National Unit Specification: general information

UNIT Microbiology for Healthcare: An Introduction

NUMBER DC4H 11

COURSE

SUMMARY

This unit seeks to develop knowledge, understanding, practical skills and problem solving skills in relation to basic microbiology that is particularly related to human health. It is designed for staff working within or towards a career in the health care sector.

OUTCOMES

1. Demonstrate knowledge and understanding in relation to the classification, structure and replication of key micro-organisms.
2. Solve problems related to the growth, culture requirements and control of key micro-organisms.
3. Carry out techniques related to microbiology.
4. Report on inter-relationships between humans and micro-organisms.

RECOMMENDED ENTRY

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

- Standard Grade Biology with Knowledge and Understanding and Problem Solving at a minimum of Grade 4;

or

- Intermediate 1 Biology.

Administrative Information

Superclass: RH

Publication date: August 2008

Source: Scottish Qualifications Authority

Version: 02

National Unit Specification: general information (cont)

UNIT Microbiology for Healthcare: An Introduction

CREDIT VALUE
1 credit at Intermediate 2 (8 SCOTCAT points at SCQF level 5*).

**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 Microbiology for Healthcare: An Introduction

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 in relation to the classification, structure and replication of key micro-organisms.

Performance criteria
a) The classification of micro-organisms is identified correctly.
b) The structure of micro-organisms is described correctly.
c) The replication of micro-organisms is described correctly.

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 growth, culture requirements and control of key micro-organisms.

Performance criteria
a) Relevant information is selected and presented appropriately.
b) Information is accurately processed.
c) Conclusions drawn are valid.

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

OUTCOME 3
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 practices.
c) The record or work is clear and accurate.
d) Results and relevant observations are reported.

National Unit Specification: statement of standards (cont)

UNIT Microbiology for Healthcare: An Introduction

Note on range for the outcome
Techniques: aseptic technique; growing micro-organisms; disinfection.

OUTCOME 4
Report on inter-relationships between humans and micro-organisms.

Performance criteria
a) The information is collected by using appropriate sources.
b) Relevant information is selected and presented in an appropriate format.

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 an integrated closed book test with items covering all of the above performance criteria. The test must have a maximum of 40 marks and should be 1 hour duration. A total of 24 marks should be allocated to Outcome 1 and 16 marks to Outcome 2. The test must include items related to the following four classes of micro-organism: bacteria; fungi; protozoa; viruses. Candidates attaining a minimum score of 26 will be deemed to have achieved both outcomes.

Outcome 3
Outcome 3 will be assessed by direct observation of candidates carrying out the required techniques. Assessors should record candidate performance using a checklist and a record sheet.

Outcome 4
One report of approximately 1500 words, covering all of the above performance criteria, of a research activity into the inter-relationships between humans and specified micro-organisms, is required. The report must include one benefit of micro-organisms to human health. It must also include harmful effects on human health of one example from one of the following four classes of micro-organism: bacteria; viruses; fungi; and protozoa. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in the research activity.

National Unit Specification: support notes

UNIT Microbiology for Healthcare: An Introduction

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 THE CONTENT AND CONTEXT FOR THIS UNIT

Outcome 1

a) The classification of micro-organisms is identified correctly.

i) Groups: Prokaryotes including bacteria, Eukaryotes including fungi and protozoa and viruses.
ii) Characteristic shapes of bacteria: cocci; rods; spiral.
iii) Gram-positive; gram-negative bacteria.
iv) Yeasts and filamentous fungi.

b) The structure of micro-organisms is described correctly.

i) Bacteria: lack of an organised nucleus; ring of DNA; cell wall; external capsule; flagella; plasmids; formation of endospores.
ii) Viruses: non-cellular structure; DNA/RNA core surrounded by protein coat; envelope.
iii) Fungi: cellular structure of fungi as exemplified by yeast; multinucleate cytoplasm of hyphal fungi as exemplified by Penicillium.
iv) Protozoa: cellular structure.

c) The replication of micro-organisms is described correctly.

i) Bacteria: asexual reproduction by binary fission; conjugation.
ii) Viruses: entry into host cell; virus DNA controlling cellular assembly processes; production and release of virus particles.
iii) Fungi: asexual reproduction by budding; asexual reproduction by spore bearing structures arising from mycelium.
iv) Protozoa: reproduction by binary fission.

Outcome 2

i) Nutrient requirements.
ii) Temperature.
iii) Oxygen concentration.
iv) pH.
v) Culture media: agar; broth; transport media.
vi) Theory of viral culture methods.
vii) Methods of sterilisation: dry heat; moist heat; radiation; filtration.
viii) Disinfection: cidal and static treatments.
ix) The use of antibiotic discs to illustrate susceptibility of micro-organisms to antibacterial agents.
x) Bacterial resistance: R factor; enzyme production.

National Unit Specification: support notes (cont)

UNIT Microbiology for Healthcare: An Introduction

Outcome 3

For each of the techniques: aseptic technique, growing microorganism and disinfection each of the following apply:

i) The preparation for work is in accordance with given specification.
ii) Techniques are carried out in accordance with safe practices.
iii) The record or work is clear and accurate.
iv) Results and relevant observations are reported.

Outcome 4

i) The benefits of micro-organisms on human health for example:
   - Commensal organisms.
   - Vaccines: live; attenuated; killed; genetically engineered.
   - Immunoglobulins.

ii) The harmful effects of bacteria on human health.
iii) The harmful effects of viruses on human health.
iv) The harmful effects of fungi on human health.
v) The harmful effects of protozoa on human health.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of micro-biology is most effective when concepts, principles, and theories are set in a relevant context e.g. by making reference to applications of micro-biology 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. Student-centred practical exercises should be incorporated when appropriate to reinforce teaching, including:

Outcome 1: Use of Methylene blue and Gram's stains
Outcome 3: Environmental monitoring
Culture techniques – preparation of work area; sub-culturing
Investigation of nutrient requirements; effect temperature; effective of pH.

It is suggested that for Outcome 4, students should be directed to appropriate sources to enable them to access information to prepare a report.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

It is recommended that Outcome 1 and 2 are assessed by a single closed book test of 1 hour duration with a cut off score of 60%.

National Unit Specification: support notes (cont)

UNIT Microbiology for Healthcare: An Introduction

For Outcome 4 a recommended structure for the report could be:

a. Title
b. Contents page
c. Introduction
d. Content: You should include a section of approximately 500 words on the benefits of micro-organisms to human health. You should include one example from one of the following key types of micro-organism: (bacteria; viruses; fungi; and protozoa) and their effects on human health.
e. Bibliography

You should use a minimum of 4 reference sources, these could include: texts, journals and websites.

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).