

National Unit Specification: general information

UNIT Microbiological Techniques (Higher)

NUMBER D042 12

COURSE Biotechnology (Higher)

SUMMARY

This unit seeks to develop knowledge, understanding and practical skills in growth limitation and sterilisation, culturing and identifying micro-organisms. This is a component unit of Higher Biotechnology.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to microbiological techniques.
- 2 Carry out techniques related to microbiology.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Intermediate 2 Biotechnology
- Standard Grade Biology at Credit level
- Intermediate 2 Biology.

Administrative Information

Superclass: RH

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CREDIT VALUE

1 credit at Higher (6 SCQF credit points at SCQF 6*)

**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.*

CORE SKILLS

There is no automatic certification of core skills or core skills components in 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 Microbiological Techniques (Higher)

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 microbiological techniques.

Performance criteria

- (a) Microbiological techniques are described correctly in relation to growth limitation and sterilisation, and culturing.
- (b) The identification of micro-organisms is described correctly in terms of the Gram stain and biochemical tests.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed-book test with items covering both the above performance criteria.

OUTCOME 2

Carry out techniques related to microbiology.

Performance criteria

- (a) The preparation for work is in accordance with given specifications.
- (b) Techniques are carried out in accordance with safe practice and given specifications.
- (c) The record of work is clear and accurate.
- (d) Results and relevant observations are reported clearly.

Note on the range for the outcome

Techniques: growth limitation and sterilisation; culturing micro-organisms; identifying micro-organisms.

Evidence requirements

A checklist of the individual work of the candidate covering all of the above performance criteria for all of the range.

National Unit Specification: support notes

UNIT Microbiological Techniques (Higher)

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

a) Microbiological techniques

- 1 Growth limitation and sterilisation techniques
 - i Sterilisation and disinfection.
Comparison of autoclaving, use of dry heat and gamma irradiation.
Chemical disinfectants.
Filtration methods.
 - ii Risk assessment and coping with spillages.
The difference between hazard and risk.
Different types of risk assessment.
The principles of control measures.
Procedures for dealing with small-scale spillages of broths and containment of large scale spillages from fermenters.
- 2 Culturing techniques
 - i Media preparation and sterilisation.
Preparation of plates, slopes and broths for inoculation.
Sterilisation and pouring of media.
Suitability of media for inoculation.
Types of media.
 - ii Isolating and culturing micro-organisms.
Loop and pipette transfer of micro-organisms.
Use of selective and differential media and discrete growth characteristics to separate mixed cultures into component organisms and obtain pure cultures.
Growth conditions of a range of micro-organism.
 - iii Enumerating micro-organisms.
Total count.
Serial dilutions.
Viable count.
Plaque assay.
 - iv Preparing a bacterial lawn.
 - v Tissue culture.
Callus culture: apical meristem culture.

b) Identification of micro-organisms

- 1 Microscopy.
 - i Gram stain.
 - ii Morphology.

National Unit Specification: support notes (cont)

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- 2 Biochemical tests.
 Presence of specific micro-organisms identified using appropriate diagnostic tests.
 - i Extra cellular degradation.
 - ii Fermentation of carbohydrate.
 - iii Tests measuring other biochemical reactions.

Outcome 2

Techniques related to growth limitation and sterilisation:

- sterilise instruments, equipment and media by autoclaving
- use Browne's tubes to check sterilisation
- prepare and use disinfectants for bench swabbing, surface sterilisation and disposal
- clear up simulated spillages in accordance with an appropriate code of practice.

Techniques related to culturing micro-organisms:

- prepare media from a ready made formula and from a recipe and autoclave
- prepare plates, slopes and broths for inoculation
- isolate pure cultures given mixed cultures
- estimate viable bacterial numbers by serial dilution and plate count
- use a haemocytometer to measure total cell count of a yeast culture
- use colorimeter to measure turbidity of broth culture
- prepare a bacterial lawn.

Techniques related to identifying micro-organisms:

- identify a range of bacteria using reaction to Gram stain and morphology
- test for the presence of specific micro-organisms using a range of diagnostic tests.

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

Details of suitable approaches will be available from the National Assessment Bank.

Outcome 1

Outcome 1 for this unit is assessed by a test designed to provide evidence that the outcome and performance criteria have been achieved. The National Assessment Bank provides advice on suitable approaches.

National Unit Specification: support notes (cont)

UNIT Microbiological Techniques (Higher)

Outcome 2

Candidates are required to demonstrate competence in carrying out one technique from each of: growth limitation and sterilisation; culturing micro-organisms; identifying micro-organisms. The National Assessment Bank provides guidance on assessment of performance of these techniques in relation to the performance criteria.

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).