Higher National Unit specification

General information for centres

Unit title: Microbiology of Foods 2

Unit code: F6VM 34

Unit purpose: This Unit is designed to enable candidates to investigate and explain the effects of different factors on the growth and multiplication of micro-organisms such as antimicrobial agents, radiations, competition and metabiotic effect. The Unit also enables candidates to develop their existing laboratory skills.

On completion of the Unit the candidate should be able to:

1 Analyse the effects of chemical and physical factors on the growth, multiplication and survival of micro-organisms.
2 Perform microbiological techniques including enumeration.

Credit points and level: 1 HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. However, it would be beneficial if candidates had completed F6VL 34 *Microbiology of Foods 1*.

Core Skills: There are opportunities to develop the Core Skills component of *Communication:* Written Communication (Writing) at SCQF level 5 and *Numeracy* (Using Number) at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

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 part of the HNC/HND Food Science and Technology. It is closely linked to the HN Unit F6VL 34 *Microbiology of Foods 1* and can be taught and assessed in conjunction with this Unit.

Assessment: The assessment for this Unit consists of a number of laboratory reports based on practical exercises and related analysis of the effects of micro-organisms on food manufacture. These reports will enable candidates to demonstrate that they have the necessary practical skills and that they have acquired the underpinning knowledge and understanding needed to analyse and evaluate the behaviour of micro-organisms and the importance of this in food manufacture. An observation checklist can be used to record the achievement of practical skills such as safe laboratory practice. Candidates could gather all their reports into a portfolio which would contain all the assessment evidence for the Unit.

Higher National Unit specification: statement of standards

Unit title: Microbiology of Foods 2

Unit code: F6VM 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Please refer to *Knowledge and/or Skills for the Unit* and *Evidence Requirements for the Unit* after the Outcomes.

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. Candidates 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

Analyse the effects of chemical and physical factors on the growth, multiplication and survival of micro-organisms

Knowledge and/or Skills

- Effects of physical and chemical factors on the growth, multiplication and survival of micro-organisms
- Effects of micro-organisms on food

Outcome 2

Perform microbiological techniques including enumeration

Knowledge and/or Skills

- Correct use of laboratory equipment
- Safe performance of laboratory techniques
- Viable counts and total counts
- Data analysis and calculation of results

Higher National Unit specification: statement of standards (cont)

Unit title: Microbiology of Foods 2

Evidence Requirements for the Unit

Candidates will need to provide written/oral and practical evidence to meet all the Knowledge and/or Skills items by showing that they can:

- analyse the effect of **three** different factors on microbial growth, multiplication and survival: the factors should be selected from antimicrobial agents, radiations, competition and metabiotic effect
- give accurate examples to illustrate the effect of microbial growth, multiplication and survival to the food industry: in each case, the example should be accompanied by a reason to explain the effect within the food industry

Candidates should carry out **three** practical laboratory exercises using different microbiological techniques related to assessing the spoilage potential of foods and promoting beneficial growth in micro-organisms. The exercises should be carried out aseptically and in accordance with approved standards.

In addition, they should also:

- perform aseptically one total count technique on a given sample in accordance with an acceptable industry method
- perform aseptically two different viable counts on given samples in accordance with an acceptable industry method: each of the two counts must use a different method selected from pour plate, most probable number, membrane filtration
- draw valid conclusions from an evaluation of the data obtained from the performance enumeration techniques

Candidates should prepare and set up equipment in an appropriate manner for each piece of laboratory work. They should deploy suitable practical techniques in accordance with prevailing safety requirements in the laboratory and ensure that their work produces accurate results. To ensure that candidates meet these requirements, they should be observed on at least **four** occasions, at least **one** of which should be when undertaking a count technique. A record should be kept of each observation. Candidates should also keep records of the results of each practical exercise.

Candidates should also provide **one** laboratory report on the practical laboratory exercise using a count technique. This report should be presented in a suitable format and include suitable data and evaluation. The evidence should include referencing and sources of errors where appropriate. The evaluation should be based directly on the data and candidates should draw reasoned conclusions from the data they have collected.

Higher National Unit specification: statement of standards (cont)

Unit title: Microbiology of Foods 2

Assessment Guidelines for the Unit

Candidates could present evidence in a number of ways to show that they can explain the effects of physical and chemical factors on micro-organisms. They could be asked to produce a short report, for example, or asked to prepare a presentation perhaps using suitable software or posters.

An observation checklist can be used to record the observation of practical work and it can cover items such as practical skills deployed and safe laboratory practice. Candidates could provide information of the results of each laboratory exercise by keeping a laboratory logbook. Candidates could be asked questions about the work they have done to supplement the observation checklist and the information on results.

The format for the laboratory report could include:

- Title and date
- Introduction including relevant theory
- Materials and method
- Results including calculations
- Discussion including analysis and conclusions
- References
- Appendices (where appropriate)

Administrative Information

Unit code: F6VM 34

Unit title: Microbiology of Foods 2

Superclass category: NH

Original date of publication: August 2008

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

Higher National Unit specification: support notes

Unit title: Microbiology of Foods 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 the content and context for this Unit

This Unit is part of HNC/HND Food Science and Technology. It is closely linked to the HN Unit F6VL 34 *Microbiology of Foods 1* and develops and extends the microbiology theory and practical skills related to food manufacture which are introduced in that Unit. Both Units will help prepare candidates for employment in a biological science related post. Candidates should have completed, or be in the process of completing, F6VL 34 *Microbiology of Foods 1* before embarking on this Unit.

The two Units are both applied Units. Candidates are expected throughout this Unit to apply their knowledge and understanding of microbiology and associated laboratory techniques to food processing and the food industry. It is important that candidates appreciate the reason why the study and practice of microbiology is vitally important in food manufacturing.

Candidates attempting this Unit should have prior knowledge of Microbiology which they can gain through F6VL 34 *Microbiology of Foods 1*.

The Unit will help candidates to develop their skills and awareness of the microbiological techniques used in the food industry. It will also reinforce for them the importance of following proper procedures in the laboratory. Throughout, candidates should be reminded of the importance of safe working practices and the precautions that should be taken to ensure that these are achieved. They should remember, and put into practice, the need to obtain accurate results and the consequent requirement to conduct experiments carefully and according to the relevant procedure. They will be expected also to keep a record of their observations and results including calculations where necessary and interpretation of the results. At the completion of the Unit, candidates should feel confident about performing a wide range of experimental techniques in microbiology.

In Outcome 1, the physical factors would include environmental factors. The factors which influence the growth, multiplication and survival of micro-organisms with respect to food technology can include:

- Antimicrobial agents
- Radiations
- Competition
- Metabiotic effect

Higher National Unit specification: support notes (cont)

Unit title: Microbiology of Foods 2

In Outcome 2, the analysis of micro-organisms is undertaken through laboratory based practical exercises. Candidates should develop the laboratory skills that they used in F6VL 34 *Microbiology of Foods 1* (such as the use of microscope and other equipment) and techniques (such as the preparation of simple and differential stained slides). The techniques required to work in a microbiology laboratory in the food manufacturing industry relevant to this Unit include:

- Safety — use of aseptic technique
- Microscopy — bacteria, mould and yeast
- Morphology of protozoa, algae and viruses
- Spoilage potential of foods
- Growth of beneficial organisms

Total count techniques can include counting chamber and spectrophotometry; while viable count techniques could be pour plate, most probable number and membrane filtration.

Candidates should be made thoroughly aware of the critical importance of health and safety in a laboratory and be able to take all appropriate precautions to ensure that an appropriate environment is maintained.

Guidance on the delivery and assessment of this Unit

Delivery should aim to help candidates apply the material in the Unit to the food industry. Learning activities should be able to take advantage of the experience that candidates have gained from F6VL 34 *Microbiology of Foods 1*. The practical laboratory work for this Unit, for example, can build on the laboratory skills that candidates have developed in F6VL 34 *Microbiology of Foods 1*. Delivery for this Unit, therefore, could seek to enhance the capability and confidence which candidates have already gained through F6VL 34 *Microbiology of Foods 1*.

Candidates 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 may enable them also to take forward expertise and understanding which they have gained from F6VL 34 *Microbiology of Foods 1*. In this way, delivery can contribute to the integration of the whole HNC/HND in Food Science and Technology. Candidates who take this Unit may well have completed Units in Food Processing and should be in a strong position to appreciate, and find examples of, the ways in which micro-organisms affect the methods used for processing food.

Assessment for this Unit involves both practical work and explanation. Explanation can be provided in a number of ways and assessors could choose to vary the methods to suit different groups of candidates. Candidates could provide a report for example which they could prepare in their own time. This report could be based on a series of questions which may help candidates to structure their responses. Another option is to ask candidates to give a presentation. Again candidates could be given some questions to help them structure their work. Candidates could make use of software (such as PowerPoint) or they could develop a poster based presentation. The evidence should include referencing and sources of errors where appropriate.

Assessment judgments should be based on the explanation of micro-biological terms, and not the facility that the candidate used to outline the explanation.

Higher National Unit specification: support notes (cont)

Unit title: Microbiology of Foods 2

Candidates 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 candidates have followed proper laboratory procedures and carried out the work safely and accurately. If necessary, the observation checklists may be supplemented by additional questions. Candidates must provide information on the results of practical work which could be done through a laboratory log book. They must also provide a laboratory report in a suitable format on a laboratory exercise using a count technique. The format should allow candidates to present and evaluate their results but any accepted format would be suitable.

Candidates could gather all their evidence in a portfolio which they can build as they progress through the Unit.

Opportunities for developing Core Skills

***Communication*: Written Communication (Writing) at SCQF level 5**

As part of their work for this Unit, candidates are expected to maintain details of experimental work in a laboratory logbook. They are also expected to provide one full laboratory report which will require them to present and analyse information from practical work they have undertaken. This will require them to organise their information into a logical structure, divide it into suitable sections and to make sure that all parts of the report link together. They will be expected to use a format appropriate to a laboratory report and communicate in a manner appropriate to a scientific audience.

***Numeracy* (Using Number) at SCQF level 5**

As part of the practical work for this Unit, candidates are required to carry out practical work using enumeration techniques. They are expected to undertake calculations on the data they obtain and to evaluate the results in the light of these calculations. This will involve quantitative data over a range and candidates will be required to decide what numerical operations are to be carried out and the order in which to do them.

Open learning

This Unit could be delivered by Open Learning. However, candidates must be able to undertake practical laboratory work under supervised conditions, something which may be time-consuming and difficult to organise. If suitable arrangements can be made, they would have to cover assessment and quality assurance.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

General information for candidates

Unit title: Microbiology of Foods 2

This Unit is part of the HNC/HND in Food Science and Technology. It follows on from the Unit *Microbiology of Foods 1* and is designed to enable you to further develop your knowledge, understanding and practical skills. You will already be aware from your study of *Microbiology of Foods 1* that micro-organisms are critical to all aspects of the food industry and can impact on consumers and manufacturing. This Unit is important (for the same reasons as *Microbiology of Foods 1*) because it gives you the 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.

This Unit is about the effects of physical and chemical factors on the growth and survival of the different types of micro-organisms that you studied in *Microbiology of Foods 1*. In the same way as you did in the previous Unit you will also be expected to give examples relevant to the food industry.

This Unit enables you to develop your laboratory skills, including important count techniques. This will give you a wider range of skills and enhance your capabilities in food science. After completing the Unit you will have built up a sound understanding of microbiology theory and practice and will be well aware of how it applies in the food industry.

The assessment for the Unit will require you to show that you can accurately explain the effects of physical and chemical factors on the growth and survival of different types of micro-organisms. 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. For this Unit, you will also have to complete a laboratory report on your work on a count technique. This report will include an evaluation of your results.

You will have succeeded in meeting all the requirements of this Unit if you pass the assessments.