# Health and Movement Science 11–12 (2023): Sample unit of work Year 12

Sample units are provided by NESA to illustrate teaching, learning and assessment of syllabus outcomes and content. Teachers should seek advice from their schools and sectors about local requirements for units of work, including opportunities for reflection and evaluation, and recording evidence of adjustments to meet the needs of individual students with disability.

#### **Unit title:** Training for improved performance

Duration**:**45 hours

Description: This unit explores the content found in the focus area Training for Improved Performance. Students learn the content through the lens of an individual sport of their choice, while the teacher presents the content through a team sport of their choice. Students will develop an understanding of a range of content including training approaches, dietary requirements, injury assessment and recovery. Students’ understanding of the content should be developed through application to a variety of sports.

| Outcomes | Subject-specific information |
| --- | --- |
| * **HM-12-04** investigates factors that impact movement and performance
* **HM-12-05** analyses individual and group training programs to improve performance
* **HM-12-06** Analysis:critically analyses the relationships and implications of health and movement concepts
* **HM-12-07** Communication:communicates health and movement concepts using modes appropriate to a range of audiences and contexts
* **HM-12-08** Creative thinking:generates and assesses new ideas that are meaningful and relevant to health and movement contexts
* **HM-12-09** Problem-solving:proposes and evaluates solutions to complex health and movement issues
* **HM-12-10** Research:analyses a range of sources to make conclusions and judgements about health and movement concepts
 | This unit of work fulfills the 45 hours of allocated time required for the focus area Training for improved performance. This unit of work also contains an assessment task. |

**Unit information**

| Content  |
| --- |
| How can exercise assessment and prescription be personalised?* Explain the importance of using a pre-exercise questionnaire and undertaking relevant health screening by exercise and fitness professionals
* Discuss the use of performance/fitness testing for recreational participants and elite athletes to improve their health, participation and performance
* Explain how exercise assessment can assist in developing training programs

How does training influence movement and performance?* Assess the types of training and training methods and their relevance for a variety of sports
	+ anaerobic training, including anaerobic interval, High Intensity Interval Training (HIIT), Sprint Interval Training (SIT), plyometric, and resistance training
	+ aerobic training, including continuous, fartlek, aerobic interval, and circuit training
	+ flexibility training, including static, dynamic, ballistic, and Proprioceptive Neuromuscular Facilitation (PNF)
	+ strength training, including free/fixed weights, body weight exercises and elastics
	+ skill and tactical development, including drills, modified games and games for specific outcomes
* Evaluate the application of the principles of training, progressive overload, training thresholds, reversibility, specificity, variety and warm up and cool down to both aerobic and strength training
* Examine the relationship between the principles of training, physiological adaptations and improved performance
	+ heart rate
	+ stroke volume and cardiac output
	+ oxygen uptake and lung capacity
	+ haemoglobin level
	+ muscle hypertrophy
	+ fast/slow twitch muscle fibres

How does training differ for individual and group sports?* Compare aspects that need to be considered when designing a training session for individual and group sports
	+ health and safety considerations
	+ overview/aim of the session (goal specific)
	+ warm-up and cool-down
	+ skill instruction and practice
	+ conditioning
	+ strategies and tactics
	+ athlete reflection and/or coach evaluation
* Compare a yearly training program for an individual and a group sport
	+ phases of competition: pre-season, in-season and off-season
	+ sub-phases
	+ peaking and tapering
	+ sport-specific attributes: fitness components, skill requirements
* Investigate how individual and group sports apply psychological strategies, optimising arousal and management of stress and anxiety, to improve participation and performance
* Discuss the factors that influence how strategies and tactics are applied to individual and group sports

What impact does sleep, nutrition and supplementation have on movement and performance?* Using research, analyse the dietary requirements, pre, during and post-performance needed dietary and fluid intake requirements of athletes from different sports
* Explain how sleep, nutrition and hydration can be used to reduce fatigue and positively influence movement and injury prevention
	+ guidelines
	+ planning
	+ routines
	+ monitoring
* Discuss the use of supplements, micronutrients, protein, caffeine and creatine products for improved performance

How do individuals train for sustained movement and performance?* Explain how biomechanics can be used to develop efficient movements for sustained movement and improved performance
* Justify recovery strategies used for sustained movement and performance
	+ physiological, including cool-down, hydrotherapy
	+ psychological, including relaxation
* Examine the role technology can play to improve performance
	+ training innovations
	+ equipment advances
	+ recording and monitoring training and performance
* Explain the management and prevention of sporting injuries
	+ classification of sports injuries, including direct and indirect, soft and hard tissue or overuse
	+ assessment of injuries, including the Talk, Observe, Touch, Active movement, Passive movement, Skill (TOTAPS) test
	+ management of injuries
	+ rehabilitation procedures, including progressive mobilisation, graduated exercise, training, use of heat and cold
	+ return-to-play policy and procedures, including application to different sports, responsibility
* Discuss the impact of drug use on injury management and improving performance
	+ health implications
	+ ethical considerations
	+ drug testing
 |

Sample units of work provide examples of teaching, learning and assessment activities for teachers to adapt to meet their school contexts and student needs. A range of opportunities for ongoing assessment are provided to support flexible monitoring of student learning.

| Suggested teaching, learning and assessment | Suggested resources |
| --- | --- |
| Note: Students complete the following activities to determine prior knowledge and understanding of energy systems. This understanding includes how these energy systems function together and how the dominant energy system is affected by the intensity and duration of the effort.In small groups, students complete a revision activity using the energy systems table (Appendix 1) by identifying the fuel source, efficiency of ATP production, duration, intensity, rate of recovery, causes of fatigue and sport specific examples to the different energy systems of the body. This is intended to show how Year 11 content is built on in Year 12.In small groups, students select and research an athlete from an individual sport. Students view/listen to clips of the athlete in competition and identify key sports-specific terminology used in the sport. This may include racing/competition movements or manoeuvres. Students discuss the competition/performance requirements of the sport and present their research to the class in a format of their choosing, for example visual, digital or multimodal. Students write a paragraph about the competition/performance requirements of the individual sport they have chosen. For surfing this may look like the following:Surfing is an explosive sport requiring athletes to be strong swimmers and have exceptional paddling efficiency. Balance is critical as is the ability to be able to react quickly to changes in the environment. Shortboard surfing requires even greater manoeuvrability such as different turns, eg cutbacks, floaters, bottom and top turns. Explosive power is imperative to the successful completion of 360 airs and reverse airs. Some students may benefit from a paragraph scaffold to support this process.Students complete a table determining when the different energy systems become dominant. Headings could include competition/performance requirement, dominant energy system and justification. Students may complete this on paper or using digital tools, working individually or with a partner. Students choose ONE dominant energy system in the sport and answer a question such as ‘Justify the most dominant energy system used during competition’.**Approach to the unit**Where possible the sport that students have chosen in the task above could be used throughout the unit as a lens to understand the content. The teacher could then teach the unit through the lens of a team sport to develop a deep understanding of the application of the content across a range of sports. |  |
| Students brainstorm and work together to design a pre-exercise questionnaire that could be used by exercise and fitness professionals. Students justify the importance of each question they have included. Teacher leads discussion about what students have chosen to include and why. As a class they develop a single questionnaire. Teacher could then provide examples of pre-exercise questionnaire and other relevant health screening tools. Teacher could include greater explanation as to why each question is asked if needed to clarify student understanding. Students determine whether changes need to be made to their questionnaire in response to this information. Students then answer a question on the importance of pre-exercise questionnaires and relevant health screening by exercise and fitness professionals. Their response may be in the form of a written paragraph, visual mind map or visual representation. Questions could include:* Explain the importance of a pre-exercise questionnaire and relevant health screening by exercise and fitness professionals.
* How can pre-exercise questionnaires and relevant health screening improve participation in physical activity and performance?
 |  |
| Students select one performance/fitness test and present to the class key information about that test. The information could include:* how it is run
* what it is testing
* sports in which it is most relevant/common
* pros and cons of the test.

Students are provided with results from a professional sports fitness testing event (eg AFL draft) and combine with hypothetical results from a recreational athlete. Teachers could select tests that are relevant to the sport through which they are teaching the unit or are of interest for other reasons. Results can be generated using fitness testing norms readily available online.In a group, students analyse and annotate the results. Annotations could include:* identification of areas of strength and/or weakness
* differences between the 2 athletes
* relevance to sport.

Students then discuss their analysis.Teacher leads discussion about how fitness testing can be used by elite athletes to improve participation, health and performance. Use examples from the analysed results to support the discussion.Teacher leads discussion about how fitness testing can be used for recreational participants to improve participation, health, and performance. Use examples from the analysed results to support the discussion.Students complete the question ‘Explain how exercise assessment can assist in developing training programs for professional athletes and recreational participants’. Students provide examples using the sport they are following. |  |
| Students create a cloze passage or other class resource to share on types of training and training methods. This could be created as a written document, infographic or multimedia presentation. This could include:* definitions of types of training
* definitions of training methods
* examples of types of training
* examples of training methods.

In small groups or independently, students apply their knowledge and understanding of types of training and training methods to their chosen sport. This includes watching footage of their athlete in competition. Students answer questions such as:* What types of training and training methods would be most relevant to the sport?
* What evidence would you include from the video in the competition to support this?
* How would this training method influence the athlete’s performance in competition?

In small groups students engage with the following 2 case studies. Case study 1: Daniel Ricciardo is a Formula One car driver. The race car can travel up to 360 km/hour. The gravitational force is so strong (2G around corners), it’s hard to keep your head straight, hence F1 drivers have thick necks. When you turn corners, it can take your breath away and leaves you with blurry eyesight. There is no power steering so you have to use every inch of strength to turn the wheel at each corner. If you want to stop it takes 61 kg of force to brake, considering the average F1 driver brakes up to 250 times per race. Drivers are on the track for up to 2 hours at a time, losing up to 7 kg, a loss that is intensified in warmer climate races. Their heart rates can escalate up to 170 bpm during parts of the race. This requires drivers to be at peak mental and physical fitness. Case study 2: Isaac Heeney is a medium forward who plays for the Sydney Swans AFL. He averages around 10 km in an average 2-hour game while performing disposals, kicks, handballs, marks, tackles and goals. In the 2 hours he must be able to perform repeated high-speed efforts when running hard to contest the ball. Fast twitch fibres are essential for powerful movements such as leaping up to contest a mark or kicking for goal. Speed combined with agility is critical when Isaac changes direction to evade an opponent, and when accelerating and decelerating. For both case studies, students complete a variety of activities which could include:* Complete a table based on the most relevant types of training and methods of training

|  |  |  |  |
| --- | --- | --- | --- |
| Sport movement | Relevant training type and method of training | Sport example | Justification on how this would influence performance |
|  |  |  |  |

* Explain the performance benefits of the training example in competition for Formula One racing and AFL eg ability to overtake, increased number of marks, faster lap.
* What are the negative implications on performance if the training example is not practised by the Formula One racer and AFL player?
* What other types and methods of training are most appropriate for the Formula One racer and AFL player? Justify your answer.

Based on those case studies students could answer one of the following: * Assess the types of training and methods that are most suitable for Daniel Ricciardo’s performance in Formula One racing.
* Assess the types of training and methods that are most suitable for Isaac Heeney’s peak performance in AFL.
* You are a journalist working for a sport publication. Your project is to write a newspaper article that exposes the reader to the performance requirements of the sport, the dominant energy systems and the most relevant training methods.
 |  |
| Teacher presents information to students on the principles of training. This could include:* definition of each principle of training (progressive overload, training thresholds, reversibility, specificity, variety and warm up and cool down)
* examples of each principle in action in the teacher’s chosen sport (linked to aerobic and strength training).

Students then brainstorm a program for application of the principles to aerobic and resistance training in their chosen sport. Students share their programs with their peers and receive feedback on the application of the principles. Students justify how the application of the principles could lead to improved performance for their chosen athlete/sport. |  |
| Note: some students may benefit from a review of the respiratory and circulatory systems from the Year 11 course.Teacher presents information on the physiological adaptations to training. The information could include:* definitions of the adaptations
* how the adaptations influence performance.

Students complete the table except for the last column:

|  |  |  |  |
| --- | --- | --- | --- |
| Physiological adaptation | Definition | Role in performance | Principles of training that can improve physiological adaptation |
| Heart rate |  |  |  |
| Stroke volume and cardiac output |  |  |  |
| Oxygen uptake and lung capacity |  |  |  |
| Haemoglobin level |  |  |  |
| Muscle hypertrophy |  |  |  |
| Fast/slow twitch muscle fibres |  |  |  |

Teacher presents an example of how a principle of training might be employed in the sport they are presenting to improve one or more physiological adaptations. Students then complete the table for their own sport. Teacher presents a sample response (paragraph, infographic) to the question: Examine the relationship between the principles of training, physiological adaptations and improved performance. Students use the teacher’s model response to develop their own (for example, as a paragraph or infographic) using the table to support them as a framework. |  |
| Students design a training session for their chosen sport. Teacher and students present this training session. Note: the teacher presents a training session that has flaws in it eg missing components, poor timings. Teacher then presents information about the different aspects that need to be considered when designing a training session. The information presented could include: * descriptions of the aspects
* examples of what could be included in each aspect
* an adjustment to their current session to meet the requirements of the aspect.

As the teacher presents information about each aspect, students are provided time to make adjustments to their own session and receive peer feedback on each component of their training session. Once all training session aspects have been taught and revised, students and teachers share their final training sessions. Students brainstorm the differences between individual (students) and group (teachers) training sessions. Students are encouraged to support their ideas with examples from their or their peers’ training sessions compared to their teacher’s. |  |
| Teacher presents a yearly training program from the sport they are following. The training program includes the 3 phases of competition, sub phases, indicators of peaking and tapering and sport-specific attributes. Teacher then leads discussion around the elements with students highlighting what they understand from their own experience eg why does tapering occur prior to competition, or why are there more fitness components during pre-season?In small groups students are provided with different key terms. They define the terms and find relevant examples to share with the class in a mode of their choosing, such as a slide, verbal or written presentation. Students then develop their own yearly training program for the sport they have chosen. Students annotate their yearly training programs to justify their choices for the program. They receive feedback from their peers and make any adjustments required. Students are then shown a yearly training program that has some errors eg incorrectly named phases, missing tapering. Students answer the question ‘Evaluate the yearly training program in meeting the needs of the athlete.’ |  |
| Students brainstorm the strategies and tactics used in their chosen sport. Teacher provides a list of strategies and tactics that are used within their sport and then leads a discussion about what might influence the chosen strategies/tactics. This could include environmental conditions or group strengths and weaknesses. Students annotate their own brainstorming noting what factors might influence the identified strategy and tactics and how that strategy/tactic, in turn, helps address the factors. Students share their lists with a partner or in a small group and discuss the variety of and influences on strategies and tactics. They may then adjust their own brainstorming to include any further thoughts.  |  |
| Teacher presents information on a range of psychological strategies including optimising arousal and management of stress and anxiety to improve participation and performance. The presentation could include:* understanding of optimal arousal and the effect of too little or too much
* mental rehearsal/visualisation
* breathing exercise
* self talk.

Students select a key moment for their sport eg grand final or Olympics and create an informative poster for an athlete to suggest what they could do and when in order to optimise their arousal and manage their stress and anxiety. Students present their posters to their peers, comparing their chosen suggestions and justifying them. Teacher presents a range of scenarios and students discuss how an athlete could be prepared beforehand and what they could do during the event to manage their stress and anxiety in the moment. Scenarios could include:* a false start in a 100 m freestyle race
* extra time in a netball grand final
* penalty shootout in hockey to decide the game
* a teammate crashes out of the bike race.
 |  |
| Students research a range of recovery strategies that can be used to support sustained movement and performance in their chosen sport. Students research:* physiological strategies – including cool-down and hydrotherapy
* psychological strategies – including relaxation
* how the strategies support sustained movement and performance
* how each strategy is implemented.

Students share their research with each other and then use this combined knowledge to suggest physiological and psychological recovery strategies for the teacher’s chosen team sport. Students respond to the question ‘Justify recovery strategies used for sustained movement and performance in a variety of sports.’  |  |
| Teacher presents information about dietary requirements for their chosen sport. Teacher addresses information on requirements and specific examples of food options. This includes:* pre-performance
* during performance
* post-performance
* fluid intake (before, during and after performance)
* linked to sport duration and nature of event.

Teacher leads a discussion about how dietary requirements might change depending on the situation. Examples could include:* an event such as a gala day/world cup
* hot/cold weather.

Students then complete a dietary and fluid plan for their chosen athlete. This could be researched and include specific suggestions of food. Students complete a question based on an incorrect scenario. Ideally this will involve a sport that is not being completed by someone in the class. The scenario could look like this:Mackenzie is a cricketer. Their team is batting, and Mackenzie is at the crease when lunch is called. The team’s nutritionist says that it’s not too hot so Mackenzie is fine to eat whatever they feel like, and they should eat up because hopefully they will be at the crease a long time. Mackenzie enjoys 2 sandwiches, some orange juice and a muffin. They go back out after 45 minutes and feel sluggish at the crease. Mackenzie is run out 5 overs later. Mackenzie is wondering what went wrong and reviews the play and the time leading up to it. Evaluate how Mackenzie’s diet may have influenced their performance. |  |
| Teacher revises information from previous lesson on nutrition and hydration guidelines. Teacher presents information about the sleep guidelines for athletes and how sleep, nutrition and hydration can be used to reduce fatigue and positively influence movement and injury prevention. Students research and outline examples of how athletes can use or have used guidelines, planning, routines and monitoring for sleep, nutrition and/or hydration. Students compare their research and create a summary table of the research they found and work together to draw links between the research and reducing fatigue and positively influencing movement preventing injury. |  |
| Teacher provides students with an introduction to supplementation. This could include:* definitions
* advice on finding reliable supplement information
* when supplements might be needed/valuable.

Students use reliable sources to unpack the use of supplements. Students complete the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Supplement | Purpose | Method of consumption/timing | Links to performance? | Risks |
| Micronutrients (iron) |  |  |  |  |
| Micronutrients (calcium) |  |  |  |  |
| Micronutrients (multivitamin) |  |  |  |  |
| Protein |  |  |  |  |
| Caffeine |  |  |  |  |
| Creatine products |  |  |  |  |

Teacher models a mind map of how supplements may or may not support improved performance in their chosen sport. Students then create their own mind maps based on this. | Australian Sports Commission – <https://www.ais.gov.au/nutrition/supplements>  |
| Teacher puts the following 3 headings on the board in relation to drugs in sport:* Health implications
* Ethical considerations
* Drug testing.

Students brainstorm examples of drug use/reasons around drug use in sport that can go under each heading.Teacher then discusses each example and asks the student(s) why they put each reason under its particular heading. Teacher then presents information about drug testing. This could include:* process
* organisations involved
* videos/newspaper articles explaining people’s experiences.

Students complete research (using the examples on the board) on ethics and health considerations for both injury management and performance. Students prepare and participate in a debate on the topic ‘There is no place for any drugs in sport.’After the completion of the debate, the class creates a summary notes page on the impact of drug use on injury management and improving performance. Students support their points of discussion with accurate and specific examples. |  |
| If equipment (mobile phones/tables/cameras) is available, students participate in a practical activity where they use a filming device with slow motion technologies to film a peer completing a sporting movement – overarm throw, AFL punt, basketball free throw. They set a target for this movement eg distance and complete the same movement 10 times. Students then compare the technique of their peer to a video or online images of correct technique. Students adjust their technique and complete the same challenge, then compare their results. Class then discusses the impact of this activity on performance:* How did the technology influence their performance?
* Where do they think this technology could or is being used?

Students complete a research task on technology in sport. They complete the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Technology in sport | Example | How does it work? | How does it improve performance? |
| Training innovation |  |  |  |
| Equipment advances |  |  |  |
| Recording and monitoring training and performance |  |  |  |

Students share their research with their peers to broaden their range of examples. Teacher leads discussion on the role technology can play in improving performance. Students use the examples they have experienced, researched or learnt about from their peers to support their responses. |  |
| Note: some students may benefit from a review of the biomechanics content from the Year 11 course.In pairs, students select a movement that can be used in physical activity, is sport specific or is a functional movement. Through their own understanding and practical application, students identify the biomechanics that influence the movement and how these can be developed to improve the efficiency of the movement for sustained movement and improved performance. For example, exploring the benefit of linear motion in pace bowling to increase the delivery speed of the ball. Students then create a poster, infographic or mind map summarising their findings and shared it with the class.Students then complete the following question using the information they learnt from their peers (not their own movement). ‘Explain how biomechanics can be used to develop efficient movements for sustained movement and improved performance.’ |  |
| Teacher presents information about the classification of sports injuries. This includes definitions and examples of the following terms:* direct and indirect injuries
* soft and hard tissue injuries
* overuse injuries.

In pairs, students create a visual representation of injury assessment that includes the following details:* description of TOTAPS (Talk, Observe, Touch, Active movement, Passive movement, Skills test)
* definition of each stage
* examples at each stage
* when it is used.

Students complete research on the most common injuries in their chosen sports. Teacher models this for the sport they have been following for each step of the process. The students select 2 injuries that they will use throughout the rest of the unit. They classify the injury and identify the anatomy involved. A table like the following could be used to support this process:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Injury | Classification | Anatomy involved | Management of injury | Rehabilitation procedures | Return to play |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Students research the management of the injury, which could include more than one treatment option, for example surgical and non-surgical. Students create a summary of the potential management options for their chosen injuries. Students compare their research findings with their peers to see similarities and differences between different types of injuries.Teacher presents information on rehabilitation procedures. This includes progressive mobilisation, graduated exercise, training, use of heat and cold. The information presented could include:* definitions
* different implementation options for each type of procedures
* examples of where they may be most relevant
* modelling application to the sport the teacher has chosen.

Students make suggestion for rehabilitation procedures that could be used for their identified injuries and what approach/timing would be most appropriate. Class brainstorms considerations that need to be made for return to play. Teacher presents information about what teams need to consider before return to play from injury. This could include:* performance or fitness tests
* psychological readiness
* exercises or activities players may undertake in warm-up
* policies and procedures (including specific examples from a range of sports)
* concussion-specific protocols
* who has responsibilities in return to play (coaches, trainers, medical staff, players).

Students research specific return to play procedures for their sport and complete the table for suggested return to play procedures for their chosen injuries.Students use their sport, their teacher’s sport and the information they have learned from the teacher’s presentation to explain how effective return to play procedures can both support return to play from injuries and prevent further injuries.  |  |

| Reflection and evaluation (space for teacher to reflect on and evaluate the unit) |
| --- |
|  |

### Appendix 1

#### Energy systems

| **Characteristic** | **ATP-PCr** | **Glycolytic (Lactic Acid)** | **Aerobic** |
| --- | --- | --- | --- |
| Fuel source |   |   |   |
| Efficiency of ATP production |   |   |   |
| Duration |   |   |   |
| Intensity |   |   |   |
| Rate of recovery |   |   |   |
| Causes of fatigue |   |   |   |
| Sport-specific examples |   |   |  |