Higher National Unit specification

General information

Unit title: Sports Therapy: Anatomy and Physiology (SCQF level 7)

Unit code: H7VD 34

Superclass: RH

Publication date: August 2018

Source: Scottish Qualifications Authority

Version: 03

Unit purpose

This Unit is designed to provide learners with underpinning knowledge of the structure and function of the human body necessary to the professions of sports massage/therapy. It also provides underpinning knowledge for many other Units and the National Occupational Standards in Sports Therapy.

Outcomes

On successful completion of the Unit the learner will be able to:

1 Identify the structure and describe the functions of the skeletal system.
2 Identify the structure and describe the functions of the muscular system.
3 Identify the structure and describe the functions of the nervous and endocrine systems.
4 Identify the structure and describe the functions of the respiratory, cardiovascular, and lymphatic systems.
5 Describe the aerobic and anaerobic energy systems.

Credit points and level

2 Higher National Unit credits at SCQF level 7: (16 SCQF credit points at SCQF level 7)

Recommended entry to the Unit

This is a mandatory Unit in the Group Awards HNC Soft Tissue Therapy/HND Sports Therapy. It is anticipated that learners will have studied some Human Anatomy at SCQF level 6 prior to undertaking this Unit. However, entry is at the discretion of the delivering centre.

Higher National Unit specification: General information (cont)

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

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.

The content of this Unit underpins much of the material within HNC/HND Fitness, Health and Exercise. Consideration should be given to this when timetabling and delivering the Unit.

The Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable, and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website **(http://www.sqa.org.uk/sqa/46233.2769.html)**.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Higher National Unit specification: Statement of standards (cont)

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

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. Learners 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 the structure and describe the functions of the skeletal system.

Knowledge and/or Skills

- Anatomy of the axial and appendicular skeleton
- Vertebral column
- Classification and function of bone types
- Structure and development of long bones
- Structure and classification of major synovial joints

Outcome 2

Identify the structure and describe the functions of the muscular system.

Knowledge and/or Skills

- Functions of the muscular system
- Structure and location of skeletal muscle
- Types of muscle fibres
- Physiology and classification of muscle contraction
- Neuromuscular control of movement and posture

Outcome 3

Identify the structure and describe the functions of the nervous and endocrine systems.

Knowledge and/or Skills

- Structure of the nervous system
- Functions of the spinal cord
- Functions of the brain
- Structure and function of neurons
- Conduction in a neuron
- Reflexes and reflex arc
- Structure of the endocrine system
- Function of hormones

Outcome 4

Identify the structure and describe the functions of the respiratory, cardiovascular and lymphatic systems.

Knowledge and/or Skills

- Structure and function of the respiratory system:
  - mechanism of breathing at rest and during exercise
- Structure and function of the cardiovascular system:
  - anatomy of the heart and circulatory system
  - components and functions of blood
  - implications of massage on the cardiovascular system.
- Structure and function of the lymphatic system

Outcome 5

Describe the aerobic and anaerobic energy systems.

Knowledge and/or Skills

- Aerobic energy systems
- Anaerobic energy systems

Evidence Requirements for this Unit

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills across all Outcomes by showing that they can:

Outcome 1

- Identify the main components of the axial and appendicular skeleton
- Identify the structure of the vertebral column and the main components of vertebrae
- Identify components of a typical synovial joint and describe their functions
- Identify bone types and describe functions and locations
- Identify and describe major synovial joints by classification and movement patterns
- Describe the structure and development of a long bone at a cellular and vascular level

Outcome 2

- Identify major skeletal muscles by position (minimum of 17 evenly distributed)
- Describe the structure of skeletal muscle
- Describe the process of contraction of skeletal muscles
- Describe the main characteristics of different types of muscle fibres
- Describe the neuromuscular control of movement

Higher National Unit specification: Statement of standards (cont)

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Outcome 3

- Describe the main components of the nervous system:
  - identify the component parts of the nervous system (CNS, PNS)
  - identify the main component parts of the brain
  - describe the main functions of the brain
  - describe the main functions of the spinal cord
- Identify the structure of a myelinated neuron
- Describe the functions of sensory, motor and inter/relay neurons
- Describe the events in an action potential
- Describe basic reflexes and explain a simple reflex arc
- Identify 6 endocrine glands and describe the function of their hormones

Outcome 4

- Identify the structures of the respiratory systems and outline their functions:
  - explain the mechanism of breathing at rest and during exercise and the process of gas exchange
- Identify the structures of the cardiovascular system and outline their functions
  - describe the physiology of the heart, blood vessels and blood
- Identify the structure of the lymphatic system and outline its functions:
  - describe the function of vessels, nodes and ducts,

Outcome 5

- Describe the processes involved in aerobic and anaerobic energy production including Glycolysis; Krebs Cycle; Electron Transport System; Phosphagen system, Anaerobic Glycolysis

Higher National Unit Support Notes

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Unit Support Notes are offered as guidance and 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

The Unit is mandatory in the HNC Soft Tissue Therapy and HND Sports Therapy and is intended to introduce the learner to the fundamental concepts of anatomy and physiology required in a Sports Massage/Therapy context, helping to prepare learners for roles in these professions and for progression to higher level study. The knowledge and skills in this unit underpin other mandatory Units and the National Occupational Standards for Sports Therapy: Skills for Health cover many units in this course and the GCMT (General Council for Soft Tissue Therapies) shows the organisations who are members e.g SMA - Sports Massage Association, STO – Sports Therapy Organisation, , SMTO – Scottish Massage Therapists Association) Society of Sports Therapists and STA – Sports Therapy Association are other organisations which may be of interest to qualified professionals

Outcome 1 develops the learners' knowledge of the skeletal system in terms of anatomy, physiology, and development. The following areas should be covered:

Bones of the axial skeleton: cranium, spine (cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacrum, coccyx), ribs, sternum.

Bones of the appendicular skeleton: shoulder girdle (clavicle, scapula); bones of upper limb (humerus, radius, ulna, carpal bones, metacarpals, phalanges); pelvic girdle (ischium, ilium, pubis); bones of lower limb (femur, tibia, fibula, patella, tarsal bones, metatarsals, phalanges.

Higher National Unit Support Notes (cont)

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Vertebrae structure: body, vertebral foramen, pedicle, lamina, spinous process, transverse processes, superior and inferior articulation points.

Components of synovial joints: capsule, articular cartilage, synovial membrane, synovial fluid, intra and extra capsular ligaments.

Bone types: long, short, flat, irregular, sesamoid.

Joints: ball and socket, hinge, pivot, condyloid/ellipsoid, gliding/planar, saddle.

Structure of long bone: periosteum, diaphysis, epiphyses, epiphyseal plate/line, spongy/cancellous bone, compact bone, medullary cavity, site of red bone marrow storage, site of yellow bone marrow storage.

Microstructure: haversian system, trabeculae.

Development of long bone: process of endochondral ossification from hyaline cartilage model to termination of growth with major developmental timescales.

Outcome 2 pays particular attention to skeletal muscle and develops knowledge of the mechanics of human movement by describing major muscle groups and the interaction of muscular and skeletal systems:

Major muscles:

Gluteals; Iliopsoas; tensor fascia lata; adductors; rectus femoris; vastus lateralis; vastus medialis; semi tendinosis/membranosis; biceps femoris; gastrocnemius; soleus; tibialis anterior; fibularis/peroneals; deltoid; biceps brachii, tricep brachii, flexor and extensor muscles of the forearm; pectoralis major, latissimus dorsi; teres major; supraspinatus; infraspinatus; teres minor; subscapularis; trapezius; serratus anterior; erector spinae; quadratus lumborum; transversus abdominus; rectus abdominus; internal oblique; external oblique; sternocleidomastoid.

Gross structure: tendon, epimysium, perimysium, endomysium, fasiculii.

Micro- structure: myofibrils, sarcomere, myofilaments, t-tubules, sarcoplasmic reticulum, actin and myosin, sarcomere arrangement.

Sliding filament theory.

Fibre types: type I, IIa, IIb.

Neuromuscular control: motor Unit structure and recruitment, neuromuscular junction, sensory receptors (muscle spindle, golgi tendon organ).

Higher National Unit Support Notes (cont)

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Outcome 3 introduces the learner to the nervous and endocrine systems.

Components of nervous system: central nervous system: brain spinal cord; peripheral nervous system: cranial nerves (12 pairs), spinal nerves (31 pairs); somatic nervous system, autonomic nervous system — parasympathetic and sympathetic branches.

Myelinated neurons – component parts

Sensory neurons: inter/relay neurons, motor neurons – describe functions

Conduction – de-polarisation, polarisation process

Reflexes – mono and di/poly-synaptic reflexes

Endocrine glands: hypothalamus, thalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal glands, pancreas, sex glands.

Outcome 4 develops the learner's knowledge of the respiratory, cardiovascular, and lymphatic systems.

Structure of the Respiratory System: oral and nasal cavities; pharynx; larynx; trachea, epiglottis; bronchus/bronchioles; alveoli, thoracic cage, lungs and breathing muscles

Physiology of the Respiratory System: gas exchange; diffusion; pressure gradient; Oxygen Delivery; Carbon Dioxide.

Mechanism of breathing at rest and during exercise: forced inspiration and expiration, volume, and pressure changes; use of ancillary muscles; increased respiratory rate.

Cardiovascular System Structure: Heart structure and function (atria, ventricles, blood vessels and valves); Blood vessels — structure and function of arteries, arterioles, veins, venules, capillary network.

Physiology of blood (Red blood cells; white blood cells, platelets, plasma).

Blood flow through the heart.

Cardiac Conduction system

Lymphatic system – structure and function of vessels, nodes and valves and ducts

Higher National Unit Support Notes (cont)

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Outcome 5

Identify the steps involved in each system, the equations, duration, and intensity of activity when each are predominant and what happens to waste/by-products of each system and replenishment of substrates
Glycolysis; Krebs Cycle; Electron Transport System.
Phosphagen system
Anaerobic Glycolysis

Guidance on approaches to delivery of this Unit

Due to the nature of the subject matter, it is suited to delivery over a longer period (perhaps the whole of the HNC year or HND first year) in order that learners can assimilate and understand the material.

Models, diagrams, animations, video clips and practical activities should be used as much as possible to demonstrate the concepts being presented. Learners should have the opportunity to work independently and in groups on directed study to extend their knowledge and skills.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

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It is necessary for learners to develop a sound understanding of the anatomy and physiology of the specified systems. All outcomes are suited to closed-book, restricted response/short answers or open-book, extended responses where learners may use limited resources (maximum two A4 sides of handwritten notes with references handed in with assessment)

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software (e.g SOLAR). Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

Learners should be encouraged in the use of information technology as they develop their knowledge and understanding of the anatomy and physiology of the human body. Instruction in the effective use of learning resource centre systems (including online learning, VLE, and similar electronic media) will support learners to access and analyse factual information and current theories.

Editing and collating of notes from a range of sources could be particularly useful in the development of an academic approach to underpinning knowledge. Teaching should support analytical and critical evaluation of information accessed, encouraging, and allowing learners to become autonomous learners.

The need to develop efficient systems of recording, coding, and storing personal notes for ease of reference should be emphasised. Where practical, learners should have opportunities for e-learning and be aware of the importance of information backup.

History of changes to Unit

Version	Description of change	Date
3	Outcome 1 removed; other outcomes streamlined with exercise references removed	29/4/21
2	Re-alignment of verbs for outcomes. Clarification of evidence requirements and guidance notes.	31/08/18

General information for learners

Unit title: Sports Therapy: Anatomy and Physiology (SCQF level 7)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

On completion of this Unit you should have gained an understanding of the skeletal, muscular, nervous, endocrine, respiratory, and cardiovascular systems of the human body. You will also be able to describe the ways which the body uses energy substrates in exercise and how all systems work together to maintain health.

This knowledge is fundamental to your understanding of human performance and will be built upon in other mandatory Units within the HNC Soft Tissue Therapy/HND Sports Therapy awards.

In addition to tuition, you will be encouraged to use your VLE and other support materials widely as a significant amount of self-study and review is essential for successful completion of this Unit.

In Outcome 1 you will study the structure, and function of exercise on the skeletal system. This will include the bones, their structure and development, and the tissues which connect them together.

In Outcome 2 you will study the structure, function, and effects of exercise on the muscular system. You will look in detail at how muscles contract, and where they are located. Both Outcome 1 and 2 are closely related to, and support, the *Functional Anatomy* Unit.

In Outcome 3 you will study the structure and functions of the nervous and endocrine systems. These systems control what goes on in our bodies and important in maintaining homeostasis (internal balance).

In Outcome 4 you will study the structure, function and effects of exercise on the respiratory and cardiovascular systems. You will look at how the respiratory system responds to the demands placed on it by exercise, and how the body adapts in order to maintain the supply of oxygen to the tissues. You will also see how the heart and vascular system delivers blood, hormones and nutrients to the working muscles, and how waste products are removed. You will examine the electrical system of the heart.

In Outcome 5 energy systems are studied, and the body's different responses to the requirement for energy examined closely.

Outcome 3 is assessed through an open-book, supervised assessment. All other Outcomes are assessed through closed-book question papers.