

Higher National Unit Specification

General information for centres

Unit title: Applied Physiology

Unit code: DP63 34

Unit purpose: The Unit is designed to provide the candidate with a good working knowledge of the physiology of the human body and the responses of the body to exercise. The Unit provides underpinning knowledge for the more applied technical Units.

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

- 1 Identify and describe the structure and function of the cardiovascular and lymphatic systems.
- 2 Describe the structure and function of the respiratory system.
- 3 Describe energy production within body cells.
- 4 Describe the organisation and function of the nervous system.

The Unit includes competencies and scope of practice as specified by the Society of Sports Therapists.

Credit points and level: 1.5 HN Credit at SCQF level 7: (12 SCQF credit points at SCQF level 7*).

**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 is recommended that candidates should have a prior knowledge of human anatomy as evidenced by at least Biology at Intermediate 2 or equivalent (SCQF level 5/6).

Core Skills: There may be opportunities to gather evidence towards Core Skills in this Unit, although there is no automatic certification of Core Skills or Core Skills components. This Unit has been signposted for Numeracy SCQF level 5 (Using Graphical Information) and Information Technology SCQF Level 5, (Using an IT system effectively and responsibly to process a range of information).

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. This is a mandatory Unit in the framework of the HNC/D Sports Therapy Group Award and should be taught at the beginning of year 1.

General information for centres (cont)

Unit title: Applied Physiology

Assessment: Two different instruments of assessments will be used to assess this Unit. Outcomes 1 and 2 and 4 could be assessed by an integrated closed-book assessment. Outcome 3 will be assessed by extended response open-book assessment under supervision.

Higher National Unit specification: statement of standards

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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

Identify and describe the structure and function of the cardiovascular and lymphatic systems

Knowledge and/or skills

- ◆ Anatomy and physiology of the heart
- ◆ Structure and function of the vascular system
- ◆ Stages of the cardiac cycle
- ◆ Factors affecting cardiac output
- ◆ Role of pacemaker
- ◆ Response of cardio vascular (CV) system to short and long term exercise
- ◆ Formation of lymph
- ◆ Structure of lymphatic system
- ◆ Function of lymphatic system

Evidence Requirements

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

- ◆ identify component parts of the heart to include chambers, blood vessels and valves
- ◆ describe the physiology of the heart in terms of the role of the pacemaker, the conduction system and the cardiac cycle
- ◆ describe the effects of short and long term exercise on cardiac output in terms of stroke volume and heart rate
- ◆ describe the structure and function of the lymphatic system and the formation and function of lymph. This will be evidenced by a written/oral response under closed-book, controlled conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Physiology

Assessment guidelines

Closed-book assessment under controlled conditions, requiring a variety of responses including, labelling of diagrams, short answers and extended responses, covering all knowledge and skills.

There is the opportunity to integrate this assessment with Outcomes 2 and 4.

Outcome 2

Describe the structure and function of the respiratory system

Knowledge and/or skills

- ◆ Structure of the respiratory system
- ◆ Mechanism of breathing
- ◆ Changes in lung volume as a result of exercise

Evidence Requirements

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

- ◆ identify the components of the respiratory system to include: pharynx, larynx, trachea, bronchi, bronchioles, alveoli, ribs, intercostal muscles, diaphragm
- ◆ describe the mechanism involved in quiet inspiration and expiration
- ◆ compare the mechanisms involved in quiet and forced breathing
- ◆ describe the changes in lung volumes during short and long term exercise: tidal volume, inspirational reserve volume, expirational reserve volume, vital capacity and residual volume. This will be evidenced by a written/oral response under closed-book, controlled conditions.

Assessment guidelines

Closed-book assessment under controlled conditions, requiring a variety of responses including, labelling of diagrams, short answers and extended responses, covering all knowledge and skills.

There is the opportunity to integrate this assessment with Outcomes 1 and 4.

Outcome 3

Describe energy production within body cells

Knowledge and/or skills

- ◆ Structure of a cell
- ◆ Function of cell organelles
- ◆ Organisation of cells in the body
- ◆ Tissue types
- ◆ Movement of molecules into and out of cells
- ◆ Energy production in cells

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Physiology

Evidence Requirements

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

- ◆ identify the structure of a typical animal cell to include, cell membrane, nucleus, mitochondrion, cytoplasm
- ◆ describe the function of the cell membrane, nucleus mitochondrion and cytoplasm
- ◆ describe the organisation of cells in the body
- ◆ identify various types of connective tissue to include bone and cartilage
- ◆ describe the formation of Adenotriphosphate (ATP) in cells
- ◆ describe the three stages involved in aerobic respiration
- ◆ describe the method by which ATP is formed anaerobically
- ◆ describe the methods of transport in cells to include diffusion, osmosis and active transport.

This will be evidenced by a minimum of 10 written/oral extended response questions under open-book, controlled conditions.

Assessment guidelines

Candidates will be required to complete a minimum of 10 extended response questions to cover all of the knowledge and skills. The assessment could be open-book under controlled conditions. Prior research and resourcing around the subject area is advised and candidates may bring restricted notes and text to the assessment.

Outcome 4

Describe the organisation and function of the nervous system

Knowledge and/or skills

- ◆ Organisation of the nervous system
- ◆ Structure of the neurones and their function
- ◆ Conduction in a neurone
- ◆ Structure of the spinal cord
- ◆ Reflexes
- ◆ Structure and function of the brain

Evidence Requirements

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

- ◆ describe the organisation of the nervous system to include: central nervous system, peripheral nervous system, spinal nerves, cranial nerves and glial cells
- ◆ identify the parts of a neurone
- ◆ describe the function of sensory neurones, motor neurones and relay neurones

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Physiology

- ◆ describe briefly the events in an action potential in terms of the events involved in depolarisation and repolarisation
- ◆ describe the differences between continuous conduction and salutatory conduction emphasising the role of myelin
- ◆ describe the cross sectional structure of the spinal cord
- ◆ identify the components of spinal reflexes and compare to simple mono-synaptic stretch reflex
- ◆ describe the organisation and function of the nervous system
- ◆ describe the structure of the brain to include the cerebrum, corpus callosum, thalamus, hypothalamus, pituitary, pons, medulla cerebellum
- ◆ describe the functions of the motor cortex, cerebellum and proprioceptors.

This will be evidenced by a minimum of seven written/oral questions under closed-book, controlled conditions.

Assessment guidelines

Closed-book assessment which will consist of a variety of questions covering a sample of a minimum of seven of the Evidence Requirements. The candidate will have no prior knowledge of the sample to be used and a different sample will be used in each assessment instrument.

There is the opportunity to integrate this assessment with Outcomes 1 and 2.

Administrative Information

Unit code:	DP63 34
Unit title:	Applied Physiology
Superclass category:	RH
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Higher National Unit specification: support notes

Unit title: Applied Physiology

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 60 hours.

Guidance on the content and context for this Unit

Outcome 1

- ◆ Models and diagrams to investigate the anatomy of the heart.
- ◆ Use of video clips and CD ROMs to demonstrate the action of the heart.
- ◆ Students may be asked to measure heart rate before and after a period of exercise, recording their results in a table. Class results may be collated and presented as a graph.

Outcome 2

- ◆ Use of models and diagrams to investigate the anatomy of the respiratory system.
- ◆ Use of video clips and CD ROMs to demonstrate the mechanisms involved in breathing at rest and during exercise.
- ◆ A variety of activities to measure lung volumes.

Outcome 3

- ◆ Use of microscopes and bio viewers to examine basic cell structures.
- ◆ Use of models and diagrams to investigate the ultra structure of an animal cell.
- ◆ Demonstration of energy release from food by simple combustion experiment.
- ◆ Use of indicator to show production of CO₂.

Outcome 4

- ◆ Use of models and diagrams to investigate the structure of the brain and spinal cord.
- ◆ Use of video clips and CD-ROMs to demonstrate the action of a nerve impulse.

Guidance on the delivery and assessment of this Unit

Outcome 1

- ◆ Use of models and diagrams to investigate the anatomy of the heart.
- ◆ Use of video clips and CD ROMs to demonstrate the action of the heart.
- ◆ Students may be asked to measure heart rate before and after a period of exercise, recording their results in a table. Class results may be collated and presented as a graph.

Higher National Unit specification: support notes (cont)

Unit title: Applied Physiology

Outcome 2

- ◆ Use of models and diagrams to investigate the anatomy of the respiratory system.
- ◆ Use of video clips and CD ROMs to demonstrate the mechanisms involved in breathing at rest and during exercise.
- ◆ A variety of activities to measure lung volumes.

Outcome 3

- ◆ Use of microscopes and bio viewers to examine basic cell structures.
- ◆ Use of models and diagrams to investigate the ultra structure of an animal cell.
- ◆ Demonstration of energy release from food by simple combustion experiment.
- ◆ Use of indicator to show production of CO₂.

Outcome 4

- ◆ Use of models and diagrams to investigate the structure of the brain and spinal cord.
- ◆ Use of video clips and CD-ROMs to demonstrate the action of a nerve impulse.

Opportunities for developing Core Skills

This Unit has been signposted for numeracy at SCQF level 5 (using graphical information) and Information Technology at SQF level 5 (using IT Systems effectively and responsibly to process a range of information).

Open learning

The underpinning knowledge for this Unit could be delivered by open learning with suitable support materials. The practical assessment skills however will require to be undertaken on a live model in a clinical environment. The candidate would be required to attend the centre for assessment opportunities requiring supervision. For further information and advice please refer to the SQA document *Assessment and Quality Assurance for Open and Distance Learning* (A1030).

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. 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. For information on these, please refer to the SQA document *Guidance Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk.

General information for candidates

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The Unit is designed to provide you with a good working knowledge of the physiology of the human body and the responses of the body to exercise. The Unit provides underpinning knowledge for the more applied technical Units.

On completion of the Unit you should be able to identify and describe the structure and function of the cardiovascular and lymphatic systems, describe the structure and function of the respiratory system and energy production within body cells. The organisation and function of the nervous system will also be investigated.

There are many good anatomy and physiology textbooks and websites available for reference. Some resources you may find useful are:

Thibodeau, G.A., Patton, K.T., (1999), *Anatomy and Physiology*, Mosby.

Lamb, D.R., (1984), *Physiology of Exercise, Responses and Adaptions*, MacMillan Publishing.

McArdle W.D., Katch F.I. et al, (1996), *Exercise Physiology: Energy, Nutrition and Human Performance*, Williams and Wilkins.