



Higher National Unit Specification

General information for centres

Unit title: Physiological Responses to Exercise

Unit code: F4SA 35

Unit purpose: This Unit is designed enable candidates to extend their knowledge of the body's reaction to exercise. It looks at the specific demands of extreme environments; investigates the use of legal and illegal ergogenic aids; and the effects of overtraining. The Unit, primarily intended for candidates who expect work in the sports industry, gives them a more applied, in-depth and well-rounded view of the important issues in physiology that they may need to address as professionals in the industry.

On completion of the Unit the candidate should be able to:

- 1 Critically analyse the physiological adaptations in the short, medium and long term with respect to different types of training.
- 2 Analyse the body's response to training in extreme environments.
- 3 Research and discuss the use and effect of legal and illegal ergogenic aids on sports performance.
- 4 Analyse and evaluate the causes, physiological effects and methods of dealing with overtraining syndrome on sport performers.

Credit points and level: 2 HN credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. However, it would be beneficial if candidates have completed the Exercise Physiology and Anatomy Unit during their first year (HNC Fitness Health and Exercise).

Core Skills: There are opportunities to develop the Core Skills of *Communication, Information Technology, Problem Solving* and *Working with Others* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: It may be that assessing each Outcome individually is most straightforward but there are opportunities to combine the assessment of some Outcomes to lighten assessment load. Outcomes 1 and 2 could be combined and assessed by using extended response questions.

Higher National Unit specification: statement of standards

Unit title: Physiological Responses to Exercise

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Critically analyse the physiological adaptations in the short, medium and long term with respect to different types of training

Knowledge and/or Skills

- ◆ Body adaptations
- ◆ Length of exercise terms including short, medium and long term
- ◆ Aerobic and anaerobic training
- ◆ Benefits of adaptations

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ critically analyse the adaptations that arise from aerobic and anaerobic training. The analysis must include reference to short, medium and long term aerobic and anaerobic training. Explain the benefits of adaptations by referring to a minimum of two physiological changes for each term.
- ◆ for each time frames investigate the differences in changes brought on by aerobic compared to anaerobic exercise.

Assessment Guidelines

The assessment for this Outcome may be combined with that for Outcome 2 details of which are given under Outcome 2.

Higher National Unit specification: statement of standards (cont)

Unit title: Physiological Responses to Exercise

Outcome 2

Analyse the body's response to training in extreme environments

Knowledge and/or skills

- ◆ Normal environments
- ◆ Extreme environments
- ◆ Body responses

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ analyse the body's response to training in a normal environment. A minimum of two responses must be explored.
- ◆ compare the body's response to training in hot and cold conditions and at altitude. A minimum of two responses for each condition must be explored.

Assessment Guidelines

The assessment for this Outcome may be combined with that for Outcome 1. The assessment could take the form of extended response questions to allow candidates to display their depth of knowledge. Questions could be based on a given scenario or case study.

Outcome 3

Research and discuss the use and effect of legal and illegal ergogenic aids on sports performance

Knowledge and/or Skills

- ◆ Use and effects of legal ergogenic aids
- ◆ Use and effects of illegal ergogenic aids
- ◆ Sports performance
- ◆ Ethical considerations
- ◆ Current regulations relating to substance control

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ research current regulations with respect to substance control for one assessor selected Scottish/National Governing Body (S/NGB). Summarise three issues from the findings with respect to sports performance.
- ◆ discuss ethical considerations involved with the use of legal and illegal ergogenic aids.
- ◆ discuss the effects of legal and illegal ergogenic aids on performance.

Higher National Unit specification: statement of standards (cont)

Unit title: Physiological Responses to Exercise

Assessment Guidelines

The assessment for this may be combined with that for Outcome 4 details of which are given in Outcome 4. Alternatively it may take the form of extended response questions.

Outcome 4

Analyse and evaluate the causes, physiological effects and methods of dealing with overtraining syndrome on sport performers

Knowledge and/or Skills

- ◆ Causes and risk factors of overtraining syndrome
- ◆ Physiological symptoms of overtraining syndrome
- ◆ Methods for preventing overtraining syndrome
- ◆ Avoidance of burnout and returning to meaningful training

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ evaluate the causes and risk factors of overtraining syndrome
- ◆ analyse a minimum of four symptoms of overtraining syndrome
- ◆ investigate methods for preventing overtraining syndrome and evaluate which methods are most effective
- ◆ evaluate ways of avoiding burnout to allow athletes to successfully return to training

Assessment Guidelines

The assessment for this Outcome may be combined with that for Outcome 3. The assessment could take the form of an assignment which would allow candidates to investigate and evaluate a sport or event that they have a particular interest in. Alternatively, it may take the form of extended response questions.

Administrative Information

Unit code: F4SA 35

Unit title: Physiological Responses to Exercise

Superclass category: RH

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Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Physiological Responses to Exercise

This part of the Unit specification is offered as guidance. The Support Notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 80 hours.

Guidance on the content and context for this Unit

This Unit is intended to develop the knowledge gained during the HNC Fitness Health and Exercise. The background for this Unit will come from *Exercise Physiology and Anatomy* (DW60 34) which allows this Unit to investigate and explore more specific areas of applied physiology that will confront candidates when they begin to work in industry. As the Unit covers a wide range of reactions, adaptations and effects of exercise it will equip candidates with the knowledge and experience to deal confidently with these areas when advising clients.

It is for this reason that whenever possible the Knowledge and and/or Skills should be covered by allowing candidates to investigate particular areas of interest. Class discussions and debates, particularly surrounding the areas where research is always bringing about developments and changes in current thinking, could be extremely useful to build candidate confidence around the topics. The following paragraphs, including guidance on the delivery and assessment of this Unit, contain suggestions on the types of learning and teaching techniques which may assist in making the learning experience more successful for the candidates.

Outcome 2 looks at how the body responds to exercise which may involve immediate and longer term responses.

Outcome 3

What constitutes an illegal aid could prove to be a well debated topic along with an investigation into the main criteria for certain bodies adding substances to their banned list. The example of the IOC (International Olympic Committee) could be used where their reason for having a banned list and adding substances to it is because of two criteria:

- ◆ to maintain the safety of athletes
- ◆ to ensure a level playing field

The unpopular argument may be posed that by having the banned list they put athletes in harm's way because they will inevitably cheat and use black market drugs which have not undergone safety tests or trials and at the same time create an unfair playing field since some athletes will cheat and use these substances while others will not. By removing the banned list would medical professionals feel more able to investigate the long term effects/damage to athletes and therefore keep them safe from harm and at the same time create a level playing field where athletes would have the choice to use these substances or not. This may not be a popular point of view but it will be the type of statement that will fuel well informed debate by candidates and allow groups to investigate ethical considerations surrounding these ergogenic aids. Group work to construct a case for or against will allow for presentation, oral communication and finally group work skills to be developed.

Higher National Unit specification: support notes (cont)

Unit title: Physiological Responses to Exercise

Outcome 4 looks at the risks surrounding too much training. This will be a situation that the candidates may find themselves dealing with whether they work with athletes or exercisers. Exercise addiction may be an area to look into to make this more relevant to exercisers.

Guidance on the delivery and assessment of this Unit

This Unit, which is likely to form part of a Group Award, is designed to develop the knowledge and understanding of candidates likely to be employed within sports science related industries.

The number of opportunities that this Unit presents for investigation, case study, discussion and debate may mean that it is particularly suited to early delivery within the Group Award to allow the group dynamics to settle down and for all candidates to become more comfortable within the group. This Unit will also provide valuable knowledge that may be of use to the candidate within the Graded Unit where they will be asked to work with an individual or group.

Outcome 1 looks into the area of training adaptations. Wherever possible during this Outcome practical tutorials should be used to allow candidates to cover the knowledge and skills. Short term reactions to anaerobic and aerobic exercise could be covered by working in groups to observe, record and analyse these changes as they happen to a volunteer. For medium and long term adaptations group work and investigations into the area may help to break up the more formal lecture style delivery that will no doubt be essential for some of the Unit. Of course it will always be the case that some formal information delivery will be needed but keeping this to a minimum benefit may benefit the candidate by providing more memorable and distinct learning experiences.

Outcome 2

As in Outcome 1 practical tutorials using candidates as volunteers may lighten the lecture load and benefit the candidates. Cold and hot conditions can be simulated by exercising outside and in a well heated room respectively. Obviously exercise at altitude cannot practically be exercised in centres and so in this case a lecture covering the current thinking would be suitable.

It may be that lecturers feel by combining the first two Outcomes they can give the candidates a more well rounded knowledge and experience with respect to exercise adaptations.

Outcome 3 revolves around the legalities of ergogenic aids with particular reference to substances. Because of the constant changes being made to the rules surrounding substance use in sport, investigative type activities will allow up-to-date information to be brought to the class group hopefully for analysis, discussion and debate.

Outcome 4

With respect to overtraining certain groups of elite athletes may be more prone to this problem so this may allow the lecturer to successfully direct investigations and analysis. Looking at case studies may allow candidates to more practically come up with ways to prevent overtraining and avoid burnout.

Outcome 1 and 2 as suggested previously will most successfully be assessed through extended response questions and could easily be combined to reduce assessment load.

Higher National Unit specification: support notes (cont)

Unit title: Physiological Responses to Exercise

Outcome 3 and 4 may benefit from being assessed using an investigation or a series of case studies and once again be combined to form one, albeit large, investigation. This form of assessment at this point may serve the candidates well when it comes to the Graded Unit.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skills of *Communication*, *Information Technology*, *Problem Solving* and *Working with Others* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Communication (Written) — by understanding and answering the extended response and assignment style questions candidates will have the opportunity to develop this Core Skill to SCQF level 6.

Communication (Oral) — if candidates are asked to feedback to the class on the investigations they are carrying out for Outcomes 3 and 4 they may be able to develop this Core Skill to SCQF level 6. If it is decided that any of the investigations are to be assessed by presentation this would provide even more opportunity.

Information Technology — it is likely that the investigative sections of the Unit will involve candidates accessing the internet independently for some references and information. This combined with the lecturer encouraging candidates to use word processing to complete investigations will allow this Core Skill to be developed. Finally if any oral presentations are used then this could provide the opportunity to increase knowledge of Presentation Software. These opportunities may allow the candidate to develop this Core Skill to SCQF level 6.

Problem Solving — by being given the opportunity to investigate, analyse and critically evaluate the areas involved in this Unit all aspects of problem solving will be essential. These opportunities may allow the candidate to develop this Core Skill to SCQF level 6.

Working with Others — group work may form the basis of class discussions and debates and enhance the candidate's ability to work successfully with other class members. Due to the type of information and the analytical nature of the Outcomes this Core Skill may be developed to SCQF level 6.

Open learning

This Unit could be delivered by distance learning although the methods for learning and teaching would differ greatly and much of the practical experience from the tutorials would not be available. As always it would be essential to put in place checks to ensure that the candidates work is their own.

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

General information for candidates

Unit title: Physiological Responses to Exercise

This Unit is designed to expand your knowledge of applied physiology. It is primarily intended to prepare you for employment within a sports industry environment.

The Unit has four main areas, each the subject of a separate Outcome:

- 1 Critically analyse the physiological adaptations in the short, medium and long term with respect to different types of training.
- 2 Analyse the body's response to training in extreme environments.
- 3 Research and analyse the use and effect of legal and illegal ergogenic aids on athletic performance.
- 4 Analyse and evaluate the causes, physiological effects and methods of dealing with overtraining syndrome on sport performers.

Outcomes 1 and 2 look at adaptations that the body goes through in the short, medium and long term due to exercise and the differing effects of extreme environments on the body. This will equip you with the knowledge and, more importantly, the confidence to address these issues with clients in industry.

The use of ergogenic aids and the dangers of overtraining will be investigated in Outcomes 3 and 4, thereby expanding your knowledge of physiology into areas that are linked to performance and elite athletes.

This Unit may involve you using knowledge gained from the *Exercise Physiology and Anatomy* Unit if it is completed within the HND Applied Sports Science award. This prior knowledge may be valuable to you in the completion of this Unit as will your ability to comment successfully on what was covered. Keeping the notes from this HNC Unit to hand and well organised may serve you well in the investigations you will be asked to carry out during this Unit.

Take the opportunity to become as involved as possible in the activities and practical tutorials that are set up for you as these experiences will allow you to make more sense of the information being explained. Discussing, in groups, the topics raised and taking the opportunity to put forward your ideas will allow your knowledge of the areas to become more complex and useful.

There are opportunities to develop the Core Skills of *Communication*, *Information Technology*, *Problem Solving* and *Working with Others* all at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.