

Physical Education

Victorian Certificate of Education Study Design

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Victorian Curriculum and Assessment Authority
2010

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Latoya BARTON
The sunset (detail)
from a series of twenty-four
9.0 x 9.0 cm each, oil on board



Tarkan ERTURK
Visage (detail)
201.0 x 170.0 cm
synthetic polymer paint, on cotton duck



Liana RASCHILLA
Teapot from the *Crazy Alice* set
19.0 x 22.0 x 22.0 cm
earthenware, clear glaze, lustres



Nigel BROWN
Untitled physics (detail)
90.0 x 440.0 x 70.0 cm
composition board, steel, loudspeakers,
CD player, amplifier, glass



Kate WOOLLEY
Sarah (detail)
76.0 x 101.5 cm, oil on canvas



Chris ELLIS
Tranquility (detail)
35.0 x 22.5 cm
gelatin silver photograph



Christian HART
Within without (detail)
digital film, 6 minutes



Kristian LUCAS
Me, myself, I and you (detail)
56.0 x 102.0 cm
oil on canvas



Merryn ALLEN
Japanese illusions (detail)
centre back: 74.0 cm, waist (flat): 42.0 cm
polyester cotton



Ping (Irene) VINCENT
Boxes (detail)
colour photograph



James ATKINS
Light cascades (detail)
three works, 32.0 x 32.0 x 5.0 cm each
glass, fluorescent light, metal



Tim JOINER
14 seconds (detail)
digital film, 1.30 minutes



Lucy McNAMARA
Precariously (detail)
156.0 x 61.0 x 61.0 cm
painted wood, oil paint, egg shells, glue, stainless steel wire

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IMPORTANT INFORMATION

Accreditation period

Units 1–4: 2011–2014

The accreditation period commences on 1 January 2011.

Other sources of information

The *VCAA Bulletin VCE, VCAL and VET* is the only official source of changes to regulations and accredited studies. The *VCAA Bulletin VCE, VCAL and VET*, including supplements, also regularly includes advice on VCE studies. It is the responsibility of each VCE teacher to refer to each issue of the *VCAA Bulletin VCE, VCAL and VET*. The *VCAA Bulletin VCE, VCAL and VET* is sent in hard copy to all VCE providers. It is also available as an e-newsletter via free subscription on the Victorian Curriculum and Assessment Authority's website at www.vcaa.vic.edu.au

To assist teachers in assessing School-assessed Coursework in Units 3 and 4, the Victorian Curriculum and Assessment Authority publishes online an assessment handbook that includes advice on the assessment tasks and performance descriptors for assessment.

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.

Photocopying

VCE schools only may photocopy parts of this study design for use by teachers.

Introduction

RATIONALE

VCE Physical Education examines the biological, physiological, psychological, social and cultural influences on performance and participation in physical activity. It focuses on the interrelationship between motor learning and psychological, biomechanical, physiological and sociological factors that influence physical performances, and participation in physical activity. The study of physical activity and sedentary behaviour is significant for the understanding of health, wellbeing and performance of people.

The study enables the integration of theoretical knowledge with practical application through participation in physical activities. There are opportunities for students to apply theoretical concepts and reflect critically on factors that affect all levels of performance and participation.

This VCE study is suitable for students with a wide range of aspirations, including those who wish to pursue further formal study at tertiary level or in vocational education and training settings. The study prepares students for such fields as the health sciences, exercise science and education, as well as providing valuable knowledge and skills for participating in their own sporting and physical activity pursuits to develop as critical practitioners and lifelong learners.

AIMS

This study enables students to:

- understand the social, environmental, cultural, biological, psychological and physiological factors that influence participation in physical activity
- develop a critical perspective on physical activity across the lifespan
- investigate the promotion of physical activity in a variety of settings
- examine how the body systems work together to produce movement
- examine performance enhancement in terms of training programming and recovery, biomechanics, sports psychology, risk management and ethics
- analyse the processes associated with skill development and coaching, and strategies and tactics used within game situations
- use practical activities to underpin theoretical understanding.

STRUCTURE

The study is made up of four units:

Unit 1: Bodies in motion

Unit 2: Sports coaching and physically active lifestyles

Unit 3: Physical activity participation and physiological performance

Unit 4: Enhancing 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 on pages 35 to 36 under ‘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.

DURATION

Each unit involves at least 50 hours of scheduled classroom instruction.

CHANGES TO THE STUDY DESIGN

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

MONITORING FOR QUALITY

As part of ongoing monitoring and quality assurance, the Victorian Curriculum and Assessment Authority 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

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 Early Childhood Development's *Victorian Government School's Reference Guide* and relevant references and associations/organisations to ensure that each activity is conducted within currently accepted guidelines.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

In designing courses for this study teachers should incorporate information and communications technology (ICT) where appropriate and applicable to the teaching and learning activities.

EMPLOYABILITY SKILLS

This study offers a number of opportunities for students to develop employability skills. The 'Advice for teachers' section 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 *Information Privacy Act 2000* 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 a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher's assessment of the student's performance on assessment tasks designated for the unit. Designated assessment tasks are provided in the details for each unit. The Victorian Curriculum and Assessment Authority publishes online an assessment handbook that includes advice on the assessment tasks and performance descriptors for assessment for Units 3 and 4.

Teachers must develop courses that provide opportunities for students to demonstrate achievement of outcomes. Examples of learning activities are provided in the 'Advice for teachers' section.

Schools will report a result for each unit to the Victorian Curriculum and Assessment Authority as S (Satisfactory) or N (Not Satisfactory).

Completion of a unit will be reported on the Statement of Results issued by the Victorian Curriculum and Assessment Authority as S (Satisfactory) or N (Not Satisfactory). Schools may report additional information on levels of achievement.

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.

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 Victorian Curriculum and Assessment Authority will supervise the assessment of all students undertaking Units 3 and 4.

In VCE Physical Education students' level of achievement will be determined by School-assessed Coursework and an end-of-year examination. The Victorian Curriculum and Assessment Authority will report students' level of performance on each assessment component as a grade from A+ to E or UG (ungraded). To receive a study score, students 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.

Unit 1: Bodies in motion

In this unit students explore how the body systems work together to produce movement and analyse this motion using biomechanical principles. Through practical activities students explore the relationships between the body systems and physical activity. They are introduced to the aerobic and anaerobic pathways utilised to provide the muscles with the energy required for movement and the basic characteristics of each pathway.

Students apply biomechanical principles to improve and refine movement. They use practical activities to demonstrate biomechanical principles and how the correct application of biomechanics can lead to improved performance in sport and physical activity.

In Area of Study 3, there are two detailed studies: Technological advancements from a biomechanical perspective and Injury prevention and rehabilitation, which will expand and build on the knowledge and skills introduced in Areas of Study 1 and 2. Students select one of these detailed studies to explore in greater depth.

AREA OF STUDY 1

Body systems and human movement

In this area of study students examine the systems of the human body and how they translate into movement. Through practical activities they explore the major components of the musculoskeletal, cardiovascular and respiratory systems and their contributions and interactions during physical activity. Anaerobic and aerobic pathways are introduced and linked to the types of activities that utilise each of the pathways.

Outcome 1

On completion of this unit the student should be able to collect and analyse information from, and participate in, a variety of practical activities to explain how the musculoskeletal, cardiovascular and respiratory systems function, and how the aerobic and anaerobic pathways interact with the systems to enable human movement.

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

Key knowledge

This knowledge includes:

- the musculoskeletal system working together to produce movement in physical activity: bones of the human body, major muscles and muscle structure, classification of joints and joint action
- characteristics and functions of muscle fibres including fibre arrangement and type
- types of muscular contraction (isotonic, isometric and isokinetic)
- agonists, antagonists and stabilisers and the concept of reciprocal inhibition
- control of muscles including the recruitment of motor units, voluntary and involuntary muscular contractions
- the cardiovascular and respiratory systems, including the structure and function of the heart and lungs, mechanics of breathing, gaseous exchange, blood vessels, blood flow around the body at rest and during exercise
- introduction to the characteristics of aerobic and anaerobic pathways (with or without oxygen) and their contribution to movement and dominant fibre type associated with each pathway.

Key skills

These skills include the ability to:

- use correct anatomical terminology to identify bones, individual muscles (for example, rectus abdominus), joints and joint actions used in human movement
- perform, observe and analyse a variety of movements used in physical activity and identify the bones, muscles, joints and joint actions responsible for movement
- accurately describe the process of reciprocal inhibition
- use correct terminology to identify muscle fibre types and muscular contractions required to perform a variety of activities at different intensities
- describe the relationship between motor unit recruitment and muscular contractions
- perform, measure and report on changes to the cardiovascular, respiratory and muscular systems at rest compared to exercise
- identify the dominant energy pathway utilised in a variety of aerobic or anaerobic activities determined by the intensity and duration of the activity
- collect, analyse and report on primary data related to responses to exercise and anaerobic and aerobic pathways.

AREA OF STUDY 2

Biomechanical movement principles

In this area of study students examine biomechanical principles underpinning physical activity and sport. Through their involvement in practical activities, students investigate and analyse movements in a variety of activities to develop an understanding of how the correct application of biomechanical principles leads to improved performance.

Outcome 2

On completion of this unit the student should be able to collect and analyse information from, and participate in, a variety of practical activities to explain how to develop and refine movement in a variety of sporting actions through the application of biomechanical principles.

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

Key knowledge

This knowledge includes:

- Newton's Laws of motion, including an understanding of force, mass and weight, acceleration and inertia applied to sport and physical activities
- straight line motion, including the concepts of acceleration/deceleration, velocity and distance/displacement applied to sport and physical activities
- components of levers (axis, force arm and resistance arm) and their application to sport and physical activities
- the principles of conservation and transfer of momentum, impulse and sequential and/or simultaneous force summation applied to sport and physical activities
- projectile motion, including the human body as a projectile, Magnus effect, spin (back spin, top spin, side spin), height of release, angle of release, velocity of release, angle of projection and flight path (trajectory)
- angular motion including torque, angular velocity, momentum and moment of inertia and their application to sport and physical activities
- elasticity and the co-efficient of restitution of sports equipment and the effect of rebound velocity on performance
- factors that affect balance and stability, including centre of gravity, base of support, line of gravity and mass in sporting and physical activities.

Key skills

These skills include the ability to:

- use correct terminology to explain the application of biomechanical principles to a variety of sporting actions
- analyse and interpret graphical representations of biomechanical principles used in human movement
- explain how spin is used to produce the desired outcome in sport (for example, curve ball in baseball, lift in javelin throwing, leg break in cricket)
- perform, observe, analyse and report on a variety of practical activities related to the application of biomechanical principles
- apply biomechanical principles to evaluate the efficiency of a variety of movements
- compare and contrast different sporting actions to identify the correct application of biomechanical principles to improve performance.

AREA OF STUDY 3

Two detailed studies are available in Unit 1. **One** detailed study is to be selected from:

- Technological advancements from a biomechanical perspective
- Injury prevention and rehabilitation.

Detailed Study 3.1: Technological advancements from a biomechanical perspective

In this detailed study students examine changes that have been made to sporting techniques and equipment (including clothing, footwear and playing fields) and explore the biomechanical effect of the change. By researching a recent change that has occurred in the selected sport, students analyse the biomechanical effect, the result of the change, the impact of the change on performance and participation, rules and the relevant implications of the change (biomechanical, social and ethical).

Outcome 3.1

On completion of this unit the student should be able to analyse data collected through research and practical activities, to explain the technological advancements that have led to biomechanical changes in sporting technique or equipment in one selected sport, and explain the implications of the change.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Detailed Study 3.1.

Key knowledge

This knowledge includes:

- technological advancements in sports equipment design, material, structure and technique
- understanding of the underpinning biomechanical principles evident in the technological advancement and how the application of the principle has resulted in the change
- factors affecting changes in equipment (such as clothing, footwear and playing fields) or technique (such as safety, performance, limitations of participants)
- changes in performance as a result of the technological change
- implications of the technological change such as biomechanical, social and ethical
- rule changes introduced as a direct result of the technological advancement
- changes in equipment and techniques to cater for a range of sub-population groups, such as children, the elderly and people with disabilities.

Key skills

These skills include the ability to:

- describe biomechanical principles associated with changes in equipment and to technique using the correct terminology
- use information and communication technology to collect and analyse information to compare and contrast the impact of different techniques and equipment on performance
- participate in, and evaluate and report on a minimum of one practical activity that demonstrates a technological change
- explain the impact of a technological advancement.

Detailed Study 3.2: Injury prevention and rehabilitation

This detailed study focuses on sports injury risk management strategies used to reduce the risk of injury to the participant/athlete, and the rehabilitation practices and processes an individual/athlete may use to ready them for a return to sport and physical activity. Students analyse and demonstrate a range of different strategies that may be implemented at a club, an administration, a coaching or an individual level.

Outcome 3.2

On completion of this unit the student should be able to observe, demonstrate and explain strategies used to prevent sports injuries, and evaluate a range of techniques used in the rehabilitation of sports injuries.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Detailed Study 3.2.

Key knowledge

This knowledge includes:

- types of sports injuries, including what occurs, how it occurs and why it occurs
- duty of care associated with the role of administrator, coach, manager, teacher or student
- ethical considerations associated with the increased use of sports medicine practices to improve performance
- Sports Medicine Australia (SMA) policies
- the role of pre-participation screening in preventing injuries to participants and athletes
- sports injury risk management systems implemented pre-event, during the event and post-event
- preventative measures such as the implementation of policy, physical preparation of athletes, warm ups and cool downs, rule modifications; ensuring safe grounds, facilities and equipment; enforcing the wearing of protective equipment and correct footwear; and taping and bandaging to reduce the risk of injury
- rehabilitation techniques used in recovery from injury and injury management techniques used to expedite return to play
- roles of health care professionals (for example, sports physiologists, doctors, physiotherapists, osteopaths, dieticians) in injury prevention and rehabilitation.

Key skills

These skills include the ability to:

- classify sports injuries (direct, indirect or overuse injuries)
- describe the duty of care of individuals involved in the delivery of sports and physical activity programs
- analyse ethical considerations relating to the use of sports medicine practices
- interpret and evaluate SMA policies
- prepare and conduct pre-activity screening documentation
- observe and describe risk management systems appropriate to training and recovery
- identify and demonstrate appropriate sports injury preventative measures used in a variety of sports and physical activities
- compare and contrast contemporary rehabilitation techniques
- investigate the role of health care professionals such as physiotherapists, occupational therapists, dieticians and masseuses in injury prevention and rehabilitation to plan a person's return to sport or lifestyle.

ASSESSMENT

The award of satisfactory completion for a unit is based on a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher's assessment of the student's overall performance on assessment tasks designated for the unit.

The key knowledge and key skills listed for each outcome should be used as a guide to course design and the development of learning activities. The key knowledge and key skills do not constitute a checklist and such an approach is not necessary or desirable for determining the achievement of outcomes. The elements of key knowledge and key skills should not be assessed separately.

Assessment 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. Teachers should select a variety of assessment tasks for their assessment program to reflect the key knowledge and key skills being assessed and to provide for different learning styles.

For this unit students are required to demonstrate achievement of three outcomes. As a set these outcomes encompass all areas of study.

Demonstration of achievement of Outcomes 1, 2 and 3.1 or 3.2 must be based on the student's performance on a selection of assessment tasks. Where teachers allow students to choose between tasks they must ensure that the tasks they set are of comparable scope and demand.

Assessment tasks for this unit are selected from the following:

- a practical laboratory report linking key knowledge and key skills to practical activity
- a case study analysis
- a data analysis
- a critically reflective folio/diary of participation in practical activities
- a visual presentation such as 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
- a physical simulation or model
- an oral presentation such as podcast, debate
- a written report
- a test.

Unit 2: Sports coaching and physically active lifestyles

This unit explores a range of coaching practices and their contribution to effective coaching and improved performance of an athlete. The way in which a coach influences an athlete can have a significant effect on performance. The approach a coach uses, the methods applied and the skills used will have an impact on the degree of improvement experienced by an athlete. By studying various approaches and applying this knowledge to a practical session, students gain a practical insight into coaching.

Students are introduced to physical activity and the role it plays in the health and wellbeing of the population. Through a series of practical activities, students gain an appreciation of the level of physical activity required for health benefits and investigate how participation in physical activity varies across the lifespan. They explore a range of factors that influence participation in regular physical activity, and collect data to identify perceived barriers and the ways in which these barriers can be overcome.

In Area of Study 3, there are two detailed studies: Decision making in sport and Promoting active living, which will expand and build on the knowledge and skills introduced in Areas of Study 1 and 2. Students select one of these detailed studies to explore in greater depth.

AREA OF STUDY 1

Effective coaching practices

In this area of study students focus on the roles and responsibilities of a coach as well as looking at coaching pathways and accreditation. The effectiveness of a coach may be determined by their style, skills and behaviours. A coach must have an understanding of skill learning practices and interpersonal skills if they are to develop and enhance the performance of athletes. Students apply these skills by coaching a team.

Outcome 1

On completion of this unit the student should be able to demonstrate their knowledge of, and evaluate, the skills and behaviours of an exemplary coach, and explain the application of a range of skill learning principles used by a coach.

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

Key knowledge

This knowledge includes:

- roles and responsibilities of the coach
- skills and behaviours of an exemplary coach
- effective and appropriate relationships between coach and the individual or group, understanding group dynamics, leadership skills, conflict resolution, communication and the setting of boundaries
- rationale for the development of codes of conduct
- coaching methods applied in different contexts
- coaching techniques, strategies and practices used by coaches to develop and improve skills
- coaching pathways and accreditation for coaches
- skill learning principles such as stages of learning (cognitive, associative and autonomous), skill learning processes and the role of feedback in skill learning
- open and closed skill and sport continuum; comparing environmental stability and instability
- types of practice and transfer of practice.

Key skills

These skills include the ability to:

- create a safe and inclusive learning environment when coaching
- demonstrate a range of coaching practices a coach may use to improve performance
- evaluate coaching methods and justify their appropriateness in a variety of settings
- apply principles of learning to practical situations
- identify factors that influence coaching and learning at different stages of learning
- adopt the role of the coach in a variety of practical sessions and reflect, evaluate and report on the personal experience of taking on the role of a coach.

AREA OF STUDY 2

Physically active lifestyles

This area of study focuses on the range of physical activity options in the community. Health benefits of participation in regular physical activity and health consequences of physical inactivity and sedentary behaviour are explored at individual and population levels. Students explore the dimensions of the National Physical Activity Guidelines and investigate the current status of physical activity and sedentary behaviour from an Australian perspective. Students investigate factors that facilitate involvement in physical activity and consider barriers to participation for various population groups. Students create and implement a program that encourages compliance with the National Physical Activity Guidelines for a given age group.

Outcome 2

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, and create and implement strategies that promote adherence to the National Physical Activity Guidelines.

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

Key knowledge

This knowledge includes:

- the concepts of physical activity, inactivity and sedentary behaviour
- physical, social and mental health benefits of regular participation in physical activity
- the increased health risks associated with being physically inactive, including Type 2 diabetes, obesity, cardiovascular disease, hypertension and high cholesterol levels
- the dimensions of the Australian National Physical Activity Guidelines for all stages of the lifespan
- current levels of physical activity and sedentary behaviour in Australia
- factors (demographic, social and environmental) facilitating participation in physical activity such as age, sex, peers, family, geographic location, physical environment and socioeconomic status
- barriers (demographic, social and environmental) to participation in physical activity for population groups such as males and females, indigenous Australians, people with a disability, rural/urban, the aged, adolescence and youth, cultural and the overweight/obese.

Key skills

These skills include the ability to

- define the concepts of physical activity, inactivity and sedentary behaviours
- participate in a variety of activities, and collect and analyse information related to the health benefits (physical, social, emotional) of physical activity
- identify the consequences of physical inactivity and sedentary behaviour
- describe the National Physical Activity Guidelines across the lifespan and assess adherence to the Guidelines
- collect, analyse and interpret data relating to the current levels of physical activity and sedentary behaviour in Australia
- investigate and identify factors that influence an individual's participation in physical activity across the lifespan
- in an ethically sound manner, collect and analyse primary data related to perceived barriers to participation in physical activity
- create and implement a program that encourages compliance with the National Physical Activity Guidelines for a given age group.

AREA OF STUDY 3

Two detailed studies are available in Unit 2. **One** detailed study is to be selected from:

- Decision making in sport
- Promoting active living.

Detailed Study 3.1: Decision making in sport

This detailed study introduces students to an understanding of games and sport, including how they are categorised. Through a series of practical activities, and for a specific scenario, students analyse and interpret different strategies and tactics used within game situations, and approaches to coaching that develop a player's ability to implement an appropriate strategic decision.

Outcome 3.1

On completion of this unit the student should be able to explain the importance of interpreting game play and selecting appropriate tactics and strategies in sports.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Detailed Study 3.1.

Key knowledge

This knowledge includes:

- categories of games and sports such as invasion, net/court, striking, fielding, target, and the fundamental game elements associated with each category
- a range of tactics and strategies that improve performance in relation to a selection of sports and their impact on the game
- approaches to decision making in sport, such as Game Sense, Discovery Learning, Constraints Based Coaching and Deliberate Play and Practice
- processes for the transfer of skills to game play.

Key skills

These skills include the ability to:

- categorise games and sports
- use correct terminology to describe tactics and strategies used in sports
- identify and implement appropriate tactical or strategic solutions to sporting scenarios
- participate in one approach to develop decision-making skills and demonstrate an awareness of an array of approaches to develop decision-making skills
- use appropriate technology to analyse and interpret set plays and strategies.

Detailed Study 3.2: Promoting active living

This detailed study focuses on the promotion of physical activity in a variety of settings. Students develop an understanding of the use of recall surveys and questionnaires in the collection of data related to physical activity levels, and compare these to the National Physical Activity Guidelines. Media communication tools that are used in the promotion of programs to increase physical activity levels are explored.

Outcome 3.2

On completion of this unit the student should be able to use a subjective method to assess physical activity levels within a given population, and implement and promote a settings-based program designed to increase physical activity levels for the selected group.

To achieve this outcome the student will draw on key knowledge and key skills outlined in Detailed Study 3.2.

Key knowledge

This knowledge includes:

- physical environment, social environment and policy approaches to promoting physical activity in a variety of settings such as home, school, community and the workplace
- the use of recall surveys and questionnaires as methods of assessing physical activity and/or sedentary behaviour in relation to the National Physical Activity Guidelines
- elements of an effective program promoting physical activity
- a variety of media communication tools used to promote population-based physical activity programs.

Key skills

These skills include the ability to:

- collect, analyse and interpret data on physical activity levels by using recall surveys and questionnaires
- evaluate and critique an existing settings-based (home, school, community or the workplace) approach to physical activity promotion
- plan and promote a physical activity program using an appropriate mode of communication (for example, visual, audio, print or web-based media).

ASSESSMENT

The award of satisfactory completion for a unit is based on a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher's assessment of the student's overall performance on assessment tasks designated for the unit.

The key knowledge and key skills listed for each outcome should be used as a guide to course design and the development of learning activities. The key knowledge and key skills do not constitute a checklist and such an approach is not necessary or desirable for determining the achievement of outcomes. The elements of key knowledge and key skills should not be assessed separately.

Assessment 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. Teachers should select a variety of assessment tasks for their assessment program to reflect the key knowledge and key skills being assessed and to provide for different learning styles.

For this unit students are required to demonstrate achievement of three outcomes. As a set these outcomes encompass all areas of study.

Demonstration of achievement of Outcomes 1, 2 and 3.1 or 3.2 must be based on the student's performance on a selection of assessment tasks. Where teachers allow students to choose between tasks they must ensure that the tasks they set are of comparable scope and demand.

Assessment tasks for this unit are selected from the following:

- a practical laboratory report linking key knowledge and key skills to practical activity
- 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
- a physical simulation or model
- an oral presentation such as podcast, debate
- a written report
- a test.

Unit 3: Physical activity participation and physiological performance

This unit introduces students to an understanding of physical activity and sedentary behaviour from a participatory and physiological perspective. Students apply various methods to assess physical activity and sedentary levels, and analyse the data in relation to adherence to the National Physical Activity Guidelines. Students study and apply the social-ecological model to identify a range of Australian strategies that are effective in promoting participation in some form of regular activity.

Students investigate the contribution of energy systems to performance in physical activity. In particular, they investigate the characteristics of each system and the interplay of the systems during physical activity. Students explore the multi-factorial causes of fatigue and consider different strategies used to delay and manage fatigue and to promote recovery.

AREA OF STUDY 1

Monitoring and promotion of physical activity

This area of study uses subjective and objective methods for assessing the student's own and another cohort's physical activity and sedentary levels. Students analyse the advantages and limitations of each of these methods to determine the most appropriate measure for a given setting. Students identify components of the social-ecological model to assist in the critique of government and non-government strategies aimed at increasing physical activity within the population.

Outcome 1

On completion of this unit the student should be able to analyse individual and population levels of sedentary behaviour and participation in physical activity, and evaluate initiatives and strategies that promote adherence to the National Physical Activity Guidelines.

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

Key knowledge

This knowledge includes:

- subjective and objective methods of assessing physical activity and sedentary behaviour, including recall surveys or diaries, pedometry, accelerometry and observational tools, in relation to the National Physical Activity Guidelines

- components of social-ecological models (individual, social environment, physical environment and policy); the relationship between the multiple levels of influences and physical activity
- the role of government and non-government organisations in promoting adherence to the National Physical Activity Guidelines in schools, workplace and communities, including VicHealth, National Heart Foundation, State and Federal Government departments
- a range of individual and population-based Australian physical activity promotion initiatives and strategies.

Key skills

These skills include the ability to:

- compare and contrast subjective and objective methods of assessing sedentary behaviour and physical activity compliance with the National Physical Activity Guidelines
- collect, measure and evaluate data using subjective and objective methods of assessing physical activity and sedentary behaviour
- identify components of the social-ecological model
- apply a social-ecological model to critique physical activity strategies used by government and non-government organisations to target two sub-population groups
- collect and analyse information on initiatives and strategies aimed at increasing physical activity levels locally.

AREA OF STUDY 2

Physiological responses to physical activity

In this area of study students explore the various systems and mechanisms associated with the 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 via the three energy systems and the associated fuels used for activities of varying intensity and duration. Students also consider the many contributing factors to fatigue as well as recovery strategies used to return to pre-exercise conditions. Through practical activities students explore the relationship between 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 fatigue mechanisms and recovery strategies.

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

Key knowledge

This knowledge includes:

- the mechanisms responsible for the acute responses to exercise in the cardiovascular, respiratory and muscular systems
- characteristics and interplay of the three energy systems (ATP – CP, anaerobic glycolysis, aerobic system) for physical activity, including rate of ATP production, the capacity of each energy system and the contribution of each energy system
- fuels (both chemical and food) required for resynthesis of ATP during physical activity and the utilisation of food for energy

- relative contribution of the energy systems and fuels used to produce ATP in relation to the exercise intensity, duration and type
- oxygen uptake at rest, during exercise and recovery, including oxygen deficit, steady state, and excess post-exercise oxygen consumption
- the multi-factorial mechanisms (including fuel depletion, metabolic by-products and thermoregulation) associated with muscular fatigue as a result of varied exercise intensities and durations
- passive and active recovery methods to assist in returning the body to pre-exercise levels.

Key skills

These skills include the ability to:

- describe, using correct terminology, the interplay and relative contribution of the energy systems in different sporting activities
- participate in physical activities to collect and analyse data relating to the range of acute effects that physical activity has on the cardiovascular, respiratory and muscular systems of the body
- perform, observe, analyse and report on laboratory exercises designed to explore the relationship between the energy systems during physical activity
- explain the role the energy systems play in enabling activities to occur as well as their contribution to active and passive recovery
- explain the multi-factorial mechanisms associated with fatigue during physical activity and sporting events resulting from the use of the three energy systems under varying conditions
- compare and contrast suitable recovery strategies used to counteract fatigue and promote optimal performance levels.

ASSESSMENT

The award of satisfactory completion for a unit is based on a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher's assessment of the student's overall performance on assessment tasks designated for the unit. The Victorian Curriculum and Assessment Authority publishes online an assessment handbook for this study that includes advice on the assessment tasks and performance descriptors for assessment.

The key knowledge and key skills listed for each outcome should be used as a guide to course design and the development of learning activities. The key knowledge and key skills do not constitute a checklist and such an approach is not necessary or desirable for determining the achievement of outcomes. The elements of key knowledge and key skills should not be assessed separately.

Assessment of levels of achievement

The student's level of achievement in Unit 3 will be determined by School-assessed Coursework and an end-of-year examination.

Contribution to final assessment

School-assessed Coursework for Unit 3 will contribute 25 per cent.

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

School-assessed Coursework

Teachers will provide to the Victorian Curriculum and Assessment Authority a score representing an assessment of the student's level of achievement.

The score must be based on the teacher's rating of performance of each student on the tasks set out in the following table and in accordance with the assessment handbook published online by the Victorian Curriculum and Assessment Authority. The assessment handbook also includes advice on the assessment tasks and performance descriptors for assessment.

Assessment 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 assessment task, they should ensure that the options are of comparable scope and demand. Teachers should select a variety of assessment tasks for their program to reflect the key knowledge and key skills being assessed and to provide for different learning styles.

Outcomes	Marks allocated*	Assessment tasks
<p>Outcome 1 Analyse individual and population levels of sedentary behaviour and participation in physical activity, and evaluate initiatives and strategies that promote adherence to the National Physical Activity Guidelines.</p>	40	<p>A response in one or more of the following forms, which focuses on strategies aimed at increasing physical activity levels:</p> <ul style="list-style-type: none"> • 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.
<p>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 fatigue mechanisms and recovery strategies.</p>	20	<p>A response in one or more of the following forms, which focuses on the acute effects that physical activity has on the cardiovascular, respiratory and muscular systems of the body:</p> <ul style="list-style-type: none"> • 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 test
	40	<p>AND</p> <p>A practical laboratory report analysing the relative contribution of the energy systems and associated fatigue mechanisms and recovery strategies used in various activities.</p>
Total marks	100	

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

Unit 4: Enhancing performance

Improvements in performance, in particular fitness, depend on the ability of the individual or coach to gain, apply and evaluate knowledge and understanding of training. Students undertake an activity analysis. Using the results of the analysis, they then investigate the required fitness components and participate in a training program designed to improve or maintain selected components. Athletes and coaches aim to continually improve and use nutritional, physiological and psychological strategies to gain advantage over the competition. Students learn to critically evaluate different techniques and practices that can be used to enhance performance, and look at the rationale for the banning or inclusion of various practices from sporting competition.

AREA OF STUDY 1

Planning, implementing and evaluating a training program

This area of study focuses on the components of fitness and assessment of fitness from a physiological perspective. Students consider the manner in which fitness can be improved by the application of appropriate training principles and methods. Students conduct an activity analysis of an elite athlete to determine the fitness requirements of a selected sport. They participate in fitness testing and an individual training program and evaluate this from a theoretical perspective.

Outcome 1

On completion of this unit the student should be able to plan, implement 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 1.

Key knowledge

This knowledge includes:

- fitness components: definitions and factors affecting the health-related fitness components, including aerobic capacity, anaerobic capacity, muscular strength and endurance, flexibility, body composition, and the skill-related components, including muscular power, speed, agility, coordination, balance and reaction time
- data collection activity analysis, including skill analysis, movement patterns and work to rest ratios

- assessment of fitness, including aims, protocols (informed consent and fitness testing), and methods and outcomes of at least two standardised, recognised tests for each fitness component
- fitness training principles, including intensity, duration, frequency, overload, specificity, individuality, diminishing returns, variety, maintenance and detraining
- fitness training methods, including continuous, interval, fartlek, circuit, weight/resistance, flexibility, plyometrics, speed, swiss ball and core strength training to improve aerobic capacity, anaerobic capacity, muscular strength and endurance, speed, flexibility and muscular power
- chronic adaptations of the cardiovascular, respiratory and muscular systems to training.

Key skills

These skills include the ability to:

- explain fitness assessment aims, methods, risks, safeguards, informed consent and confidentiality
- use appropriate technology to perform an activity analysis to collect and analyse primary data to determine major fitness components and energy systems used in sporting events and physical activities
- perform, observe, analyse and report on laboratory exercises designed to explore the assessment of fitness pre and post training
- justify the selected fitness tests in relation to the strengths and weaknesses of the testing methodology
- explain how chronic adaptations to the cardiovascular, respiratory and muscular systems lead to an improved performance
- design, participate in, and evaluate a six-week training program that demonstrates the correct application of training principles and methods to enhance and maintain specific health-related fitness components.

AREA OF STUDY 2

Performance enhancement and recovery practices

This area of study explores nutritional, physiological and psychological strategies used to enhance performance. Students examine legal and illegal substances and methods of performance enhancement and develop an understanding of different anti-doping codes. Students consider strategies used to promote recovery, including nutritional, physiological and psychological practices.

Outcome 2

On completion of this unit the student should be able to analyse and evaluate strategies designed to enhance performance or promote recovery.

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

Key knowledge

This knowledge includes:

- nutritional strategies used to enhance performance and improve recovery, including carbohydrate loading, application of the glycemic index, carbohydrate gels, protein supplementation and caffeine supplementation
- hydration techniques to enhance performance and recovery, including water, hypertonic, hypotonic and isotonic drinks and the use of intravenous drips in rehydration

- physiological strategies to enhance recovery including heat, ice, compression, hyperbaric chambers, massage and sleep
- psychological strategies used to enhance performance and aid recovery, including sleep, meditation, motivational techniques, optimal arousal, mental imagery and concentration
- perceived benefits and potential harms to the athlete of legal and illegal substances and methods that enhance performance, including altitude training, creatine supplementation, enhancement of oxygen transfer, gene doping, hormones (including steroids, erythropoietin and growth hormones), diuretics and masking agents, stimulants and beta blockers
- the rationale for anti-doping codes used by the World Anti-Doping Agency (WADA) and the Australian Sports Anti-Doping Authority (ASADA), including health, safety, fairness, role modelling for children and the maintenance of the spirit of sport.

Key skills

These skills include the ability to:

- compare and contrast practices designed to enhance performance and/or speed up recovery
- analyse and evaluate nutritional and hydration procedures used to enhance individual performance and recovery
- identify and explain psychological factors which impact on performance and recovery
- evaluate anti-doping codes used to govern sport, including the World Anti-Doping Agency (WADA) and the Australian Sports Anti-Doping Authority (ASADA)
- participate in and evaluate a range of nutritional, physiological or psychological strategies that potentially enhance performance and aid recovery.

ASSESSMENT

The award of satisfactory completion for a unit is based on a decision that the student has demonstrated achievement of the set of outcomes specified for the unit. This decision will be based on the teacher's assessment of the student's overall performance on assessment tasks designated for the unit. The Victorian Curriculum and Assessment Authority publishes online an assessment handbook for this study that includes advice on the assessment tasks and performance descriptors for assessment.

The key knowledge and key skills listed for each outcome should be used as a guide to course design and the development of learning activities. The key knowledge and key skills do not constitute a checklist and such an approach is not necessary or desirable for determining the achievement of outcomes. The elements of key knowledge and key skills should not be assessed separately.

Assessment of levels of achievement

The student's level of achievement for Unit 4 will be determined by School-assessed Coursework and an end-of-year examination.

Contribution to final assessment

School-assessed Coursework for Unit 4 will contribute 25 per cent.

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

School-assessed Coursework

Teachers will provide to the Victorian Curriculum and Assessment Authority a score representing an assessment of the student's level of achievement.

The score must be based on the teacher's rating of performance of each student on the tasks set out in the following table and in accordance with the assessment handbook published online by the Victorian Curriculum and Assessment Authority. The assessment handbook also includes advice on the assessment tasks and performance descriptors for assessment.

Assessment 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 assessment task, they should ensure that the options are of comparable scope and demand. Teachers should select a variety of assessment tasks for their program to reflect the key knowledge and key skills being assessed and to provide for different learning styles.

Outcomes	Marks allocated*	Assessment tasks
Outcome 1 Plan, implement and evaluate training programs to enhance specific fitness components.	40	A written report that includes a plan and evaluation of a six-week training program with reference to an activity analysis, fitness testing and a training diary, designed to enhance specific fitness components.
	20	AND 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: <ul style="list-style-type: none"> • a case study analysis • a data analysis • a critically reflective folio/diary of participation in practical activities • a practical laboratory report • a visual presentation • a test.
Outcome 2 Analyse and evaluate strategies designed to enhance performance or promote recovery.	40	A response in one or more of the following formats, which identifies and evaluates various strategies and practices that are used to enhance performance: <ul style="list-style-type: none"> • a practical laboratory report • a case study analysis • a data analysis • a media analysis • a test.
Total marks	100	

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

End-of-year examination**Description**

The examination will be set by a panel appointed by the Victorian Curriculum and Assessment Authority. 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 Victorian Curriculum and Assessment Authority.
- Victorian Curriculum and Assessment Authority 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 Victorian Curriculum and Assessment Authority.

Contribution to final assessment

The examination will contribute 50 per cent.

Further advice

The Victorian Curriculum and Assessment Authority publishes specifications for all VCE examinations on the Victorian Curriculum and Assessment Authority 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 Units 3 and 4 sequence together with any sample material.

Advice for teachers

DEVELOPING A COURSE

A course outlines the nature and sequence of teaching and learning necessary for students to demonstrate achievement of the set of outcomes for a unit. The areas of study broadly describe the learning context and the knowledge required for the demonstration of each outcome. Outcomes are introduced by summary statements and are followed by the key knowledge and key skills which relate to the outcomes.

Teachers must develop courses that include appropriate learning activities to enable students to develop the key knowledge and key skills identified in the outcome statements in each unit.

In order to meet the requirements of the outcome statements and key skills it is essential that practical activities are used in conjunction with the teaching of theoretical concepts throughout Units 1 to 4. Practical activities may include laboratory work, data collection, physical activity, sports and games. Activities do not necessarily need to run for the whole class and may be a demonstration, a whole class activity or a small group task that is done in the classroom, gym, sporting facility, outside or at a suitable venue for the activity. Where students are collecting data for analysis, the process may involve the whole group or small groups of students; however, the assessment of the analysis of data must be an individual task. Teachers must allocate sufficient time to ensure that the practical component of Physical Education is adequately covered. As a guide, between 10 and 15 hours of class time should be devoted to student practical work across each unit.

In Unit 1, Area of Study 1, students are exposed to the systems of the human body. Students will need to have an understanding of how the body systems work to then relate this knowledge to biomechanical and coaching applications. It is also necessary to understand the structure and function of the cardiorespiratory systems prior to looking at the impact and consequences of physically active and inactive lifestyles.

For each of Units 1 and 2 two detailed studies are provided, one of which must be selected in each unit. The detailed studies have been developed to build on the knowledge and skills addressed in Areas of Study 1 and 2 in each unit. The table below shows the relationship between the detailed studies and Areas of Study 1 and 2 within each unit.

Unit	Area of study	Related detailed study
1	1 Body systems and human movement	3.1 Technological advancements from a biomechanical perspective
1	2 Biomechanical movement principles	3.2 Injury prevention and rehabilitation
2	1 Effective coaching practices	3.1 Decision making in sport
2	2 Physically active lifestyles	3.2 Promoting active living

Teachers may adjust the sequencing of the areas of study in each unit so that the detailed study is taught after completion of the area of study to which it relates.

For example Unit 1 could be sequenced as:

Area of Study 1 Body systems and human movement	Detailed Study 3.2 Injury prevention and rehabilitation	Area of Study 2 Biomechanical movement principles
OR		
Area of Study 1 Body systems and human movement	Area of Study 2 Biomechanical movement principles	Detailed Study 3.1 Technological advancements from a biomechanical perspective

For example Unit 2 could be sequenced as:

Area of Study 1 Effective coaching practices	Detailed Study 3.1 Decision making in sport	Area of Study 2 Physically active lifestyles
OR		
Area of Study 1 Effective coaching practices	Area of Study 2 Physically active lifestyles	Detailed Study 3.2 Promoting active living

It is intended that the detailed studies are to be student directed. While the teacher may select the detailed study, students select a topic from within that detailed study to investigate. A suggested time allocation for the teaching of Units 1 and 2:

- Area of Study 1 approximately 6 weeks
- Area of Study 2 approximately 6 weeks
- Area of Study 3: Detailed Study 3.1 or 3.2 approximately 4 weeks

In Units 3 and 4, the time allocated to each area of study should reflect the weighting of the assessment tasks. For example, in Unit 3, Area of Study 1 is worth 40% and the time allocated to the teaching of the key knowledge and skills in this area of study should be 40% of the semester; accordingly, 60% of the semester should be allocated to Area of Study 2.

For Units 1 and 2, teachers must select assessment tasks from the list provided. Tasks should provide a variety and the mix of tasks should reflect the fact that different types of tasks suit different knowledge and skills and different learning styles. Tasks do not have to be lengthy to make a decision about student demonstration of achievement of an outcome.

In Units 3 and 4, assessment is more structured. For some outcomes, or aspects of an outcome, the assessment tasks are prescribed. The contribution that each outcome makes to the total score for school-assessed coursework is also stipulated.

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

In designing courses and developing learning activities for Physical Education, teachers should make use of applications of information and communications technology (ICT) for teaching and learning purposes. In Physical Education, information and communications technology can assist students to:

- capture and record data for analysis
- simulate laboratory activities where equipment or facilities are unavailable
- organise data and identify relationships
- analyse data, movement or activity
- communicate with others using Internet-based forums to share ideas, discuss content, conduct research and gather information
- present findings.

When planning learning activities, ICT should be used as a tool for learning. The use of appropriate technology rather than specific hardware, software and other applications is stated to ensure that schools make use of the resources available to them and are not disadvantaged by limited access to various ICT tools.

Primary data collection is imperative to student understanding across many areas of Physical Education. The use of technology in gathering and analysing data should allow students to demonstrate an understanding of the relationship being investigated or to demonstrate a theoretical connection.

Capturing of moving images for analysis of motion in biomechanics or for an activity analysis can be done using digital cameras, mobile phones, Flip cameras and similar technology. Analysis can be done using computer software or manually, viewing the footage frame by frame. The image can be projected using a data projector or, alternatively, projected onto an interactive whiteboard so that annotations can be made directly onto the image.

In Unit 3, Area of Study 1, Effective coaching practices and Detailed Study 3.1, Decision making in sport, interactive whiteboards could be used by students to demonstrate strategic responses in game situations, where players could be moved around a virtual field of play.

It is appropriate for students to use various forms of ICT such as web-based databases, digital and video cameras, light gates and so on to collect data, and programs such as Excel, Swinger and Dartfish to analyse and interpret data.

ICT applications such as web authoring, flash animation, computer slide narration, podcasts or videocasts, are diverse and engaging learning methods used to access information and record and present information. Students may engage in collaborative research through the posting of information onto a wiki such as Wikispace, Wetpaint or PB Wiki. Information on how to use a wiki can be accessed at www.education.vic.gov.au/teacher/wiki.htm.

GLOSSARY

For the purposes of this study design the following definitions will apply.

Term	Definition
Acute	The immediate response the body has to physical stress (exercise).
Aerobic capacity	The total amount of energy obtainable from the aerobic energy system (i.e. energy produced in the presence of oxygen).
Aerobic glycolysis	The breakdown of glycogen in the presence of oxygen to produce energy, carbon dioxide, water and heat.
Aerobic pathway	The process for energy production that is dependent on the presence of oxygen.
Anaerobic capacity	The total amount of energy obtainable from the anaerobic energy systems (the combined capacity of the ATP-PCR system and lactic acid system).
Anaerobic glycolysis	An energy system that relies on the breakdown of glycogen, in the absence of oxygen, to produce energy. Also known as the glycolytic/nonoxidative energy system, lactic acid (LA) system.
Anaerobic pathway	The process for energy production that is not dependent on the presence of oxygen.
Anaerobic power	The maximum amount of energy that can be generated by the anaerobic energy systems per unit of time. Rate of energy production anaerobically.
ATP-CP energy system	An immediate energy system that does not require oxygen. Also known as the phosphagen system.
Chronic adaptations	Physiological changes which occur to the cardiovascular, respiratory and muscular systems as a result of long-term training.
Displacement	The difference between the initial position and final position of an object.
Force summation	The correct timing and sequencing of body segments and muscles through a range of motion.
Inactivity	Not being physically active – failure to meet the desired levels of physical activity as described by the National Physical Activity Guidelines.

Term	Definition
Interplay	The three energy systems working together to produce the energy required for the activity being undertaken.
Moment of inertia	A measure of an object's resistance to change its rate of rotation.
Momentum	The product of mass and velocity. For example, a body with greater mass moving faster will have greater momentum than a lighter object moving slower.
Muscular endurance	The ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time.
Muscular power	The ability of a muscle or muscle group to exert a maximum amount of force in the shortest period of time.
Muscular strength	The muscle's ability to generate force against an object.
Musculoskeletal system	Consists of the bones (skeleton), muscles, connective tissues and joints and provides form, stability and movement for the body.
Reciprocal inhibition	Muscles working together to produce movement - muscles on one side of the joint relaxing to accommodate contraction on the other side of that joint.
Sedentary behaviour	Activities that do not increase energy expenditure substantially above the resting level. Sedentary behaviours include activities such as sleeping, lying down, sitting, watching television and other screen-based entertainment.
Social-ecological model	A model that recognises the interwoven relationship that exists between the individual and their environment and the factors which affect their behaviour.
Speed	The rate of motion.
Stabilisers	Muscles which contract to fixate the area so that another limb or body segment can exert a force and move.

SUITABLE RESOURCES

Courses must be developed within the framework of the study design: the areas of study, outcome statements, and key knowledge and key skills.

A list of suitable resources for this study has been compiled and is available via the Physical Education study page on the Victorian Curriculum and Assessment Authority website: www.vcaa.vic.edu.au/vce/studies/index.html

VICTORIAN ESSENTIAL LEARNING STANDARDS (VELS)

VCE Physical Education is a study which builds on knowledge and skills developed in the VELS domains of Health and Physical Education, Interpersonal Development, Thinking Processes and Communication.

The key knowledge and key skills in VCE Physical Education builds on many of the concepts in the Health and Physical Education dimension of Movement and physical activity. In the VELS dimension Movement and physical activity students:

- demonstrate proficiency in the execution of manipulative movement skills in complex activities
- use training methods to improve their fitness level
- maintain regular participation in moderate to vigorous physical activity
- employ and devise skills and strategies to counter tactical challenges in a games situation
- assume responsibility for the conduct of aspects of a sporting competition in which roles are shared
- display appropriate sporting behaviour.

In the Interpersonal Development dimension Working in teams, students develop the knowledge, skills and behaviours to cooperate with others to contribute to the achievement of group goals. The focus is not only task achievement, but also on contributing to, and reflecting on, the learning which occurs through being part of a team.

The Thinking Processes domain requires students to become discriminating thinkers, capable of making informed decisions about complex issues. In the Reasoning, processing and inquiry dimension, students discriminate in the way they use a variety of sources of information. They process and synthesise complex information and employ appropriate methodologies for creating and verifying information. In the Reflection, evaluation and metacognition dimension, students reflect on their own thinking and analyse alternative perspectives.

The Communication domain focuses on developing students who communicate clearly and confidently in a range of contexts both within and beyond school. In the Presenting dimension, students demonstrate their understanding of the relationship between form, content and mode, and select suitable resources and technologies to effectively communicate. They use subject specific language and conventions in accordance with the purpose of their presentation to communicate complex information.

EMPLOYABILITY SKILLS

Units 1 to 4 of the VCE Physical Education study provide students with the opportunity to engage in a range of learning activities. In addition to demonstrating their understanding and mastery of the content and skills specific to the study, students may also develop employability skills through their learning activities.

The nationally agreed employability skills* are: Communication; Planning and organising; Teamwork; Problem solving; Self-management; Initiative and enterprise; Technology; and Learning.

Each employability skill contains a number of facets that have a broad coverage of all employment contexts and are designed to describe all employees. The table below links those facets that may be understood and applied in a school or non-employment related setting, to the types of assessment commonly undertaken within the VCE Physical Education.

*The employability skills are derived from the Employability Skills Framework (*Employability Skills for the Future*, 2002), developed by the Australian Chamber of Commerce and Industry and the Business Council of Australia, and published by the (former) Commonwealth Department of Education, Science and Training.

Assessment task	Employability skills: selected facets
Annotated folio of activities	Communication (writing to the needs of the audience)
Data analysis	Communication (reading independently; writing to the needs of the audience) Planning and organising (collecting, analysing and organising information) Problem solving (using mathematics to solve problems) Technology (using IT to organise data)
Media response	Communication (listening and understanding; reading independently; writing to the needs of the audience; persuading effectively) Problem solving (testing assumptions taking the context of data and circumstances into account)
Multimedia presentation	Communication (sharing information; speaking clearly and directly) Technology (having a range of basic IT skills; using IT to organise data; being willing to learn new IT skills)
Report (oral/written/visual)	Communication (sharing information; speaking clearly and directly; writing to the needs of the audience; using numeracy) Planning and organising (collecting, analysing and organising information) Technology (using IT to organise data)
Student-designed investigation	Initiative and enterprise (generating a range of options; initiating innovative solutions; being creative) Planning and organising (planning the use of resources including time management; weighing up risk, evaluating alternatives and applying evaluation criteria) Problem solving (developing practical solutions; testing assumptions taking the context of data and circumstances into account) Self management (evaluating and monitoring own performance) Teamwork (working as an individual and as a member of a team; knowing how to define a role as part of the team)
Summary report of activities	Communication (writing to the needs of the audience) Planning and organising (collecting, analysing and organising information)
Test	Communication (writing to the needs of the audience) Problem solving (using mathematics to solve problems)

LEARNING ACTIVITIES

Examples of learning activities for each unit are provided in the following sections. Shaded examples are explained in detail in accompanying shaded boxes.

Unit 1: Bodies in motion

AREA OF STUDY 1: Body systems and human movement

Outcome 1

Collect and analyse information from, and participate in, a variety of practical activities to explain how the musculoskeletal, cardiovascular and respiratory systems function, and how the aerobic and anaerobic pathways interact with the systems to enable human movement.

Examples of learning activities

develop a class glossary of bones, muscles, joints and joint actions using a wiki such as Wikispaces, Wetpaint or PBwiki; Connect contains information on creating a wiki <www.education.vic.gov.au/teacher/wiki.htm>

construct a skeleton, either a model or paper version, and identify the bones and joints

use an Internet site such as www.bbc.co.uk/science/humanbody or computer software packages such as Body Systems (see Resources) to label and identify major bones and muscles within the body

conduct a laboratory activity that uses a flip, digital or video camera or mobile phone to record students participating in a variety of activities; use the footage to complete a movement analysis of the activity where students identify joint actions, agonists, antagonists and stabilisers responsible for the movement

demonstrate a range of joint actions; explain using correct terminology the structure of the joint, movements allowed, muscles involved and type of contractions involved in the action

research the link between muscle fibre type (slow twitch and fast twitch only), intensity and duration of activity, and identify specific sports where it may be advantageous to have a higher percentage of one fibre type

using concept mapping software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind 42, MindMeister, Mindomo, Bubble.U.s or FreeMind, construct a concept map demonstrating how the musculoskeletal and cardiorespiratory systems work together and interact with the aerobic and anaerobic pathways to produce movement

use a Venn diagram to compare and contrast isometric, isokinetic and isotonic contractions

explore the structure of the heart through a dissection of a sheep's heart

create a poster showing the path that oxygen takes through the cardiorespiratory system from the lungs to the heart and then to the working muscles

use heart rate monitors, or take a pulse manually, to collect heart rate data to analyse in relation to the response of the cardiovascular system at rest and during exercise

construct a working model of the lungs to demonstrate the mechanics of breathing

list those muscular contractions which are voluntary and those which are involuntary; hypothesise as to what might happen if all muscular contractions were under voluntary control

participate in a variety of activities to record and report on the acute effects of exercise on the cardiovascular and respiratory systems

participate in laboratory activities that investigate the difference between aerobic and anaerobic pathways used during activity; from your experience in the activity and using two other data sources (e.g. textbook, web-based resources or class notes) construct a flow chart using concept mapping software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Bubble.us or FreeMind that shows the differences between the two pathways

Detailed example

LABORATORY ACTIVITY: MUSCLE MOVEMENT IN A CIRCUIT

Aim:

Use a flip, digital or video camera or mobile phone to record muscle movements and analyse the actions of joints, agonists, antagonists and types of contractions responsible for movement.

Method:

1. Set up a weight circuit with a variety of activities that demonstrate different muscle movements. At each station place a card which outlines the activity to be undertaken. Note: some activities may require a demonstration of correct technique.
2. Perform an adequate warm up.
3. Arrange the class into small groups. Allocate each group a station.
4. Students are to perform and record images of the activity described at the station.
5. Once these tasks are completed, the group should move onto the next station and activity.

Results:

Save the video footage to computer and annotate the joints, muscles and types of contractions involved in each muscle movement.

Draw up a summary table with the following headings:

- activity
- major joint used
- major joint action

- agonist muscle
- antagonist muscle
- type of contraction.

Use the annotated video footage to complete the summary table.

Discussion:

1. Describe the importance of a warm up before attempting the circuit.
2. Describe how movement at the joint is initiated by the nervous system.
3. Once movement is initiated by the nervous system, describe how movement is created at the joint.
4. Describe the role of agonists, antagonists and stabilisers in muscle movement.
5. What type of contraction is predominantly used in the 'lifting' phase of each activity compared to the 'letting go' phase? Give reasons for this.

Conclusion:

Summarise findings, outlining how movement is created, the types of contractions used under different conditions and the role of agonists and antagonists.

Extension:

As an extension activity, repeat the activity using skills in various sports such as a kick in soccer or a badminton overhead.

AREA OF STUDY 2: Biomechanical movement principles

Outcome 2

Collect and analyse information from, and participate in, a variety of practical activities to explain how to develop and refine movement in a variety of sporting actions through the application of biomechanical principles.

Examples of learning activities

design a laboratory activity to investigate the application of Newton's Laws to a sporting situation

use correct terminology to create a set of flash cards of biomechanical principles such as mass and weight, acceleration and deceleration, inertia and velocity momentum; use the flash cards as the basis for a class online quiz using Classmarker, eQuizzer, Easy TestMaker or Hot Potatoes

use video footage to analyse periods of acceleration, constant velocity and deceleration in a 400m sprint

calculate velocity and acceleration by timing sprints over known distances

use a flip video, digital video or mobile phone to capture video footage of a selected sport and then use a software program such as Dartfish or Swinger to complete a biomechanical analysis of the skill

investigate the effect of lever length on performance by playing handball, bat tennis and tennis

undertake laboratory activities investigating transfer of momentum and force summation by progressively using more body parts when projecting a ball; for example, initially throw the ball while seated and only using the hand and wrist then step forward and begin to use legs, hips, trunk shoulder, arm, wrist and hand; analyse the data collected

undertake a laboratory activity to investigate projectile motion; using a garden hose, manipulate the variables of angle of release (nozzle angle, degrees to the horizontal), height of release (nozzle height above the ground) and velocity of release (water pressure); measure the distance of the stream of water at varying angles of release, height and velocity; relate the findings to sporting scenarios

participate in various athletics events such as long jump, triple jump, high jump to compare and contrast the factors affecting projectile motion

use Internet sites, texts and journals to research the changes in high jump performance over time; from a biomechanical perspective analyse the data to investigate factors that affect the human body when used as a projectile

demonstrate the effect of increasing and decreasing moment of inertia; relate the results to sporting applications such as performing a forward somersault in the tuck position compared to the pike position

undertake a laboratory activity that investigates elasticity and co-efficient of restitution; compare rebound heights of three tennis balls; one at room temperature, one cooled and one heated; or compare the rebound heights of three different balls (e.g. tennis, basketball and softball) on the same surface; or compare the rebound heights of one ball on three different surfaces (e.g. grass, wooden floor and concrete)

use a softball windmill pitch to investigate the principles of angle of release and accuracy by participating in a target game

play a game of 'Simon Says' to investigate factors affecting balance and stability; for example, 'Simon says stand on tip toes, Simon says balance with two hands and two feet on the ground, Simon says perform an arabesque, Simon says demonstrate a shape with a wide and/or narrow base of support, Simon says stand on two feet and reach both arms out in front' and so on

Detailed example

DATA ANALYSIS: THE HUMAN BODY AS A PROJECTILE

Instruct students to do the following:

1. Research, collect and analyse data of high jump records and the techniques used.
2. Use websites, texts and journals to research high jump records and the techniques used to achieve success.
3. Refer to your data and perform a biomechanical analysis that compares and contrasts the different techniques used in high jump.
4. Comment on the following biomechanical principles related to high jump:
 - the human body as a projectile
 - forces involved in projectile motion
 - gravity
 - air resistance
 - propelling force
5. After completing data and biomechanical analysis, draw a conclusion about the most effective technique for improved performance in high jump. Justify your decision.
 - centre of gravity
 - vertical and horizontal projection
 - factors affecting projectile motion
 - speed of release
 - angle of release
 - height of release.

DETAILED STUDY 3.1: Technological advancements from a biomechanical perspective**Outcome 3.1**

Analyse data collected through research and practical activities, to explain technological advancements that have led to biomechanical changes in sporting technique or equipment in one selected sport, and explain the implications of the change.

Examples of learning activities

use a graphic organiser to classify a range of sporting technological advancements into either design, material, structure or technique

select a sport and research the changes in equipment and/or technique; construct a list of all the changes and then select one of the more recent developments to investigate, demonstrate and report on in detail; determine through your research, the biomechanical principle/s that are evident in the change in technology, and how the application of the principle has resulted in the change

use six focus questions: what – is the change, when – did the change occur, where – is it most evident (only at elite level or has it flowed through to grass roots sport), who – instigated the change (clothing companies, the athlete, the governing body etc.), why – was the change introduced, and how – has the change led to improved performance, determine the factors affecting the change

devise, demonstrate and participate in a practical activity that shows the impact of a technological change on performance; evaluate the outcome

compare and contrast the performance outcomes before and after a technological change in technique or equipment; discuss the consequences of the change from a biomechanical, social and ethical perspective

outline any rule changes that have been introduced as a result of a technological change

participate in activities that use equipment, techniques or rule changes that cater for sub-population groups such as children, the elderly and people with disabilities; for example, Auskick, Softcross; from your involvement, analyse the rationale for the changes and justify biomechanically the impact on performance

Detailed example

REFLECTIVE FOLIO: MODIFIED SPORT – SOFTCROSS

Aim:

Students participate in a modified sport and identify the changes in equipment, technique or rules. They analyse the rationale for the changes and justify biomechanically the impact on performance.

Method:

Participate in a game of Softcross.

1. Reflection

In the reflection, comment on the following:

- size, weight or style of equipment
- playing area and goals
- length of games and/or season

- team sizes and interchanges/rotation policy
- relaxation of technical or complicated rules
- the biomechanical principles underpinning the changes in equipment (specifically comment on lever length, inertia of the lever and force that can be applied to the lever)
- the rationale for the changes.

2. Conclusion

Summarise your conclusion about the impact on participation and performance outcomes for children participating in modified sport.

For additional information on modified sport go to: www.ausport.gov.au/participating/schools_and_juniors/juniors/get_involved/modified_sports

DETAILED STUDY 3.2: Injury prevention and rehabilitation**Outcome 3.2**

Observe, demonstrate and explain strategies used to prevent sports injuries, and evaluate a range of techniques used in the rehabilitation of sports injuries.

Examples of learning activities

brainstorm a range of injuries that can occur in sport and then classify them according to type

create a presentation such as a poster, a podcast that is uploaded to the web or a web page that outlines the responsibilities of an administrator, a coach, a manager, a teacher or students in relation to prevention of sports injuries and duty of care; information about podcasting can be accessed from Connect <www.education.vic.gov.au/teacher/podcasting.htm>

research the use of sports medicine practices (for example, pain killing injections, IV drips) to improve sports performance and post on a class wiki such as Wikispaces, Wetpaint or PBwiki; use as a basis for discussion and class debate

research online Sports Medicine Australia (www.sma.org.au/) and synthesise the information to answer six focus questions: who, what, why, when, where and how?

choose a sport and create a poster which demonstrates the application of the Smartplay (www.smartplay.com.au/) sport safety and injury prevention message of Warm up. Drink up. Gear up.

complete an International Physical Activity Questionnaire (IPAQ) (www.ipaq.ki.se) and discuss the use of screening as a tool for injury prevention

prepare and conduct a warm up or cool down for the class, demonstrating an understanding of the role of warm ups and cool downs in reducing the risk of injury

participate in different sports and activities that require protective equipment (for example, baseball/softball, cricket, hockey) and identify other protective measures that can be implemented to reduce the risk of injury

using Expert Jigsaw groups, research various sports medicine specialists (for example, doctors, physiotherapist, osteopaths, dieticians, masseuse) and report back to your base group on the role they play in injury prevention and rehabilitation

create a podcast for athletes that outlines a plan for the return to sport following an injury; include the use of healthcare professionals and rehabilitation techniques that are specific to the scenario created; Connect contains information for teachers on podcasting <www.education.vic.gov.au/teacher/podcasting.htm>

Detailed example

SPORTS MEDICINE SPECIALISTS – EXPERT JIGSAW

Divide students into five-person 'base groups'.

1. Number each student 1 to 5 and allocate a sports medicine specialist to each number.
 - 1 – doctor
 - 2 – physiotherapist
 - 3 – osteopath
 - 4 – dietician
 - 5 – masseuse
2. Each student conducts their own research into their topic and then joins the people from the other groups with the same number to form an 'expert group', i.e. all the number 1's together, all the number 2's and so on.
3. The 'expert group' discuss their findings, having the opportunity to hear from the other experts

and add to their own findings. They then write up their findings and rehearse the presentation they will give to their 'base group'. All students are required to prepare a well-organised report of up to two A4 pages on their findings.

4. The base groups then reconvene and each student presents their findings. The rest of the group take notes as they listen.
5. All the students have now had the opportunity to learn about each of the sports medicine specialists from the 'expert' within their group.
6. Student presentations to the group could be videoed using a Flip camera, video camera or mobile phone. Video footage could be uploaded to the class wiki such as Wikispaces, Wetpaint, PB Wiki.

Unit 2: Sports coaching and physically active lifestyles

AREA OF STUDY 1: Effective coaching practices

Outcome 1

Demonstrate their knowledge of, and evaluate, the skills and behaviours of an exemplary coach, and explain the application of a range of skill learning principles used by a coach.

Examples of learning activities

compare and contrast the roles and responsibilities of a coach of a junior sports team and the coach of an elite sports team

brainstorm a class list of the skills and behaviours of an exemplary coach, based on the experiences and expectations of the class; in pairs use the Intel Visual Ranking Tool to rank each skill/behaviour in order of importance; display and discuss the overall rankings to establish criteria for an exemplary coach

interview a coach either in person or using a voiceover Internet provider such as Skype or Microsoft Office Communicator about how they manage team dynamics, conflict resolution, communication with the athlete/s, what leadership skills they need and what boundaries they need to set to maintain an appropriate coach–athlete relationship

discuss the factors which would affect the creation of a safe and inclusive learning environment; develop a plan to assist coaches in ensuring their athletes have a positive experience

use online research to investigate coaching codes of conduct; analyse the different codes and devise a code of conduct which incorporates the strengths of the various codes; present your code as a poster

in pairs or small groups observe a coach in action; each group should record their observations on the class wiki: such as Wikispaces, Wetpaint or PBwiki, and use these observations to prepare a report that identifies coaching strategies and practices the coach used to develop their players; information on how to use a wiki can be accessed from Connect <www.education.vic.gov.au/teacher/wiki.htm>

construct a flow diagram using concept mapping software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Bubble.us or FreeMind that shows the possible pathways for accreditation as a coach

use Expert Jigsaw with three students in each base group; number each student 1 to 3 and allocate a stage of learning; each number researches their stage and then confers with the other 'experts' to extend their understanding of the stage of learning; each 'Expert' then reports back to base group on the characteristics, appropriate coaching strategies, types of practice used etc. of that stage of learning

brainstorm a list of skills and then use the Intel Visual Ranking Tool to construct a continuum, placing each of the skills in the appropriate place from open to closed; discuss the variables that determine whether a skill is open or closed; identify which of those variable may change within the game and within the competition

use the terms stability and instability to contrast open and closed sports; determine how an increase in instability and a decrease in stability changes the position a sport may sit on the open–closed continuum

undertake laboratory activities that investigate the role of feedback in skill learning

coach a junior team OR undertake small group peer teaching; identify factors that influence the use of different coaching strategies when catering for different stages of learning within the team; reflect on your role as a coach; share individual reflections on a class wiki such as Wikispaces, Wetpaint or PB Wiki; information on how to use a wiki can be accessed at Connect <www.education.vic.gov.au/teacher/wiki.htm>

Detailed example

LABORATORY ACTIVITY – THE ROLE OF FEEDBACK IN SKILL LEARNING

Aim: To show how feedback affects performance.

Equipment: Tennis balls, rubbish bins

Method:

1. Divide the class into three groups.
 - Group 1 – receives no feedback
 - Group 2 – receives limited feedback (subjects are told yes or no with regard to the success of the throw)
 - Group 3 – receives as much feedback as possible
2. The subject stands with their back to the bin, holding the tennis ball, three metres from the bin.
3. The subject attempts to throw the ball over their head and into the bin without turning around.
4. Each subject has 10 shots with the designated amount of feedback.
5. Repeat step 4 for each member of the group with the allocated type of feedback.

Results:

Record the score for each shot using the following point system:

- Inside bin = 3 points
- Contacts rim of bin = 2 points
- Complete miss = 1 point

Discussion questions:

- a) Describe what happens to performance when feedback is given.
- b) Which type of feedback gave the best results?
- c) List the types of feedback you received under each test condition.
- d) What are the functions of feedback?
- e) Give an example of knowledge of results and knowledge of performance that could apply to these tests.
- f) How could your partner make your feedback more effective?

Conclusion:

Students use the results from the practical activity to draw conclusions on the overall impact of feedback.

AREA OF STUDY 2: Physically active lifestyles

Outcome 2

Collect and analyse data related to individual and population levels of participation in physical activity, and sedentary behaviour, and create and implement strategies that promote adherence to the National Physical Activity Guidelines.

Examples of learning activities

discuss current perceptions of what constitutes physical activity, inactivity and sedentary behaviours; classify day-to-day activities under each heading and provide a definition of each

research the physical, social and emotional benefits of participation in regular physical activity; present the findings in a brochure promoting physical activity within a given context, for example the local council wants to increase the use of the walking and bicycle paths within the area and wants to use the benefits of regular exercise as a tool to promote the facilities

complete the Risko chart <www.3dmotiontraining.com/calculators.cfm> and explore risk factors of coronary heart disease

measure your blood pressure, waist girth and BMI (kg/m²); investigate the link of these variables to obesity, type 2 diabetes and coronary heart disease

use data from the Australian Bureau of Statistics (www.abs.gov.au), textbooks and journal articles to identify the most popular activities for each age group across the lifespan; compare the results in Australia with global trends; graph the findings and present in poster form to the class

construct a questionnaire that investigates factors that facilitate participation in physical activity and survey parents, teachers, friends, siblings and family; place the questions and results on a class wiki, such as Wikispaces, Wetpaint or PB wiki; collate the data, analyse the results and present a final report; information on how to use a wiki can be accessed at Connect <www.education.vic.gov.au/teacher/wiki.htm>

within the local community examine the facilities provided to people with disabilities to participate in physical activity; use Google maps to present this information; for a description on how to create a Google map see <http://maps.google.com.au/help/maps/mymaps/creat.html>

compare and contrast the availability of sporting and recreational facilities of a country town with a city suburb; discuss the impact of geographical location on involvement in sport and physical activity

construct posters that identify each of the dimensions of the National Physical Activity Guidelines (frequency, intensity, duration and type) for all stages of the lifespan; provide examples of how individuals could meet the guidelines

select an age group and identify the applicable National Physical Activity Guidelines; create a program that meets the guidelines; participate in the program for at least a week; reflect on factors facilitating participation and barriers to participation

complete a case study analysis on an individual not currently meeting the National Physical Activity Guidelines and outline the risks associated with the current behaviour; create a program that meets the National Physical Activity Guidelines and discuss the health benefits of participating in regular physical activity

Detailed example**A CASE STUDY ANALYSIS: INCREASING PHYSICAL ACTIVITY**

Jenny is a 60+ year-old female who has not participated in regular physical activity since she was in her 30s.

Jenny is moderately overweight, but has no other limiting factors.

Jenny would like to start exercising again and needs some advice.

Students are to design a program for Jenny. The following steps need to be undertaken:

- identify any barriers to participation and factors facilitating participation

- provide Jenny with some information as to the increased health risks of being inactive.

Students then design a three-week program to help Jenny in meeting the National Physical Activity Guidelines.

Include specific advice related to the dimensions of the National Physical Activity Guidelines.

Provide Jenny with information relating to the social, emotional and physical benefits of participating in regular physical activity.

DETAILED STUDY 3.1: Decision making in sport**Outcome 3.1**

Explain the importance of interpreting game play and selecting appropriate tactics and strategies in sports.

Examples of learning activities

list all the sports and games that the class can think of and then organise them under the appropriate category such as net/court, striking, fielding, target

watch video footage of various games and sports; identify different tactics and strategies used to improve the performance of the team or athlete

use an interactive whiteboard to demonstrate how coaches use specific set plays and strategies to overcome their opponent

observe a set play, for example the kick in from a point being scored in Australian Rules Football; discuss the rationale for the set play, the desired outcome and evaluate the success of the strategy

research decision-making approaches used in sport; compare and contrast the various models; evaluate your findings to justify which is most appropriate for a given scenario, for example coaching children, adults, elite athletes

conduct Internet-based research into one model of decision-based coaching and identify how it addresses the following key areas: perception-action coupling, maintaining reliable perceptual variables in the training/learning environment, problem-based coaching to teach the links between solutions (movement, actions, skills etc.) and problems, using questioning and understanding broad principles of play; present findings in a written report

Detailed example**WRITTEN REPORT: DECISION-BASED COACHING**

1. For this written report, students are to select one of the following models to research:
 - Game sense
 - Discovery Learning
 - Constraints-Based Coaching.
2. From their research, they now determine how the model they have selected addresses the key areas of:
 - perception-action coupling
 - maintaining reliable perceptual variables in the training/learning environment
 - problem-based coaching to teach the links between solutions (movement, actions, skills etc.) and problems
 - using questioning
 - understanding broad principles of play.
3. The written report must include:
 - an outline of the model
 - the aims and rationale for its use and inclusion in coaching
 - discussion of each of the key areas listed
 - how the model develops decision-making skills in players/athletes
 - a conclusion based on findings as to the appropriateness of the model for coaching in a school-based setting.

AREA OF STUDY 3.2: Promoting active living**Outcome 3.2**

Use a subjective method to assess physical activity levels within a given population, and implement and promote a settings-based program designed to increase physical activity levels for the selected group.

Examples of learning activities

brainstorm a list of social, policy and environmental approaches to increasing physical activity; discuss how the approach would lead to an increase in physical activity

evaluate the use of recall surveys and questionnaires as tools for measuring physical activity; include advantages and disadvantages of the method

perform a case study on a program implemented in the workplace (for example, the Global Corporate Challenge); analyse the appropriateness of the program, the desired outcome, the method of measurement

select a setting (home, school, workplace or community) and design a program aimed at increasing physical activity levels

design a recall survey or questionnaire to collect data relating to compliance with the National Physical Activity Guidelines for a selected age group; conduct the research; collect and analyse the data

compare and contrast various forms of promoting physical activity programs, for example mass media – visual or audio, web based or print media

devise a whole-school plan to promote physical activity for all students and staff that would incorporate aspects of the social and physical environment of the school, as well as policies that would need to be implemented; promote the program using an appropriate mode of communication; implement the program

Detailed example**CASE STUDY ANALYSIS: INCREASING PHYSICAL ACTIVITY IN THE WORKPLACE**

Students undertake a case study analysis on physical activity in the workplace. They initially research the Global Corporate Challenge (GCC) (www.gettheworldmoving.com/). From this, students:

1. Determine the rationale for the program.
2. Provide an overview of the program and how it works.
3. Determine how participants measure their physical activity levels.
4. Explain the four elements of the GCC – sustainable, engaging, measurable and accessible.
5. Provide evidence to show that the program has been successful.
6. Outline the advantages to the employer for staff to be involved in the GCC.
7. Outline the advantages to the employee to be involved in the GCC.

Students compile the findings and present the information as a brochure, poster, podcast or multimedia presentation.

Unit 3: Physical activity participation and physiological performance**AREA OF STUDY 1: Monitoring and promotion of physical activity****Outcome 1**

Analyse individual and population levels of sedentary behaviour and participation in physical activity, and evaluate initiatives and strategies that promote adherence to the National Physical Activity Guidelines.

Examples of learning activities

discuss the advantages and limitations of subjective and objective methods of assessing physical activity and sedentary behaviour; present these as a mindmap using software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Bubble.U.s or FreeMind

wear a pedometer for a week to monitor physical activity levels; keep a diary or log of the steps taken; compare the results at the end of the week to the National Physical Activity Guidelines; discuss strategies for increasing physical activity

assess the physical activity levels of an individual by using an objective method such as heart rate telemetry, pedometry, accelerometry, and/or a subjective method such as recall, observational logs or diaries; compare the results to the National Physical Activity Guidelines

use a valid observational instrument, for example SOFIT, to assess the amount of time students engage in moderate to vigorous physical activity during a physical education lesson

identify services available in the local community that provide physical activity for a particular population; use Google maps to present this information; for a description on how to create a Google map see <http://maps.google.com.au/help/maps/mymaps/create.html>

formulate questions to help identify the influences on the type, frequency, duration and intensity of physical activity; use collaborative documents such as Google Docs, WriteWith, Writeboard or Scribd to compile a class list of questions; collect information through an interview, in person or using a voiceover Internet provider such as Skype or Microsoft Office Communicator; analyse the data in relation to socio-demographic, psychological, social and environmental perspectives

conduct web-based research into government and non-government organisations to determine the role they play in promoting adherence to the National Physical Activity Guidelines; identify the key stakeholders; develop a list of key stakeholder websites and share these with the class by using social bookmarking tools such as Del.icio.us or FURL

examine individual and population-based strategies or initiatives aimed at increasing physical activity levels; comment on the similarities and differences which are evident between strategies used to target two sub-population groups such as regional vs urban, adults vs children

construct a poster to show the relationship between the individual, social environment, physical environmental and policy components of the social-ecological model

select a specific government or non-government strategy, apply the social-ecological model to critique the strategy; draw conclusions about the effectiveness of the program for the defined population group at which it is aimed

Detailed example

CASE STUDY ANALYSIS: MY PERSONAL LEVELS OF PHYSICAL ACTIVITY

Students complete a case study analysis on their own levels of fitness. They undertake the following steps:

1. Wear a pedometer for a week. Use a collaborative spreadsheet such as Google Docs, Expresso Spreadsheet, Sheetster or Simple Spreadsheet to record daily step counts and calculate the average daily step count. Compare weekdays to days on weekends. For information about collaborative spreadsheets go to <www.wikipedia.org/wiki/online_spreadsheet>.
2. Graph daily steps.
3. Determine if you meet the daily recommendation of 10,000 steps. Discuss using 10,000 steps as a guide to meeting the National Physical Activity Guidelines.
4. Determine the percentage of the class that met the daily recommendation of 10,000 steps.
5. If members of the class did meet the recommendations, discuss how it was achieved. Discuss strategies of how to maintain these levels of physical activity into the next stage of the lifespan, taking into account the factors that affect type, frequency, duration and intensity of physical activity.
6. If members of the class did not meet the recommendations, devise strategies for increasing daily steps to incorporate more physical activity into the daily routine (e.g. Walking to school, getting off one stop earlier on the bus/tram/train).

AREA OF STUDY 2: Physiological responses to physical activity

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 fatigue mechanisms and recovery strategies.

Examples of learning activities

Produce a summary table of the acute response to exercise in the cardiovascular, respiratory and muscular systems; differentiate between responses to sub-maximal and maximal intensity activity and between train and trained subjects

role-play the breakdown of ATP to release energy and the resynthesis of ADP and Pi

compare and contrast the three energy systems; include reference to rate and yield of ATP production, intensity and duration of activity, fuel sources used by each system and the by-products of each system

construct a flow chart to show anaerobic glycolysis and aerobic glycolysis using software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Minomo, Bubble.U.s or FreeMind

wear a heart rate monitor and participate in practical activities of differing intensities and durations; record heart rates; analyse the data collected and relate the findings to the dominance of each of the three energy systems in certain activities

participate in a team sport such as basketball, netball or hockey; at the conclusion of the game discuss the varying intensities within the game and the different roles of different players/positions; predict the relative contribution of each of the three energy systems and compare the prediction to known data

interpret graphical and numerical data to determine the relative contribution of the three energy systems under varying intensities and durations

develop a class glossary of key terms and concepts such as cardiac output, oxygen uptake, oxygen deficit, steady state and exercise post-exercise oxygen consumption; use a wiki such as Wikispaces, Wetpaint or PBWiki to share definitions; connect contains information on creating a wiki <www.education.vic.gov.au/teacher/wiki.htm>

undertake laboratory activities to investigate fatigue mechanisms; record observations made; generate a list of questions and use these as a basis for research on muscular fatigue mechanisms; collect information from a variety of sources of information such as the Internet and textbooks; synthesise the information on muscular fatigue to produce a comprehensive summary of fatigue mechanisms

participate in an active recovery and a passive recovery after completing both anaerobic activity and aerobic activity; describe each type of recovery; demonstrate an understanding of the associated by-products of each of the energy systems and link the type of recovery to the removal of by-products and the replenishment of fuels

construct a mind map using software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Bubble.U.s or FreeMind of the role of oxygen in energy production and recovery; link concepts such as oxygen uptake, oxygen deficit, EPOC, steady state, aerobic glycolysis, anaerobic glycolysis and resynthesis

Detailed example**LABORATORY REPORT: COMPARISON OF ANAEROBIC AND AEROBIC ACTIVITY**

Aim: To compare the energy systems used in maximal and sub-maximal efforts.

Method: Wearing a heart rate monitor, perform a continuous activity such as cycling, swimming, rowing or running.

1. Perform an adequate warm up.
2. First exercise session: Perform 4 maximal efforts of the activity for a total of 20 seconds. Perform an active recovery for 5 minutes in between each bout. Record your heart rate immediately after each 20 second work bout.
3. Second exercise session: Perform the activity continuously at a sub-maximal intensity for 10 minutes. Record the heart rate every 2 minutes. Results: Record the heart rate results for each work bout in a table.

Discussion:

1. Discuss the predominant energy system used in the first exercise session. Give reasons for your answer by referring to the characteristics (intensity, duration, by-products) of the energy system that are specific to the activity.

2. Discuss the predominant energy system used in the second exercise session. Give reasons for your answer by referring to the characteristics (intensity, duration, by-products) of the energy system that are specific to the activity.
3. Outline the chemical pathway that is used to produce ATP in the activity of maximal intensity.
4. Outline the chemical pathway that is used to produce ATP in the activity of sub-maximal intensity.
5. Is there any evidence of the production of lactic acid in either activity? Explain your answer by referring to the data.
6. Describe how oxygen gets to the muscles to produce ATP.
7. Discuss the importance of oxygen for enhanced performance by referring to lactic acid tolerance in the maximal efforts and lactate threshold in the sub-maximal activity.
8. Discuss the predominant food fuels used in both activities.

Unit 4: Enhancing performance**AREA OF STUDY 1: Planning, implementing and evaluating a training program****Outcome 1**

Plan, implement and evaluate training programs to enhance specific fitness components.

Examples of learning activities

complete an 'Alphabet Activity' for fitness components and the factors affecting both health-related fitness components and skill-related components; write 26 facts about the topic, one for each letter of the alphabet; for example, A – aerobic capacity is the capacity of the cardiorespiratory systems to deliver and use oxygen; B – body composition is the relative proportion of fat and fat-free tissue in the body; use a wiki such as Wikispaces, Wetpaint or PBWiki to share alphabet statements; Connect contains information on creating a wiki <www.education.vic.gov.au/teacher/wiki.htm>

perform an activity analysis on a high-performing individual; use a video or digital camera to collect data or use prerecorded footage to complete the analysis; analyse the data; include a skills analysis, analysis of movement patterns and a calculation of work to rest ratios

research components of pre-activity screening such as a Physical Activity Readiness Questionnaire (PAR-Q), a Health History Questionnaire (HHQ) and Informed Consent form; adapt or modify the questionnaires to create a pre-screening form for VCE PE students to complete prior to undertaking fitness testing

develop a fitness test battery for a selected sport or activity and justify your choice of tests

visit a tertiary institution to experience use of high technology fitness testing equipment to analyse fitness components; compare the protocols, techniques and outcomes of laboratory (direct) based testing to field (indirect) tests

perform a battery of fitness tests testing a range of health and skill-related fitness components; record results in a table, listing the name of the test, the fitness component it is evaluating and the outcome of the test; compare the results to standardised norms; note: sensitivity must be used when collecting data from students; check school-based privacy acts and procedures for collection and storage of student personal information

perform a beep test as a class using heart rate monitors; use the results to estimate VO₂ maximum levels; compare differences between genders and fitness levels; discuss expected differences between age groups

identify and participate in various methods for improving muscular strength and endurance, speed, power, aerobic capacity, anaerobic capacity and flexibility; reflect on your participation in each session

plan, implement and evaluate a training program that reflects appropriate application of training methods and principles to enhance the fitness of a participant in a particular sport or physical activity; present findings in a written report

perform fitness testing pre and post the training program; use a collaborative spreadsheet such as Google Docs, Espresso Spreadsheet, Sheetster or Simple Spreadsheet to record and graph data; analyse the results by calculating the percentage change

evaluate the effectiveness of the training program undertaken; comment on chronic adaptations to the cardiovascular, respiratory and muscular systems and link to improved performance; present your evaluation in a suitable format

summarise the chronic adaptations to the cardiovascular, respiratory and muscular systems after both aerobic and anaerobic training; display your findings using concept mapping software such as SmartDraw, Webspiraton, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Buble.Us or FreeMind

Detailed example**WRITTEN REPORT: PLAN, IMPLEMENT AND EVALUATE A TRAINING PROGRAM**

1. Students will need to have previously completed an activity analysis and a battery of fitness tests.
2. Using the data collected in the activity analysis and the fitness tests, identify areas of strength and weakness.
3. Design a six-week training program that aims to enhance one health-related fitness component and maintain two.

The six-week training program must demonstrate the correct application of the training principles of specificity, frequency, intensity, duration, overload, individuality, and variety.
4. Participate in the six-week training program; keep a training log or diary of each session.

Repeat the battery of fitness tests (post tests).
5. Complete an evaluation of the training program, comparing pre and post test results.

Present your findings in a written report.

Include in your report reference to the:
 - activity analysis
 - selection and justification of fitness tests
 - results of pre and post tests
 - six-week plan
 - training diary
 - evaluation.

Note: Students would be expected to complete this task in two sections: planning and evaluating. Teachers are encouraged to review students' training programs prior to their implementation.

AREA OF STUDY 2: Performance enhancement and recovery practices**Outcome 2**

Analyse and evaluate strategies designed to enhance performance or promote recovery.

Examples of learning activities

compare various nutritional strategies which are readily available, such as high and low GI food, carbohydrate gels, protein bars and caffeine supplementation; summarise the results in a table which lists key feature, desired outcome, cost, taste, effectiveness and so on

analyse the nutritional requirements of participants in different sports; for example, triathlon, body building, basketball

compare and contrast hydration techniques; present findings using concept mapping software such as SmartDraw, Webspiration, Cmaps, Inspiration, MindManager, Mind42, MindMeister, Mindomo, Bubble.us or FreeMind

complete a media analysis on an advertisement for a popular brand sports drink; identify the claims made by the ad, the ingredients and likely benefits of consumption; make a recommendation about who should be using this product as part of their recovery strategy

research different recovery strategies used by elite sporting clubs; classify the strategies as nutritional, physiological or psychological; outline the perceived benefit of the strategy

explain the use of heat, ice and compression in the recovery process; list specific practical examples of each

research the role of sleep in promoting recovery; analyse the physiological and psychological benefits of sleep

explore motivational techniques used by coaches; create a multimedia presentation of visual images and audio grabs of coaches motivating their players

research psychological strategies used to prepare athletes for competition; role-play a scenario where the coach is trying to achieve the optimal arousal level for their athlete; what strategies would the coach use? How would the strategy differ depending on the sport?

participate in a meditation session; reflect on your involvement

describe the process of mental imagery; explain how athletes use mental imagery to improve performance

play legal and illegal substance and method bingo; make a 3 x 3 grid, select 9 substances or methods to fill the squares; the teacher gives a summary of how the substance or method improves performance; students determine the correct substance or method being referred to, call out the answer and then mark it off their Bingo card; game continues until someone covers all nine squares or gets three in a row

research the anti-doping codes used by WADA (www.wada-ama.org/) and ASADA (www.asada.gov.au/); evaluate each policy; prepare a report on the similarities and differences in the policies; develop your own opinion to the suitability of each code

use the Intel Showing Evidence Tool <www.intel.com/education/tools> to plan a debate on the anti-doping codes used to govern sport; focus on issues such as fairness, athlete responsibilities, testing and bans from sport

Detailed example

MEDIA ANALYSIS: SPORTS DRINKS PROMOTION

Students complete a media analysis on an advertisement for a sports drink. Students:

- Watch a commercial for a sports drink such as Gatorade or Powerade on YouTube.
 - Go to a sports drink website.
 - Read the label of a sports drink.
1. Answer the following questions as part of the analysis for each form of media (commercial, website and label):
 - What is the implied message of the marketing campaign used by the sports drink?
 - Who are the commercials, web-based media and packaging aimed at?
 - What affect does the sports drink have on performance according to these three sources?
 2. Evaluate the accuracy of the claims made by the sport drink promotion:
 - How can a sports drink assist in recovery?
 - Analyse the role of the ingredients in a sports drink. Comment of the percentage of water, sugar/carbohydrates/ and salts/sodium.
 - What role does each of the set key ingredients play in assisting recovery?
 - What is the likely actual benefit of drinking a sports drink?
 3. Draw conclusions from the media analysis, considering the athletes and types of sports most likely to benefit from drinking a sports drink.

SCHOOL-ASSESSED COURSEWORK

In Units 3 and 4 teachers must select appropriate tasks from the assessment table provided for each unit. Advice on the assessment tasks and performance descriptors to assist teachers in designing and marking assessment tasks will be published online by the Victorian Curriculum and Assessment Authority in an assessment handbook. The following is an example of a teacher's assessment program using a selection of the tasks from the Units 3 and 4 assessment tables.

Outcomes	Marks allocated	Assessment tasks
Unit 3		
Outcome 1 Analyse individual and population levels of sedentary behaviour and participation in physical activity, and evaluate initiatives and strategies that promote adherence to the National Physical Activity Guidelines.	40	A data analysis that analyses primary and secondary data on levels of sedentary behaviours and participation in physical activity. Compare the findings to the National Physical Activity Guidelines and using a social-ecological model, critique the effectiveness of an initiative aimed at increasing physical activity levels.
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 fatigue mechanisms and recovery strategies.	20	A practical laboratory report analysing the acute effects that physical activity has on the cardiovascular, respiratory and muscular systems.
	40	AND A practical laboratory report analysing the relative contribution of the energy systems used predominately in aerobic and anaerobic activities, for example three different athletics events, jumps, 400m and 1500m events. Compare the intensity and duration of each event to determine the dominant energy system. Identify the fatigue mechanisms for each event and justify the application of a correct recovery strategy for each event.
Total marks for Unit 3	100	

Outcomes	Marks allocated	Assessment tasks
Unit 4		
Outcome 1 Plan, implement and evaluate training programs to enhance specific fitness components.	40	A written report that includes a plan of a training program that has been designed to enhance the fitness components identified as dominant through an activity analysis and appropriate fitness testing. The report must also include an evaluation of the training program, with specific reference to data collected in the training diary. AND
	20	A practical laboratory report that evaluates the effectiveness of the training program undertaken by identifying the chronic adaptations of the cardiovascular, respiratory and muscular systems as a response to training and discusses the impact of these changes on performance.
Outcome 2 Analyse and evaluate strategies designed to enhance performance or promote recovery.	40	A media analysis that identifies various strategies and/or practices that an elite sporting club may use, for example the use of ice baths, carbohydrate gels and re-injecting an athlete's blood to enhance performance or promote recovery.
Total marks for Unit 4	100	