

National Unit Specification: general information

UNIT Human Physiological Processes

NUMBER DC4D 12

COURSE

SUMMARY

This unit develops knowledge, understanding and analysis skills related to Human Physiological Processes. It is suitable as a basic in human biology for staff working within or towards a career in the health care sector.

OUTCOMES

1. Demonstrate knowledge and understanding of the activities of the major systems of the human body.
2. Solve problems related to the major systems of the human body.
3. Collect and analyse information related to human physiological processes.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have some knowledge and understanding and skills relating to Biology. This could be demonstrated by attainment of

◆ Standard Grade Biology with Knowledge and Understanding and Problem Solving at a minimum of Grade 3

or

◆ Intermediate 2 Biology

or

◆ the Intermediate 2 unit Animal Physiology

Administrative Information

Superclass: RH

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CREDIT VALUE

2 credits at Higher (12 SCOTCAT points at SCQF level 6*).

**SCOTCAT 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 SCOTCAT points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

There is no automatic certification of core skills or core skills components for this unit.

Additional information about core skills is published in the *catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Human Physiological Processes

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 the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding of the activities of the major systems of the human body.

Performance criteria

- a) Processes involved in the activities of major systems are described correctly.
- b) Mechanisms involved in the activities of major systems are described correctly.

Note on range for the outcome

Major body systems: digestive; respiratory; excretory; cardiovascular; lymphatic; nervous; endocrine and muscular.

Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

OUTCOME 2

Solve problems related to the major systems of the human body.

Performance criteria

- a) Relevant information is selected and presented appropriately.
- b) Information is accurately processed, using calculations where appropriate.
- c) Conclusions drawn are valid, and explanations given are supported by evidence.

Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

National Unit Specification: statement of standards (cont)

UNIT Human Physiological Processes

OUTCOME 3

Collect and analyse information related to human physiological processes.

Performance criteria

- a) Information is collected by active participation in the activity.
- b) The procedures are described accurately.
- c) Relevant information is recorded in an appropriate format.
- d) Recorded information is analysed and presented in an appropriate format
- e) Conclusions drawn are valid.
- f) The activity is evaluated with supporting argument.

Evidence requirements

Please refer to *Evidence requirements for the unit* at the end of the Statement of Standards.

EVIDENCE REQUIREMENTS FOR THE UNIT

Outcomes 1 and 2

Outcomes 1 and 2 must be assessed by two integrated closed book tests with items covering all of the above performance criteria. Each test should have a maximum score of 30 marks and should be of 1 hour duration. In each test a total of 18 marks should be allocated to Outcome 1 and 12 marks to Outcome 2. One test will assess the following systems: nervous; endocrine; and digestive. The other test will assess the respiratory, excretory, cardiovascular; lymphatic and muscular systems. Candidates attaining a minimum score of 18 in each test will be deemed to have achieved both outcomes.

Outcome 3

Evidence of an appropriate level of achievement must be generated from a report, of approximately 1000 words and covering the above performance criteria, of one experimental activity or one investigation.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from:

- ◆ active participation in an experiment involving the candidate in planning the experiment; deciding how it is managed; identifying and obtaining the necessary resources; and carrying out the experiment. Depending on the activity, the collection of the information may be group work.
- or**
- ◆ individual research on an agreed topic: which involves candidates planning the activity, detailing how it is managed, identifying and obtaining the necessary resources and carrying out the activity.

Evidence submitted in support of attainment of PC(d) must be in the format of a table or graph as appropriate. Conclusions drawn must be justified by reference to supporting evidence. The evaluation should cover all stages of the activity including the initial analysis of the activity and planning and organising the activity.

National Unit Specification: support notes

UNIT Human Physiological Processes

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

Outcome 1

Body systems, processes and mechanisms should include:

Nervous system

- i) Transmission of nerve impulse along and between nerves: electrical and chemical.
- ii) Reflex arc.

Endocrine system

- i) Hormone action: interaction with plasma membrane receptors resulting in increase in synthesis of CAMP (second messenger) which alters cell function, steroid hormones diffuse across membrane and combine with intracellular receptor to form hormone-receptor complex which binds to DNA and alters function by activating gene.

Digestive system

- i) Mechanical and chemical breakdown of food.
- ii) Enzyme action: salivary amylase, pepsin, pancreatic amylase trypsin, lipase, maltase, lactase, sucrase, peptidase.
- iii) Absorption of nutrients.
- iv) Role of liver: bile production, production and storage of glycogen, blood component manufacture, detoxification, metabolism of fat, heat production.
- v) Role of pancreas; enzyme production, alkali production.
- vi) Assimilation and supply of nutrients.

Respiratory system

- i) Mechanism of breathing: volume and pressure changes.
- ii) Gaseous exchange.
- iii) Control of carbon dioxide levels.

Excretory system

- i) Ultrafiltration and reabsorption.
- ii) Removal of waste.
- iii) Role of the skin in sweat secretion and temperature regulation.

Cardiovascular and lymphatic systems

- i) Transport: blood as the transport medium for nutrients, hormones, carbon dioxide, and oxygen lymphatics as returning vessels containing fat.
- ii) Cardiac cycle: systole, diastole, pressure changes.
- iii) Blood clotting mechanism: prothrombin, thrombin, thromboplastin, fibrinogen, fibrin, platelets, calcium, Vitamin K, coagulation factors.
- iv) Role of lymphatic system in immunity: B and T lymphocytes, antibodies and antigens, passive and active immunity.

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Muscular system

- i) Origin and insertion of muscles, action of antagonistic pairs, levers.
- ii) Sliding filament theory.
- iii) Neuromuscular junction: neurotransmitters, muscle contraction.

Outcome 2

Principles should include:

Negative feedback

- i) Blood sugar: role of insulin and glucagons.
- ii) Metabolic rate: role of thyroxine.
- iii) Temperature: role of hypothalamus as regulating centre, involuntary and voluntary responses.
- iv) Acidosis and alkalosis.

Nervous control

- i) Parasympathetic vs sympathetic: control of heart rate, control of digestive juices.
- ii) Blood pressure.
- iii) Breathing rate: role of hypothalamus and medulla, baroreceptors.

Hormonal control

- i) Osmoregulation: ADH, aldosterone.
- ii) Gastrin and secretin.
- iii) Oestrogen and progesterone.
- iv) Calcitonin.

Outcome 3

- a) The information is collected by active participation in the activity.**
 - i) Laboratory practical: protocol of experiment.
 - ii) Investigative report: experimental data, textbooks, Internet etc.
- b) The procedures are described accurately.**
- c) Relevant information is recorded in an appropriate format.**
 - i) Laboratory practical: standard format of lab report.
 - ii) Investigative report: may be word processed or hand written.
- d) Recorded information is analysed and presented in an appropriate format.**
- e) Conclusions drawn are valid.**
- f) The activity is evaluated with supported argument.**

Learning activities for Outcomes 1 and 2 which provide suitable contexts for the development of problem solving skills include:

- ◆ calculate surface area to volume ratios
- ◆ use nomograms to estimate surface area of the body
- ◆ obtain and present information on coronary heart disease
- ◆ interpret graphs of pressure changes in heart and blood vessels
- ◆ analyse data from Hb/O₂ dissociation curves

National Unit Specification: support notes (cont)

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- ◆ analyse data on composition of plasma of hepatic artery, tubule fluid and urine composition and rate of production
- ◆ analyse graphs showing distribution of blood to tissues at rest and during exercise
- ◆ calculate cardiac output under different conditions
- ◆ analyse glucose tolerance curves of normal and diabetic subjects

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of Human Physiological Processes is most effective when concepts, principles, and theories are set in a relevant context e.g. by making reference to applications of Human Physiological Processes in healthcare settings.

Learning and teaching approaches should include lectures, individual and group work reinforced by handouts and worksheets which should incorporate problem-solving exercises. A student-centred, resource-based approach is likely to be the most flexible for this unit. Use of visual aids, models and videos is recommended. An integrated approach is essential to develop a holistic view of the functioning of the human body.

Laboratory practical work is likely to play a significant part in this unit. During the work of this unit, students should have several opportunities to demonstrate their practical and/or research skills.

Selection of data, tabulating and drawing conclusions are examples of a problem solving approach appropriate for establishing concepts where laboratory work is not possible, eg when using open learning packs.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

It is recommended that Outcome 1 and 2 are assessed by two integrated, closed book tests of 1 hour duration each with a cut off score of 60%. These should be suitably divided between the major body systems and should cover both outcomes.

Outcome 3 is assessed by an investigation of a practical nature, by data collection and processing from appropriate resource material or by a project on an agreed topic of the student's choice. All methods must include collection and handling of data and appropriate conclusions.

Candidates should be encouraged to pursue their own interest in relation to the human body. The investigation or project could cover any aspect of any body system, and may include malfunction(s) or disease as well as normal operation of the chosen system.

National Unit Specification: support notes (cont)

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Suggested investigations:

- ◆ Effect of bile on lipase action or as an emulsifier or other digestive enzyme experiments
- ◆ Effect of exercise on breathing and pulse rates
- ◆ Analysis of data on glomerular filtrate, tubule fluid and urine composition and rate of production
- ◆ Analysis of protein, glucose and salt concentrations in 'artificial urine'
- ◆ Analysis of urea content in 'artificial blood'
- ◆ Interpretation of data on tissue transplantation and rejection in relation to the body's immune response
- ◆ Analysis of data on glucose tolerance in normal and diabetic subjects

It is recommended that simple experiments could also be incorporated into learning and teaching process as time/resources allow.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, publication code AA0645).