National Unit Specification: general information

UNIT Working with Micro-organisms (Intermediate 2)

NUMBER D039 11

COURSE Biotechnology (Intermediate 2)

SUMMARY

This unit seeks to develop knowledge, understanding and practical skills in the microbiological techniques of plate pouring, subculturing micro-organisms, sampling the environment, separating a mixed culture, staining and microscopy. This is a component unit of Intermediate 2 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 will normally be expected to have attained one of the following:

- Standard Grade Biology
- Intermediate 1 Biology.

Previous biology experience is not an absolute requirement and the course is therefore also suitable for those wishing to study biotechnology with a background in other sciences.

Administrative Information

Superclass: RH

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Version: 04

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CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF 5*)

**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 Working with Micro-organisms (Intermediate 2)

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) Work with micro-organisms is described correctly in relation to microbiological procedures.
(b) The microscopic examination of micro-organisms is described correctly in terms of microscopy and simple staining techniques.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed-book test with items covering all 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: plate pouring; subculturing micro-organisms; separating a mixed culture; staining and microscopy.

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 Working with Micro-organisms (Intermediate 2)

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 procedures

i Preparation of person.
Preparation of work space.

ii Aseptic transfer operations and reasons for each stage in the procedure.

iii Pouring plates.

iv Subculturing micro-organisms.
Loop transfer.
Streak plate inoculation.
Transfer of fungal mycelium.

v Separating micro-organisms.

b) Microscopy

i Microscopic examination of micro-organisms.
Parts and functions of the light microscope.
Calculation of total magnification.

ii Simple staining techniques.
The processes of fixing and staining leading to the examination of dead micro-organisms.
Use of vital stains.

Further detail is given in the supplementary notes in the course content section of the course specification.

Outcome 2

Suitable learning activities for this outcome include:

- prepare work space: use Benchkote or similar if necessary, swab surface with a suitable disinfectant, set out materials and equipment in an organised fashion
- bring agar to pouring temperature, pour plates, label and store
- examine poured plates for contamination
- loop transfer of micro-organisms: solid to solid; solid to liquid; liquid to solid; liquid to liquid
- streak plate inoculation
- transfer block of agar containing fungal mycelium from plate to plate using a sterile scalpel
- use a swab to sample the environment and plate out

- streak out a mixed bacterial broth culture of two bacteria to produce individual colonies
- examine fresh material under bright and dark field illumination (and phase contrast if available)
- examine prepared specimens (including oil immersion if available)
- examine photomicrographs of micro-organisms taken with electron microscopy and phase contrast
- calculate magnification and specimen size
- use simple stains to examine a range of micro-organisms to show the variety of shapes and structures
- stain cultures of fungi and bacteria with, eg methylene blue and carbol fuchsin
- stain smears of yoghurt with nigrosin to visualise bacteria
- stain smears of root nodules with carbol fuchsin for *Rhizobium*.

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

Outcome 1 for this unit is assessed by a test designed to provide evidence that the outcome and performance criteria have been achieved.

Outcome 2

Candidates are required to demonstrate competence in carrying out the following techniques: pouring plates; subculturing micro-organisms; separating a mixed culture; staining and microscopy.

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).