions. Through practical activities students explore the interplay of the energy systems during physical activity.

Outcome 2

On completion of this unit the student should be able to use data collected in practical activities to analyse how the major body and energy systems work together to enable movements to occur, and explain the factors causing fatigue and suitable recovery strategies.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 2.

Key knowledge

- fuels (both chemical and food) required for resynthesis of ATP at rest and during physical activity, including the relative contribution of fuels at varying exercise intensities
- characteristics of the three energy systems (ATP–CP, anaerobic glycolysis, aerobic system) for physical activity, including rate of ATP production, the yield of each energy system, fatigue/limiting factors and recovery rates associated with active and passive recoveries
- interplay of energy systems in relation to the intensity, duration and type of activity

- oxygen uptake at rest, and during exercise and recovery, including oxygen deficit, steady state, and excess post-exercise oxygen consumption
- acute physiological responses to exercise in the cardiovascular, respiratory and muscular systems.

Key skills

- participate in a variety of physical activities and describe, using appropriate terminology, the interplay and relative contribution of the energy systems
- perform, observe, analyse and report on laboratory exercises designed to explore the relationship between the energy systems during physical activity and recovery
- explain the changes in oxygen demand and supply at rest, and during sub-maximal and maximal activity
- participate in physical activities to collect and analyse data on the range of acute effects that physical activity has on the cardiovascular, respiratory and muscular systems of the body
- explain the fatiguing factors associated with the use of the three energy systems under varying conditions.

School-based assessment

Satisfactory completion

The award of satisfactory completion for a unit is based on whether the student has demonstrated the set of outcomes specified for the unit. Teachers should use a variety of learning activities and assessment tasks to provide a range of opportunities for students to demonstrate the key knowledge and key skills in the outcomes.

The areas of study and key knowledge and key skills listed for the outcomes should be used for course design and the development of learning activities and assessment tasks.

Assessment of levels of achievement

The student's level of achievement in Unit 3 will be determined by School-assessed Coursework. School-assessed Coursework tasks must be a part of the regular teaching and learning program and must not unduly add to the workload associated with that program. They must be completed mainly in class and within a limited timeframe.

Where teachers provide a range of options for the same School-assessed Coursework task, they should ensure that the options are of comparable scope and demand.

The types and range of forms of School-assessed Coursework for the outcomes are prescribed within the study design. The VCAA publishes *Advice for teachers* for this study, which includes advice on the design of assessment tasks and the assessment of student work for a level of achievement.

Teachers will provide to the VCAA a numerical score representing an assessment of the student's level of achievement. The score must be based on the teacher's assessment of the performance of each student on the tasks set out in the following table.

Contribution to final assessment

School-assessed Coursework for Unit 3 will contribute 25 per cent to the study score.

Outcomes	Marks allocated*	Assessment tasks
Outcome 1 Collect and analyse information from, and participate in, a variety of practical activities to develop and refine movement skills from a coaching perspective, through the application of biomechanical and skill acquisition principles.	**50**	Structured questions that draw on primary data which analyses a movement skill using biomechanical and skill acquisition principles.
Outcome 2 Use data collected in practical activities to analyse how the major body and energy systems work together to enable movements to occur, and explain the factors causing fatigue and suitable recovery strategies.	**25**	A laboratory report based on primary data collected during participation in a practical activity, which analyses the relative contribution of energy systems and acute responses to exercise.
	25	A response in one or more of the following forms, which focus on energy system interplay, fatigue and/or recovery. • a practical laboratory report • a case study analysis • a data analysis • a critically reflective folio/diary of participation in practical activities • a visual presentation • a multimedia presentation • structured questions.
Total marks	**100**	

*School-assessed Coursework for Unit 3 contributes 25 per cent.

External assessment

The level of achievement for Units 3 and 4 is also assessed by an end-of-year examination, which will contribute 50 per cent.

Unit 4: Training to improve performance

In this unit students analyse movement skills from a physiological, psychological and sociocultural perspective, and apply relevant training principles and methods to improve performance within physical activity at an individual, club and elite level. Improvements in performance, in particular fitness, depend on the ability of the individual and/or coach to gain, apply and evaluate knowledge and understanding of training. Students analyse skill frequencies, movement patterns, heart rates and work to rest ratios to determine the requirements of an activity. Students consider the physiological, psychological and sociological requirements of training to design and evaluate an effective training program.

Students participate in a variety of training sessions designed to improve or maintain fitness and evaluate the effectiveness of different training methods. Students critique the effectiveness of the implementation of training principles and methods to meet the needs of the individual, and evaluate the chronic adaptations to training from a theoretical perspective.

Area of Study 1

What are the foundations of an effective training program?

In this area of study students focus on the information required to form the foundation of an effective training program. They use data from an activity analysis and determine the fitness requirements of a selected physical activity. They also use data collected from participating in a series of fitness tests to inform the design of the training program.

Students determine the relevant factors that affect each of the fitness components, and conduct a series of fitness tests that demonstrate correct and ethical implementation of testing protocols and procedures.

Outcome 1

On completion of this unit the student should be able to analyse data from an activity analysis and fitness tests to determine and assess the fitness components and energy system requirements of the activity.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 1.

Key knowledge

- activity analysis, including skill frequencies, movement patterns, heart rates and work to rest ratios
- fitness components: definitions and factors affecting aerobic power, agility, anaerobic capacity, balance, body composition, coordination, flexibility, muscular endurance, power and strength, reaction time and speed
- assessment of fitness including:
  - the purpose of fitness testing including physiological, psychological and sociocultural perspectives
  - pre-participation health screening (PAR-Q)
  - informed consent
  - test aims and protocols
  - test reliability and validity
- methods of at least two standardised, recognised tests for aerobic power, agility, anaerobic capacity, body composition, flexibility, muscular endurance, power and strength and speed.

Key skills

- analyse data to determine the major fitness components and the factors that affect them, and energy systems used in a variety of sporting events and physical activities
- determine an appropriate fitness testing regime based on the physiological, psychological and sociocultural needs of the individual and the requirements of the activity
- conduct a valid and reliable assessment of fitness using ethical protocols
- perform, observe, analyse and report on practical laboratory exercises designed to assess fitness prior to designing a training program
- justify the selection of fitness tests in relation to the physiological, psychological and sociocultural requirements of the test subject.

Area of Study 2

How is training implemented effectively to improve fitness?

In this area of study students focus on the implementation and evaluation of training principles and methods from a practical and theoretical perspective. They consider the manner in which fitness can be improved through the application of appropriate training principles and methods. Students identify and consider components of an exercise training session, they monitor, record and adjust training. Students explain the chronic adaptations to the cardiovascular, respiratory and muscular systems.

Outcome 2

On completion of this unit the student should be able to participate in a variety of training methods, and design and evaluate training programs to enhance specific fitness components.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Area of Study 2.

Key knowledge

- strategies to monitor and record physiological, psychological and sociological training data, including training diaries, digital activity trackers and apps
- components of an exercise training session including warm up, conditioning phase and cool down
- training program principles, including frequency, intensity, time, type, progression, specificity, individuality, diminishing returns, variety, maintenance, overtraining and detraining
- training methods including continuous, interval (short, intermediate, long and high intensity), fartlek, circuit, weight/resistance, flexibility and plyometrics
- psychological strategies used to enhance performance and aid recovery including sleep, confidence and motivation, optimal arousal, mental imagery and concentration
- nutritional and rehydration recovery strategies including water, carbohydrate and protein replenishment
- chronic adaptations of the cardiovascular, respiratory and muscular systems to aerobic, anaerobic and resistance training.

Key skills

- explain the importance of maintaining physiological, psychological and sociological records of training
- conduct and participate in all components of an exercise training session
- reflect on the physiological, psychological and sociological aspects of participation in a variety of training sessions
- analyse training data to identify appropriate modifications to a training program

- design a training program that demonstrates the correct application of training principles and methods to enhance and/or maintain fitness components
- evaluate and critique the effectiveness of different training programs
- evaluate a range of psychological strategies which affect performance and recovery
- explain and apply relevant nutrition and rehydration strategies to enhance recovery
- explain how the cardiovascular, respiratory and muscular systems' chronic adaptations to training lead to improved performance.

School-based assessment

Satisfactory completion

The award of satisfactory completion for a unit is based on whether the student has demonstrated the set of outcomes specified for the unit. Teachers should use a variety of learning activities and assessment tasks to provide a range of opportunities for students to demonstrate the key knowledge and key skills in the outcomes.

The areas of study and key knowledge and key skills listed for the outcomes should be used for course design and the development of learning activities and assessment tasks.

Assessment of levels of achievement

The student's level of achievement in Unit 4 will be determined by School-assessed Coursework. School-assessed Coursework tasks must be a part of the regular teaching and learning program and must not unduly add to the workload associated with that program. They must be completed mainly in class and within a limited timeframe.

Where teachers provide a range of options for the same School-assessed Coursework task, they should ensure that the options are of comparable scope and demand.

The types and range of forms of School-assessed Coursework for the outcomes are prescribed within the study design. The VCAA publishes Advice for teachers for this study, which includes advice on the design of assessment tasks and the assessment of student work for a level of achievement.

Teachers will provide to the VCAA a numerical score representing an assessment of the student's level of achievement. The score must be based on the teacher's assessment of the performance of each student on the tasks set out in the following table.

Contribution to final assessment

School-assessed Coursework for Unit 4 will contribute 25 per cent to the study score.

Outcomes	Marks allocated*	Assessment tasks
Outcome 1 Analyse data from an activity analysis and fitness tests to determine and assess the fitness components and energy system requirements of the activity.	30	A written report analysing data from an activity analysis to determine the relevant fitness components and energy system requirements in a selected activity, and including justification of the selection of appropriate tests to assess fitness.
Outcome 2 Participate in a variety of training methods, and design and evaluate training programs to enhance specific fitness components.	25	A reflective folio of participation in a minimum of five different training sessions focusing on the components of the session, the training method completed and the implementation of training principles to the fitness components being trained.
	25	A written report that will draw on the personal experiences recorded in the folio to design a six-week training program for a given case study.
	20	A response in one or more of the following formats, which links chronic adaptations of the cardiovascular, respiratory and muscular systems to training methods and improved performance: • a case study analysis • a data analysis • structured questions.
Total marks	100	

*School-assessed Coursework for Unit 4 contributes 25 per cent.

External assessment

The level of achievement for Units 3 and 4 is also assessed by an end-of-year examination.

Contribution to final assessment

The examination will contribute 50 per cent.

End-of-year examination

Description

The examination will be set by a panel appointed by the VCAA. All the key knowledge and key skills that underpin the outcomes in Units 3 and 4 are examinable.

Conditions

The examination will be completed under the following conditions:

- Duration: two hours.
- Date: end-of-year, on a date to be published annually by the VCAA.
- VCAA examination rules will apply. Details of these rules are published annually in the *VCE and VCAL Administrative Handbook*.
- The examination will be marked by assessors appointed by the VCAA.

Further advice

The VCAA publishes specifications for all VCE examinations on the VCAA website. Examination specifications include details about the sections of the examination, their weighting, the question format/s and any other essential information. The specifications are published in the first year of implementation of the revised Unit 3 and 4 sequence together with any sample material.