SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Biotechnological Industries (Intermediate 1)

NUMBER D024 10

COURSE Biology (Intermediate 1)

SUMMARY

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

OUTCOMES

1 Demonstrate knowledge and understanding related to biotechnological industries.
2 Carry out practical techniques related to biotechnological industries.
3 Solve problems by an investigation related to Intermediate 1 Biology.

RECOMMENDED ENTRY

While entry is at the discretion of the centre and no previous biology experience is required, the unit would be suitable for those with an award in Standard Grade Biology, Chemistry, Physics or Science at grades 4-7.

CREDIT VALUE

1 credit at Intermediate 1.

Administrative Information

Superclass: RH

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Health and Technology (Intermediate 1)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

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 (Intermediate 1)

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 related to biotechnological industries.

Performance criteria

(a) Facts, ideas and terminology are described correctly in relation to biotechnological industries.
(b) Explanations given are supported by evidence.

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 for 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 one technique related to each of the categories in the range.

National Unit Specification: statement of standards (cont)

UNIT Biotechnological Industries (Intermediate 1)

OUTCOME 3

Solve problems by an investigation related to Intermediate 1 Biology.

Performance criteria

(a) The aims of the investigation are clearly stated.
(b) Appropriate data is identified and collected.
(c) The collected data is analysed and presented in an appropriate format.
(d) Conclusions drawn are valid.

Evidence requirements

A report of one investigation must be provided covering all of the performance criteria and related to the contents and notes specified for Intermediate 1 Biology.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from participating in solving a problem involving the candidate in planning, deciding how the activity is to be managed, identifying and obtaining the necessary resources, and carrying out the activity. Depending on the activity, the investigation may be carried out as group work.

National Unit Specification: support notes (cont)

UNIT Biotechnological Industries (Intermediate 1)

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 40 hours.

GUIDANCE ON 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, pastuerised 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.

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

National Unit Specification: support notes (cont)

UNIT Biotechnological Industries (Intermediate 1)

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.
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 course specification.

Outcome 2

The techniques required for this outcome are:

- resazurin test
- yeast immobilisation
- biological enzyme assay.

Outcome 3

An investigation related to Intermediate 1 Biology should be carried out. Data may be collected by candidates carrying out a practical investigation or it may be provided as case-study material.

Suitable examples in the context of this unit would include:

- investigate the effect of different temperatures on the raising of a flour-yeast dough
- investigate how a local biotechnological industry monitors waste disposal.

National Course Specification: support notes (cont)

UNIT Biotechnological Industries (Intermediate 1)

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Details of suitable approaches are detailed in the course specification.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcome 1 should be assessed by an integrated end of unit test with questions covering both of the performance criteria for knowledge and understanding and all of the range.

A checklist appropriate to the techniques used should be produced to cover the performance criteria for Outcome 2.

Candidates should provide a report for Outcome 3 which should be related to the performance criteria as follows:

Performance criteria	**Suggestions to aid professional judgement**
(a) The aims of the investigation are clearly stated.	Main features to be investigated are identified.
(b) Appropriate data is identified and collected.	The plan should include: • what is to be measured/collected • what (variable) is to be altered • what (variable) is to be kept constant • how many readings/measurements/observations/subjects • equipment/resources required • how data will be recorded. Collected data must be recorded in a clear table with correct headings, appropriate units and results/readings entered correctly.
(c) The collected data is analysed and presented in an appropriate format.	Data should be analysed and presented in tabular or graphical format as appropriate: • for a tabular presentation this may be an extension of the table used for PC (b) above, and must include: suitable headings and units showing averages or other appropriate computations • for a graphical presentation this must include: data presented as a histogram, bar chart, connected points, line of best fit as appropriate, with suitable scales and axes labelled with quantity and units and with data correctly plotted.
(d) Conclusions drawn are valid	Conclusions should make use of the presented evidence and could: • identify strengths and weaknesses of the investigation based on the evidence.

Re-drafting of a report after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment. Redrafting and resubmission is only required for the specific performance criterion identified in need of further attention ie the entire report does not need to be rewritten.

Candidates are only required to produce one report for Outcome 3 in relation to the contents and notes specified for Intermediate 1 Biology. This report can then be used as evidence for Outcome 3 for the other units of the course.

Conditions required to complete the report

Candidates may complete their reports outwith class time provided sufficient measures are taken to ensure that the report is the individual work of the candidate.

Teachers and lecturers may wish candidates to write up reports under their direct supervision so that they can provide appropriate advice and support. However, they may feel confident that any redrafting required need not be undertaken under such close supervision as it will be evident in the candidate's response that it is his or her unaided work. Under such circumstances it would be acceptable for such redrafting to take place outwith class time.

Use of IT

Candidates may, if they wish, present their reports in a word-processed format. Candidates may use Excel (or any other suitable data analysis software) when tackling Outcome 3. However, candidates must not be given a spreadsheet with pre-prepared column headings nor formulae, as they are being assessed on their ability to enter quantities and units into a table. The use of clip art or images captured by digital camera may also be used in recording details of experimental methods.

Transfer of evidence

Candidates, who are repeating a course, may carry forward evidence of an appropriate standard, generated in a previous year.

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).