

BIOLOGY
Access 3

Fourth edition – published June 2002

**NOTE OF CHANGES TO ARRANGEMENTS
FOURTH EDITION PUBLISHED JUNE 2002**

CLUSTER TITLE: Biology (Access 3)

CLUSTER NUMBER: C007 09

National Cluster Specification

Cluster Details: No change.

National Unit Specifications

All Units

Statement of Standards: No change

Support Notes Additional guidance is given on the content and context for each unit.

National Cluster

BIOLOGY (ACCESS 3)

CLUSTER NUMBER C007 09

STRUCTURE

The following three units have been written at the Access 3 level. They are based on the three units available at the Intermediate 1 level, with the outcomes modified to meet the needs of candidates who may be achieving at Access 3.

<i>D023 09</i>	<i>Health and Technology</i>	<i>1 credit (40 hours)</i>
<i>D024 09</i>	<i>Biotechnological Industries</i>	<i>1 credit (40 hours)</i>
<i>D025 09</i>	<i>Growing Plants</i>	<i>1 credit (40 hours)</i>

It is envisaged that appropriate groups of candidates can be taught at the Intermediate 1 level using the content and suggested activities provided in the Intermediate 1 course arrangements document. Candidates can then be assessed to provide evidence of their actual level of achievement, i.e., to determine whether this is at Intermediate 1 or Access 3. Appropriate assessment material is provided through the National Assessment Bank.

In common with all courses, this coherent group of units includes 40 hours over and above the 120 hours for the component units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation and integration of learning. This time is an important element of the programme of study and advice on its use is included in the coherent group of unit details.

NOTE: The titles of the units at the Access 3 level have been kept the same as the corresponding Intermediate 1 units. The relevant content together with advice on learning and teaching can be found in the course arrangements document for Intermediate 1 Biology.

Administrative Information

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National Cluster: general information (cont)

CLUSTER Biology (Access 3)

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CORE SKILLS

This cluster gives automatic certification of the following:

Complete core skills for the cluster	None	
Additional core skills components for the cluster	Planning and Organising	Acc 3
	Using Graphical Information	Acc 3

For information about the automatic certification of core skills for any individual unit in this cluster, please refer to the general information section at the beginning of the unit.

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

SPECIAL NEEDS

This 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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT Health and Technology (Access 3)

NUMBER D023 09

CLUSTER Biology (Access 3)

SUMMARY

This unit seeks to develop knowledge and understanding, problem solving and practical abilities related to the use of technology in measuring, recording and monitoring health.

OUTCOMES

1. Handle information related to physiological measurement.
2. Carry out physiological measurements related to health and technology.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

Superclass: PE

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Additional copies of this unit specification can be purchased from the Scottish Qualifications Authority. The cost for each unit specification is £2.50 (minimum order £5).

National Unit Specification: general information (cont)

UNIT Health and Technology (Access 3)

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 Health and Technology (Access 3)

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

Handle information related to physiological measurements.

Performance criteria

- (a) Facts are used correctly in relation to physiological measurements.
- (b) Relevant information is selected and presented appropriately.
- (c) Conclusions drawn are valid.

Note on range for the outcome

Physiological measurements related to: heart, lungs, whole body.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test with items covering all the performance criteria for all of the range.

OUTCOME 2

Carry out physiological measurements related to health and technology.

Performance criteria

- (a) The procedures are followed accurately and safely.
- (b) Relevant measurements and observations are recorded in an appropriate format.

Note on range for the outcome

Physiological measurements: pulse rate, body temperature.

Evidence requirements

A checklist of the individual work of the candidate must be produced for all of the performance criteria for each technique given in the range.

National Unit Specification: support notes

UNIT Health and Technology (Access 3)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

Outcome 1

1. What is health and technology?

- i The meaning of health.
The health triangle.
The importance of a healthy lifestyle.
- ii The value of physiological measurements as indicators of health.
The advantages and disadvantages of high tech and low tech approaches to measuring temperature, body fat, blood pressure and heart rate (pulse rate).

2. A healthy heart

- i The heart and circulatory system.
The heart as a muscle which pumps blood around the body.
The three main blood vessels are arteries, veins and capillaries.
Transport function.
- ii Pulse rate as a health indicator.
Pulse rate, its measurements and the normal range of values.
Recovery time
Effect of exercise on pulse rate and recovery time.
- iii The concept of blood pressure.
Blood pressure, its measurement and average value.
Blood pressure under different conditions and its significance for health.
- iv Blood tests and cell counts.
Detection of infection and other medical conditions to include anaemia, diabetes and leukaemia.
Identification of blood groups.
Measurement of alcohol or drug concentration in the blood.

National Unit Specification: support notes (cont)

UNIT Health and Technology (Access 3)

3. Healthy lungs

- i The lungs and breathing.
Positions and parts of the breathing system.
The function of the lungs.
The effect of exercise on breathing and recovery time.
- ii The physiological measurements of the lungs.
Tidal volume, vital capacity and peak flow depend on the size, age, sex and fitness of a person.
Peak flow can be used in the diagnosis and management of asthma.
- iii Health risks and effects of smoking.

4. A healthy body

- i The importance of diet and energy balance.
The main food groups and their uses.
A healthy diet contains a balance of the three food types.
- ii The relationship between body fat and health.
Body fat, its measurement and the normal range of values of body mass.
Implications for health of being overweight or underweight.
- iii The relationship between body temperature and health.
Body temperature, its measurement and the normal range of values.
Implications for health of high and low temperatures.
- iv Exercise and the health of muscles.
The importance of regular exercise in the maintenance of the size and strength of muscles.
Muscle size and strength decrease if muscles are not exercised regularly.
- v Reaction time as an indicator of health.
Reaction time, its measurement.
Factors that can affect reaction time.
Implications for health of long reaction time.
- vi Health risks and the effects of alcohol and other drugs.

Further detail is given in the course content section of the Intermediate 1 Biology course specification.

Outcome 2

Physiological measurements suitable for this outcome are:

- pulse rate
- body temperature.

National Unit Specification: support notes (cont)

UNIT Health and Technology (Access 3)

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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Biotechnological Industries (Access 3)
NUMBER	D024 09
COURSE	Biology (Access 3)

SUMMARY

This unit seeks to develop knowledge and understanding, problem solving and practical abilities related to the applications of biology to industry.

OUTCOMES

1. Handle information related to biotechnological industries.
2. Carry out practical techniques related to biotechnological industries.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

Superclass:	RH
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National Unit Specification: general information (cont)

UNIT Biotechnological Industries (Access 3)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Core skills components for the unit	Planning and Organising	Acc 3

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 Biotechnological Industries (Access 3)

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

Handle information related to biotechnological industries.

Performance criteria

- (a) Facts are used correctly in relation to biotechnological industries.
- (b) Relevant information is selected and presented appropriately.
- (c) Conclusions drawn are valid.

Note on range for the outcome

Biotechnological industries: dairy, yeast-based, detergent, pharmaceutical.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test with items covering all the performance criteria for all of the range.

OUTCOME 2

Carry out practical techniques related to biotechnological industries.

Performance criteria

- (a) The procedures are followed accurately and safely.
- (b) Relevant measurements and observations are recorded in an appropriate format.

Note on range of the outcome

Techniques: resazurin test, yeast immobilisation, biological enzyme assay.

Evidence requirements

A checklist of the individual work of the candidate must be produced for all of the performance criteria for each technique given in the range. For PC (a) the teacher/lecturer must attest that the candidate has been involved in planning the technique, selecting appropriate resources and carrying out the task.

National Unit Specification: support notes

UNIT Biotechnological Industries (Access 3)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

Outcome 1

1. Dairy industries

- i Milk.
Milk as a food containing sugar, fats, proteins, vitamins and minerals.
Different processing treatments to produce evaporated milk, skimmed and semi-skimmed milk, pasteurised milk and UHT milk.
Microbial tests are carried out on milk to test for fitness for consumption.

- ii Yoghurt.
Bacterial cultures can be added to pasteurised milk to make yoghurt.
Making yoghurt is a method of preserving milk.

- iii Cheese
Use of rennet and bacterial cultures in the production of cheese.

- iv Environmental impact.
Potential impact on the environment of disposal of whey in rivers.
Upgrading and use of whey.

2. Yeast-based industries

- i Bread.
The use of yeast in bread dough.

- ii Beer.
The type of yeast, the temperature and the fermentation time affect the alcohol content of the beer produced.
Cask conditioned beer.
Brewery conditioned beer.

- iii Fermented milk drinks.
Produced using an enzyme and yeast.
Immobilisation technique in the production of fermented milk drinks.

- iv Flavouring and food colouring.

National Unit Specification: support notes (cont)

UNIT Biotechnological Industries (Access 3)

- v Environmental impact.
 Potential impact on the environment of disposal of waste in rivers from yeast-based industry.
 Upgrading and use of waste.

3. Detergent industries

- i Production of biological washing powders and liquids.
 Use of enzymes.
- ii Value and use of product.
- iii Environmental impact.
 Reduced fuel consumption and pollution.
 Detergents in waste water can be toxic to wildlife.
 Methods of reducing environmental impact.

4. Pharmaceutical industries

- i Antibiotics.
- ii Antifungals.

Further detail is given in the course content section of the Intermediate 1 Biology course specification.

Outcome 2

Suitable techniques for this outcome are:

- resazurin test
- yeast immobilisation
- biological enzyme assay.

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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Growing Plants (Access 3)
NUMBER	D025 09
COURSE	Biology (Access 3)

SUMMARY

This unit seeks to develop knowledge and understanding, problem solving and practical abilities related to the propagation and growth of plants.

OUTCOMES

1. Handle information related to plant propagation.
2. Carry out practical techniques related to plant propagation.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

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National Unit Specification: general information (cont)

UNIT Growing Plants (Access 3)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Core skills components for the unit	Planning and Organising	Acc 3

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 Growing Plants (Access 3)

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

Handle information related to plant propagation.

Performance criteria

- (a) Facts are used correctly in relation to plant propagation.
- (b) Relevant information is selected and presented appropriately.
- (c) Conclusions drawn are valid.

Note on range for the outcome

Plant propagation: growing plants from seed, vegetative propagation, plant production.

Evidence requirements

Evidence of an appropriate level of attainment from a closed-book test with items covering all performance criteria for all of the range.

OUTCOME 2

Carry out practical techniques related to plant propagation.

Performance criteria

- (a) The procedures are carried out accurately and safely.
- (b) Relevant measurements and observations are recorded in an appropriate format.

Note on range for the outcome

Techniques: sowing seeds, watering, pricking out, potting on, taking cuttings.

Evidence requirements

A checklist of the individual work of the candidate must be produced for all performance criteria for all of the range. For PC (a) the teacher/lecturer must attest that the candidate has been involved in planning the technique, selecting appropriate resources and carrying out the task.

National Unit Specification: support notes

UNIT Growing Plants (Access 3)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

Outcome 1

1. Growing plants from seed

- i Seed biology.
- ii Germination.
Conditions for germination.
Dormancy and its natural advantage in delaying germination.
- ii Photosynthesis as the process of food production in sunlight for growth.
- iv Growing plants from seeds.
Methods of seed sowing.
Pelleted seeds.
Pre-germinating (chitting) seed.

2. Vegetative propagation

- i Plant propagation structures.
Methods of making use of plant propagation structures.
- ii Artificial propagation.
Growing points.
Techniques of taking stem and leaf cuttings.
Methods of reducing water loss.
Layering and its advantages.
The advantages and disadvantages of heat during propagation.

3. Plant production

- i Conditions for plant growth.
Loam and loamless composts.
Properties of granular and liquid fertilisers.
Watering.
Heating and ventilation.

National Unit Specification: support notes (cont)

UNIT Growing Plants (Access 3)

- ii Plant maintenance.
The needs of mature plants.
Methods of maintaining plants.
Methods of controlling pests and disease.
Protected cultivation under glass, plastic and floating fleece.
- iii Modern production methods including genetic engineering and computer control technology.
- iv Environmental impact.

Further detail is given in the course content section of the Intermediate 1 Biology course specification.

Outcome 2

Suitable techniques for this outcome are:

- sowing seeds
- watering
- pricking out
- potting on
- taking cuttings.

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 alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).