Government of **Western Australia**
School Curriculum and Standards Authority

PHYSICAL EDUCATION STUDIES

ATAR Year 12

Syllabus support document

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

Purpose

This document is intended to support the delivery of the Year 12 Physical Education Studies ATAR syllabus. It contains conventions, definitions and examples to provide teachers and students with clarity relating to the expected depth of teaching of most content points in the syllabus.

Content elaborations and definitions

For the purposes of the Physical Education Studies Year 12 syllabus, the following will apply.

Content	Notes
Developing physical skills and tactics	
• develop and refine sport specific skills and techniques to enhance performance	
• select and adapt skills and techniques	
• select and apply advanced tactical responses varying in complexity ▪ various environmental conditions ▪ strengths and weaknesses of opposition ▪ responding to opposition ▪ phases/stages of play	Tactical response: action taken by a player or team that results from a specific situation or predetermined tactics.
• select and adapt tactics	Tactic: a predetermined skill or action aimed to achieve a certain goal, used to outplay an opponent.
Functional anatomy	
• structure of skeletal muscle ▪ muscle belly ▪ epimysium ▪ endomysium ▪ fascicle ▪ perimysium ▪ muscle fibre ▪ myofibril	• identification and purpose of each component of skeletal muscle • purpose of skeletal muscles • relationship between components
• the role of the following in the sliding filament theory: ▪ myosin (cross bridges) ▪ actin (binding sites) ▪ sarcomere ○ H zone ○ I band ○ A band ○ Z line ▪ calcium (release of ATP)	• identification and purpose of each component • relationship between components • overview of the sliding filament theory • the effect of the sliding filament theory on working muscles

Content	Notes
• relationship between the velocity of muscle contraction to the amount of force exerted by the contraction ▪ force–velocity (concentric)	• definition of relevant terms • application of the concept to appropriate sporting movements (examples)
	Velocity: the speed of an object in a specific direction. Force: the action of a pull or a push from one object to another. It can affect an object by changing its shape or direction of movement or just make objects move. Concentric contraction: the generation of force by a muscle as it shortens.
• relationship between the length of muscle to the potential amount of force it can exert ▪ force–length (shortened, mid-length, lengthened)	• application of the concept of force–length to appropriate sporting movements • the difference between shortened, mid-length and lengthened muscles
	Force: the action of a pull or a push from one object to another. It can affect an object by changing its shape, direction of movement or just make objects move.
• structure of the motor neuron ▪ dendrite ▪ axon ▪ cell body/nucleus	• identification and purpose of each component • relationship between components
	Motor neuron: the unit of components responsible for transmitting messages from the central nervous system to the muscles. It is comprised of a cell body, dendrites and axon. Dendrite: the part of the motor neuron that receives signals from the central nervous system. Axon: the part of the motor neuron that receives signals from the cell body and transmits them to the target muscle activation site.
• function of the following in relation to creating movement: ▪ sensory neuron ▪ the brain ▪ spinal cord ▪ motor neuron ▪ motor unit	• identification and purpose of each component • relationship between components • link between the components and movement creation • application to specific sporting movements (examples)
	Motor unit: comprises of a motor neuron and all muscle fibres that it innervates. The greater the number of motor units, the greater the force that can be generated.

Content	Notes
• relationship between muscle contraction and nerve function ▪ 'all or none' law ▪ motor unit size and number ▪ fibre recruitment (preferential recruitment) ▪ frequency of impulse	• definition of relevant terms • relationship between concepts • application to specific sporting movements (examples) 'All or none' law: all muscle fibres associated with a motor unit will contract to their maximum level at the same time. Preferential recruitment: the body's recruitment of muscle fibres depending on the demands of the muscle contraction.
• characteristics of fast and slow twitch fibres and their relationship to physical performance types (sprint, endurance) ▪ Type I ▪ Type IIa ▪ Type IIb	• identification and purpose of each fibre type • relation of each fibre type to sporting activities Slow twitch muscle fibres (type I): 'red' muscle fibres that are more efficient in their use of oxygen to generate ATP, making them more appropriate for the performance of sustained effort, such as a marathon. These fibres fire at a lower speed but are able to fire for a longer period before fatigue. Fast twitch muscle fibres: these 'white' muscle fibres contract faster than 'red' fibres and are best suited to activities that require speed and power. Athletes who typically have a high proportion of fast twitch fibres include weightlifters and sprinters. Type IIa (intermediate): these fibres are a combination of both slow and fast twitch fibre types. Type IIb: these are most typical of fast twitch fibres and produce the highest rate of contraction.
Exercise physiology	
• relationship between energy demands and nutritional requirements pre-, during and post-competitive sporting activity ▪ fats ▪ proteins ▪ carbohydrates ▪ glycaemic index (low and high)	• definition of relevant terms • availability of energy from fats, proteins and carbohydrates and their effects on the body • effects of high GI foods on availability of energy • effects of low GI foods on availability of energy • differences between energy demands of various sporting activities • differences between nutritional requirements pre-, during and post-competitive sporting activity • application of food types to specific sporting activities (examples) Glycaemic index (GI): the degree to which carbohydrates can affect blood glucose. As the GI increases, so does the rate at which blood glucose levels increase. Low GI food includes foods such as bananas and pasta and is typically consumed before performance. High GI food includes foods such as white rice and wholemeal bread and is typically consumed during and after performance.

Content	Notes
• hydration pre-, during and post-competitive sporting activity	• effects of hydration on the body • effects of appropriate hydration pre-, during and post-competitive sporting activity • hydration rates for various activities/conditions
	Hydration: the process of replacing water in the body.
• considerations for performing in varying environmental conditions (heat/humidity, cold, altitude) ▪ temperature regulation mechanisms (radiation, convection, conduction, evaporation) ▪ physiological changes in these environments ▪ acclimatisation processes and the adaptations gained ▪ strategies to manage performance in these environments	• definition of relevant terms • effects of various environmental conditions on the body • strategies to minimise effects of various environmental conditions during preparation (acclimatisation) and performance
	Radiation: the transfer of heat to/from the surroundings. Heat moves from warmer areas to cooler ones. Convection: the transfer of heat through the movement of air or water. Conduction: the transfer of heat through direct contact with another object. Evaporation: the transfer of heat resulting from the evaporation of sweat from the body. Acclimatisation: the process of an athlete adjusting to new environmental conditions in order to assist with performance.
• physiological risks and benefits associated with the use of performance enhancers ▪ protein powders ▪ anabolic steroids ▪ caffeine ▪ creatine ▪ EPO ▪ blood doping	For each performance enhancer: • description and examples • legal consequences of their use (if any) • potential benefits • potential risks/side-effects
	Anabolic steroids: synthetic drugs designed to imitate the actions of testosterone. Creatine: supplement that allows an athlete to recover quicker between intense bouts of activity. EPO (erythropoietin): hormone responsible for stimulating the production of red blood cells. Blood doping: involves the reinjection of an athlete's previously drawn blood. This has the effect of increasing the blood's oxygen carrying capacity.

Content	Notes
• components of periodisation: ▪ micro cycle ▪ meso cycle ▪ macro cycle ▪ pre-season (preparation) ▪ in-season (competition) ▪ off-season (transition)	• definition of relevant terms • differences in training requirements pre-, in- and off-season • relationship between micro, meso and macro cycles • identification of the three cycles in a training program
	Periodisation: the process of breaking up a training program into smaller blocks, often related to the performance (season). Micro cycle: the shortest phase of a training program, usually of one week's duration. Meso cycle: a block of training that consists of approximately 3–4 weeks (micro cycles) and is designed to achieve a specific training goal. Macro cycle: the longest phase of a training program, which may run for up to a year. A macro cycle is made up of meso cycles that in turn are made up of micro cycles.
• principles of training ▪ peaking ▪ tapering ▪ recovery (including strategies) ▪ maintenance	• definition of relevant terms • guidelines for the design of activities in the peaking and tapering phases • strategies used to assist with recovery • significance of a maintenance phase in a training program
	Peaking: the planning of training in such a way that the mental, emotional and physical attributes of an athlete reach optimal performance at the appropriate time. Tapering: reducing an athlete's or team's training load in the lead-up to competition to optimise performance.
• overtraining (signs and symptoms)	• signs and symptoms of overtraining and their effect on the body and performance • strategies that can be used to avoid overtraining
Motor learning and coaching	
• definition of transfer of learning	• definition of transfer of learning
	Transfer of learning: the influence of any previous experience in performing a skill on the learning or performance on a new skill or set of skills. The effect can be positive, negative or zero.

Content	Notes
• categories of transfer of learning ▪ skill to skill ▪ theory to practice ▪ training to competition	• definition of each category • effects of transfer of learning on skill development • examples of skills/sports relevant to each category
	Transfer of learning: the influence of any previous experience in performing a skill on the learning or performance of a new skill or set of skills. The effect can be positive, negative or zero. Skill to skill: when the skills developed in one sport affect the development of skills in another sport. Theory to practice: the transfer of theoretical knowledge of a skill or sport to performance in that skill/sport. Training to competition: the transfer of skills developed in training to their application in a competitive context.
• effects of transfer of learning on skill execution and movement efficiency ▪ positive ▪ negative ▪ zero effects	• definition and characteristics of each effect • examples of skills/sports relevant to each effect
	Positive: a skill developed in one sport enhances the development of a skill in another sport. Negative: a skill developed in one sport hinders the development of a skill in another sport. Zero: a skill developed in one sport has no impact on the development of a skill in another sport.
• use of the Knudson and Morrison model through the application of the preparation, observation, evaluation, intervention and re-observation of tasks to improve performance	• definition of relevant terms • application of the qualitative analysis model • characteristics of each stage of skill analysis • strategies that can be used by a coach at each stage
	Preparation: the gathering of knowledge and consideration of key features and/or common errors in the performance of the skill. Observation: the gathering of appropriate information about the performance of the skill. Evaluation: the identification of the relative strengths and weaknesses of the performance of the skill as well as possible ways to improve the performance. Intervention: the provision of feedback or changing the conditions of the practice to assist with the improvement of the performance of the skill. Re-observation: the repetition of the observation of a skill and subsequent re-evaluation.

Content	Notes
• use of coaching/training activities to improve performance in selected skills, including shaping, chaining and static-dynamic	• definition of relevant terms • examples and analysis of skills that are conducive to being taught using a specific method
	Chaining: method used to teach a complex motor skill. This involves the breaking up of a skill into simpler components and teaching each component in sequence. The components are then brought together to perform the skill in its entirety. Shaping: method used to teach a complex motor skill. This involves the development of a skill in its entirety and reinforcing components that have been demonstrated correctly. Static-dynamic: the progression from simple drills often involving repetitive performance in a fixed practice to those that usually incorporate the performance of multiple skills, often in game-like scenarios or situations that could be experienced in competition.
• use of different leadership styles – democratic, authoritarian (autocratic) and laissez-faire (casual) to suit the athlete or situation	• characteristics of each leadership style • linking leadership styles to specific athletes/teams/competition standards
	Democratic: style that includes the coach consulting with their athletes, other coaches or administrators before deciding on a course of action. Authoritarian (autocratic): style that involves no consultation and in which the coach maintains complete control over the athletes and processes. The coach has the only say in the future direction of an athlete or a team. Laissez-faire (casual): style in which the coach allows the athletes to determine and decide any future course of action.
• learning and skill development in relation to correction and improvement of self and others ▪ use of video analysis ▪ checklists ▪ peer/mentor/coach feedback ▪ questionnaires	• characteristics of each method • use of each method to analyse performance • examples of skills/activities for which specific methods are more appropriate • type of information collected through each method

Content	Notes
Biomechanics	
• impulse–momentum relationship	• definition of relevant terms • impulse and its relevance to specific actions • momentum and its relevance to specific actions • relationship between impulse and momentum and their application in sporting activities
	Impulse: the application of force over time to change the momentum of an object. Momentum: the amount of motion of the mass of a moving body. It is calculated by multiplying the mass of a body (kg) by its velocity (m/s).
• characteristics of the interacting bodies affecting coefficient of restitution in the application to sport ▪ temperature ▪ equipment and surfaces ▪ velocity	• definition of coefficient of restitution • calculation of coefficient of restitution • relevance of the coefficient of restitution in various sporting activities • effects of each characteristic of interacting bodies on the coefficient of restitution
	Coefficient of restitution: measures the amount of energy that remains after an elastic collision. It compares the height of the bounce of an object to the original drop height. Coefficient of restitution has a value between 0 and 1.
• definition of, application and relationship between the following concepts in sport: ▪ moment of inertia ▪ angular velocity ▪ conservation of angular momentum ▪ third class levers within the body and as applied to sporting contexts ○ resistance arm ○ force arm	• definition of relevant terms • effects of each concept on rotating objects, especially in sporting contexts • application of levers and their components on human movement with specific reference to sporting actions • interrelationship between various concepts
	Moment of inertia: the resistance of a rotating object to movement. It is affected by the mass of the object and the radius of the rotation (distance from the axis). Angular velocity: the speed at which an object rotates. Angular momentum: the amount of motion of a rotating object. It is the product of the object's 'moment of inertia' and its 'rotational velocity'. Lever: a simple machine that is used to move a resistance using an applied force. The lever involves the pivoting of a lever arm about a fixed point (axis or fulcrum). The relative position of the force, resistance and axis determine the class of lever. Third class lever: a lever where the force being applied is between the axis and the resistance of the load to be moved. Resistance arm: in a lever, the distance between the fulcrum and the load. Force arm: in a lever, the distance between the fulcrum and the applied force.

Content	Notes
• application of biomechanical principles to analyse physical skills ▪ balance ○ base of support ○ height of centre of gravity ○ line of centre of gravity ○ mass ▪ summation of forces ○ simultaneous ○ sequential/ segmental interaction ▪ optimal projection	• definition of relevant terms • factors affecting balance • application of balance in various sporting contexts • categorising a skill according to simultaneous or sequential movement • optimal projection for various projectiles Balance: the ability to maintain stability and keep the centre of gravity within the base of support to maintain or hold an object's position. Centre of gravity: the point around which a body's weight is evenly distributed. Simultaneous movement: movement where all component movements occur at the same time, e.g. performing a squat. Sequential movement: movement performed through the progressive movements of body parts and joints in a specific sequence, e.g. throwing a ball. Optimal projection: the angle at which a projectile must travel in order to maximise distance travelled.
• Fluid mechanics ▪ definition of laminar and turbulent flow ▪ definition of pressure drag (form drag/profile), surface drag (skin friction) and wave drag and how they apply to sporting contexts ▪ Bernoulli's principle – effect of shape and pressure differential ▪ changes in flight paths in spinning balls – the Magnus effect in relation to ○ top spin ○ back spin ○ side spin	• definition of relevant terms • differences between various types of drag • effects of different types of drag on human movement and specific sporting actions • methods used to overcome drag • analysis of components of Bernoulli's principle • examples of the application of Bernoulli's principle in sport • analysis of components of the Magnus effect • examples of the application of Magnus effect in sport • ways in which spin can affect an object • the effect of the types of spin in various sporting contexts Laminar flow: the flow of a fluid running smoothly in layers parallel to each other. Turbulent flow: the irregular movement of particles within a fluid. The particles at any one point can change in speed and direction. Pressure drag: caused by the shape and size of an object. It is the difference between the pressure in the front and back of an object (also referred to as form or profile drag). Surface drag: caused by the friction between the surface of an object and the fluid that it is passing through (also referred to as skin friction). Wave drag: the imbalance of pressure on the body caused by waves created by a swimmer and how this limits the speed of the swimmer. Bernoulli's principle: principle relating to the movement of objects through fluids, based on differences in pressure. Pressure differential: the difference in air pressure between the two sides of a moving object. Magnus effect: the effect of rotation on an object's path as it moves through a fluid; the effect that spin can have on the direction of flight of a spinning object.

Content	Notes
Sport psychology	
• strategies used pre- and during performance, to manage stress, motivation, concentration, self-confidence and arousal levels ▪ self-talk ▪ relaxation ▪ performance routines ▪ goal-setting ▪ imagery	• definition and characteristics of relevant terms • appropriate strategies to use either pre- or during performance • linking appropriate strategies to specific requirements
	Self-talk: the practice of an athlete talking to themselves. This can be used to reduce stress levels, regulate arousal or increase motivation. Performance routines: a predetermined set of behaviours or thoughts that an athlete will perform in sequence to prepare to perform a skill or routine. Imagery: the process of an athlete preparing by 'seeing' and feeling an action or routine before performance begins.
• group cohesion ▪ social cohesion ▪ task cohesion	• definition and characteristics of relevant terms • effects of group cohesion (or lack of) on team performance
	Group cohesion: the ability of a team to stick together, persevere and continue to pursue common goals. Social cohesion: the interpersonal connection between members of a team that allows them to interact positively. Task cohesion: the degree to which members of a team work together to achieve success.
• strategies to improve group cohesion ▪ use of leadership ▪ communication ▪ goal setting (individual and team) ▪ team building ▪ roles and expectations	• strategies used to improve group cohesion • examples of sporting contexts with a high/low degree of group cohesion
• factors affecting group cohesion ▪ social loafing ▪ leadership ▪ team dynamics	• definition and characteristics of relevant terms • factors that may affect group cohesion
	Social loafing: the concept that some individuals will put in less of an effort in a group as opposed to working on their own. Team dynamics: behavioural factors between team members and the ways in which they work together to achieve success.