



Higher National Unit Specification

General information

Unit title: Microbiology of Foods 1 (SCQF level 7)

Unit code: F6VL 34

Superclass: NH

Publication date: June 2019

Source: Scottish Qualifications Authority

Version: 02

Unit purpose

This unit is designed to enable learners to describe the different main groups of microorganisms and explain their importance to the food industry. The unit also introduces learners to some of the practical skills required in the microbiology laboratory.

Outcomes

On completion of the unit the learner should be able to:

- 1 Describe the main groups of microorganisms and explain their roles in the food industry.
- 2 Perform aseptic microbiological techniques and evaluate the growth of microorganisms under various conditions.

Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Recommended entry to the unit

Access to this unit will be at the discretion of the centre. However, it would be beneficial if learners had completed a science subject. This could be achieved through units in Biology or Chemistry at SCQF level 6, or the HN Unit F6VB 33 *Science for the Food Industry: An Introduction*.

Higher National Unit Specification: General information (cont)

Unit title: Microbiology of Foods 1 (SCQF level 7)

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the support notes for this unit specification.

There is no automatic certification of Core Skills or Core Skill components in this unit.

Context for delivery

If this unit is delivered as part of a group award, it is recommended that it should be taught and assessed in the subject area of the group award to which it contributes. This unit is a mandatory unit in the HNC in Food Science and Technology and the PDA in Food Science. It can also be delivered as a stand-alone unit.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>)

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit Specification: Statement of standards

Unit title: Microbiology of Foods 1 (SCQF level 7)

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 SQA.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the main groups of microorganisms and explain their roles in the food industry.

Knowledge and/or skills

- ◆ Cell structure and function
- ◆ Morphology
- ◆ Reproduction/replication
- ◆ Roles of microorganisms in food safety and in the food industry

Outcome 2

Perform aseptic microbiological techniques and evaluate the growth of microorganisms under various conditions.

Knowledge and/or skills

- ◆ Correct use of laboratory equipment
- ◆ Safe and aseptic performance of laboratory techniques
- ◆ Data analysis and calculation of results

Higher National Unit Specification: Statement of standards (cont)

Unit title: Microbiology of Foods 1 (SCQF level 7)

Evidence requirements for this unit

Learners will need to provide evidence to demonstrate their knowledge and/or skills across all outcomes by showing that they can:

- ◆ describe, using diagrams where appropriate, the cell structure and explain functions, identify the different morphologies and describe the reproduction/replication cycles of bacteria, yeasts, moulds, protozoa, algae and viruses.
- ◆ give a valid example to illustrate the role of each of the six types of microorganisms in the food industry. In each case, the example should be accompanied by a reason to explain their role in the food industry.

Learners should carry out three practical laboratory exercises on the growth of microorganisms using different microbiological techniques. The exercises should be carried out aseptically and in accordance with approved standards.

Learners should prepare and set up equipment in an appropriate manner for each piece of laboratory work. They should demonstrate suitable practical techniques in accordance with prevailing safety requirements in the laboratory. They should draw conclusions on the effect of the growth of microorganisms from the results of the practical work. These conclusions should be related to the food industry.

Learners should be observed while undertaking the three practical laboratory exercises and a record should be kept of this observation. Learners should also keep records of the results of each practical exercise and analyse the data generated.



Higher National Unit Support Notes

Unit title: Microbiology of Foods 1 (SCQF level 7)

Unit support notes are offered as guidance and 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

This unit is a mandatory unit in the HNC in Food Science and Technology and the PDA in Food Science. It introduces learners to basic microbiology theory and practical skills in the context of food safety and manufacture. It will also help prepare learners for employment in a biological science related post. This unit is an applied unit.

Learners undertaking this unit will find it beneficial to have some prior scientific knowledge. This can be achieved through the completion of suitable units in biology or a related science at SCQF level 6. It is possible, however, that some learners may not have previously studied science at SCQF level 6 and in this situation can take the HN Unit F6VB 33 *Science for the Food Industry: An Introduction*, which will prepare them for this SCQF level 7 unit.

It is important that learners appreciate the reason why the study and practice of microbiology is vitally important in food manufacturing. A key part of the unit is to provide learners with an understanding of the vocabulary of microbiology, which will enable them to have meaningful discussion with specialists in an industrial context.

Learners are expected to apply their knowledge and understanding of microbiology and associated laboratory techniques to food processing and the food industry throughout the unit.

The unit will help learners to become familiar with some of the microbiological techniques which are used in the food industry and of the importance of following proper procedures in the laboratory. Learners should be made fully aware of the importance of safe working practices and the precautions that should be taken to ensure that these are achieved. They should recognise the need to obtain accurate results and the consequent requirement to conduct and record experiments carefully and according to the relevant procedures.

They will be expected to keep a record of their observations and results, including calculations where necessary, and interpretation of the results. At the completion of the unit, learners should feel confident about performing routine experiments.

Higher National Unit Support Notes (cont)

Unit title: Microbiology of Foods 1 (SCQF level 7)

For Outcome 1, the following types of microorganisms can be covered: bacteria, yeasts, moulds, protozoa, algae and viruses. In each case, learners should be able to describe the cell structure and explain the function of the various organelles, describe the differing morphologies and reproduction/replication cycles of the microorganisms. They should also be able to give an example of each microorganism, which is relevant to the food industry. It is insufficient to provide an example on its own and learners would be expected to relate the example to a suitable context relevant to the food industry, and explain why the example is important.

For Outcome 2, the analysis of microorganisms is undertaken through laboratory based practical exercises. For this unit, laboratory work should focus on the growth of microorganisms. Learners should develop suitable laboratory skills, such as the use of a microscope to examine wet preparations; the preparation of simple and differential stained slides; aseptic transfers; use of a pipette; inoculation of solid and liquid media.

The techniques required to work in a microbiology laboratory in the food manufacturing industry include:

- ◆ Safety — use of aseptic technique
- ◆ Microscopy — morphology of bacteria, yeasts and moulds
- ◆ Staining techniques — simple staining, Gram staining, endospore staining
- ◆ Sub culturing techniques — pipetting, serial dilutions, inoculations, streaking out and spreading plates
- ◆ Incubation techniques — temperature, gaseous environment, pH
- ◆ Disposal — cultures, slides, samples

Learners should be made thoroughly aware of the critical importance of health and safety, including Personal Protective Equipment (PPE) in a laboratory and be able to take all appropriate precautions to ensure that an appropriate environment is maintained. They should draw conclusions from their practical work, which are related to the food industry.

Guidance on approaches to delivery of this unit

Delivery should aim to help learners apply the content in the unit to the food industry. It should also build laboratory skills so that learners can approach laboratory work confidently. Delivery should aim to integrate the practical laboratory elements with the taught elements of the unit where possible.

Learners should be encouraged to take responsibility for their own learning and may be able to research for themselves some of the ways in which microbiology applies in the food industry. This could help to integrate different parts of the HNC in Food Science and Technology as learners should be able to recognise, for example, the ways in which the growth and/or inhibition microorganisms affect the methods used for processing food.

Higher National Unit Support Notes (cont)

Unit title: Microbiology of Foods 1 (SCQF level 7)

Guidance on approaches to assessment of this unit

Assessment for this unit involves both practical work and explanation. Learners should be observed during some of their practical work and the observation should be recorded on a checklist (photographic and/or video evidence could be used to supplement the checklist). This will provide evidence that learners have followed proper laboratory procedures and carried out the work safely and accurately. If necessary, the observation checklists may be supplemented by additional questions. Learners must provide information on the results of practical work which could be done through a laboratory log book. Learners must be able to analyse and explain their results.

Explanation can be provided in a number of ways and assessors could choose to vary the methods to suit different groups of learners. Learners could provide a report for example which they could prepare in their own time. This report could be based on a series of open questions which may help learners to structure their responses. Another option is to ask learners to give a presentation.

The evidence should include referencing where appropriate. Again, learners could be given some open questions to help them structure their work. Learners could make use of software (such as PowerPoint) or they could develop a poster-based presentation. Whatever method is used, assessment judgments should be based on the explanation of microbiological terms and not the facility with which the learner uses the method of explanation.

For all assessment evidence, learners could be asked questions to supplement evidence provided in another form. There may be scope, depending on the way assessment evidence is generated, for learners to gather all their evidence in a portfolio which they can build as they progress through the unit.

Assessment guidelines for the unit

Learners could present evidence in a number of ways to show that they can describe the different types of microorganisms. This could take the form of a short report, an oral or poster presentation. The learners should include the roles of the microorganisms in the food industry. The evidence should include referencing where appropriate.

An observation checklist can be used to record the observation of practical work and it can cover items such as practical aseptic technique and safe laboratory practice. Photographic and/or video evidence could be used to supplement the checklist. Learners could provide information of the results of each laboratory exercise by keeping a laboratory workbook. Data generated in the practical work should be analysed by the learner. Learners could be asked questions about the work they have done to supplement the observation checklist and the information on results.

Higher National Unit Support Notes (cont)

Unit title: Microbiology of Foods 1 (SCQF level 7)

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

Communication: Written Communication (Writing) at SCQF level 5

As part of their assessment work for this unit, learners are expected to maintain details of practical work. This can be done in a laboratory log book or diary and learners will be expected to organise the content into a logical and effective structure. Learners will, use written evidence to demonstrate their knowledge and understanding of relevant ideas and information. Learners can also be asked to write up their practical work in a report style, which can replicate that used in industry. In these cases, learners are expected to make sure that the report meets its intended purpose, by using a format and layout appropriate to an industrial readership.

Learners also have the opportunity develop communication skills in the assessment for Outcome 1, which may take the form of an oral presentation.

History of changes to unit

Version	Description of change	Date
02	Unit content has been transferred to a new shell and typographical amendments made to wording throughout.	03/06/19

© Scottish Qualifications Authority 2008, 2019

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Business Development and Customer Support team, telephone 0303 333 0330.

General information for learners

Unit title: Microbiology of Foods 1 (SCQF level 7)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

This is a mandatory unit in the HNC in Food Science and Technology and PDA in Food Science. It is designed to provide you with a basic knowledge and understanding of microbiology. This underpins all aspects of the food industry and is something that you will make use of throughout your whole course. It applies particularly to the food processing units but you will find applications of microbiology in many other parts of the courses too.

The unit is important also because it gives you the understanding and vocabulary that you will need when you take up employment in the food industry. This will enable you to discuss what happens to food and the effects that this may have on consumers as well as on food manufacturers. You will study aspects of six different kinds of microorganisms: bacteria, yeasts, moulds, protozoa, algae and viruses. In each case, you will also be expected to give examples to show how they are relevant and important to the food industry. As well as giving you some background in scientific concepts and understanding, the unit enables you to develop skills in laboratory work. Again, these are skills that can be critical to the successful operation of organisations in the food industry.

In this unit, you will concentrate particularly on laboratory techniques relating to the growth of microorganisms. After completing the unit, you will have a good understanding of microbiology theory and practice, and be well aware of its relevance to the food industry.

The assessment for the unit will require you to show that you can accurately explain the different types of microorganisms. You will also have to successfully complete practical laboratory work. You will be observed while you are doing your laboratory work and will have to keep records of work that you have done. You will also have to draw conclusions relating to the food industry from the results.

This unit will develop your skills and understanding of microbiology and the relevance of microorganisms in food production. Other skills developed will include presentation and communication skills and practical laboratory based skills including aseptic techniques.