Higher National Unit specification

General information for centres

Unit title: Science for the Food Industry: An Introduction

Unit code: F6VB 33

Unit purpose: This Unit is designed to provide candidates with the theoretical and practical scientific knowledge and understanding which underpins food technology.

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

1 Explain the cellular nature of food.
2 Explain basic scientific concepts applicable to food technology.
3 Perform basic laboratory techniques.

Credit points and level: 1 HN credit at SCQF level 6: (8 SCQF credit points at SCQF level 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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. This Unit is suitable for candidates with no prior knowledge of science.

Core Skills: There are opportunities to develop the Core Skills component of *Communication:* Written Communication (Writing) at SCQF level 4 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 in Food Science and Technology. It is intended for candidates who have not previously completed Units in a scientific subject at SCQF level 6. It will prepare candidates for the Units, F6VD 34 *Food Composition* and F6VL 34 *Microbiology of Foods 1*, both of which are mandatory in the HNC in Food Science and Technology.

Assessment: Candidates will be expected to demonstrate their knowledge and understanding by explaining scientific concepts and relate them, where appropriate, to the food industry. They could do this by responding to specific questions. For the practical part of the Unit, they will be expected to carry out experiments and record the results of them in a suitable format, possibly in a laboratory logbook. In addition, observation checklists are used to ensure that experimental work is carried out safely and accurately. Candidates may gather their evidence for all Outcomes together in a portfolio.

Higher National Unit specification: statement of standards

Unit title: Science for the Food Industry: An Introduction

Unit code: F6VB 33

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

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

Explain the cellular nature of food

Knowledge and/or Skills

- Plant and animal cells
- Cell structure in relation to function
- Respiration, photosynthesis and osmosis

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- explain the cell structure of a plant and animal cell: the explanation should cover the function of nucleus, cytoplasm, chloroplast, cell membrane and cell wall and should include a correctly labelled diagram of each cell
- explain respiration, photosynthesis and osmosis: the explanation should outline what each involves and should include an illustrative example related to the food industry

Assessment Guidelines

Candidates could be asked to generate evidence by giving responses to specific questions. These could be presented in the form of a short report or in another suitable presentation format. This work could be combined with the evidence for Outcomes 2 and 3 and presented in a portfolio.

Higher National Unit specification: statement of standards (cont)

Unit title: Science for the Food Industry: An Introduction

Outcome 2

Explain basic scientific concepts applicable to food technology

Knowledge and/or Skills

- Structure of molecules and compounds
- Properties of compounds
- Carbon compounds
- Functional groups and homologous series
- Solutions and colloidal suspensions
- Acidity and alkalinity
- Heat

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- explain one structure of a molecule and one structure of a compound: the explanation should refer to different types of bonding and to the Periodic Table
- explain one property of a compound: the property should be selected from melting point, boiling point and hardness/softness
- explain two carbon compounds: the compounds should be selected from alkanes, alkenes, alkanols, akanals, alkones, alkanoic acids or esters
- explain one functional group: the functional group should be selected from hydroxyl, carbonyl, carboxyl and amino
- explain one solution and one colloidal suspension: the colloidal suspension should be chosen from sols, gels or emulsions
- explain acidity and alkalinity with reference to the pH scale
- explain heat by giving one example of a change of state and one example of heat transfer: the example of change of state should be taken from latent heat, boiling and melting point or specific heat capacity and the example of heat transfer should be taken from conduction, convection or radiation

In each case, the explanation should refer to a relevant example related to food technology. Explanations should be scientifically accurate and, where appropriate, should make use of relevant formulae.

Assessment Guidelines

Candidates could be asked to generate evidence by giving responses to specific questions. These could be presented in the form of a short report or in another suitable presentation format. This work could be combined with the evidence for Outcomes 1 and 3 and presented in a portfolio.

Higher National Unit specification: statement of standards (cont)

Unit title: Science for the Food Industry: An Introduction

Outcome 3

Perform basic laboratory techniques

Knowledge and/or Skills

- Follow instructions for an experiment
- Safe working practices in a laboratory
- Precise results
- Reporting of results

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can perform 2 laboratory experiments accurately and record the results in a suitable format. Records should include:

- all relevant results, including correct calculations where appropriate
- a summary of conclusions drawn from the results, including sources of error

Candidates should prepare and set up equipment in an appropriate manner for each experiment. They should deploy suitable practical techniques in accordance with prevailing safety requirements in the laboratory and ensure that their work produces accurate results. Candidates should be observed on both occasions and a record should be kept of the observation.

Assessment Guidelines

Candidates can present the evidence of their practical work in a laboratory logbook. An observation checklist can be used to record the achievement of practical skills such as safe laboratory practice. Candidates could be asked questions about the work they have done to supplement the observation checklist and the recording of analyses.

The work for this Outcome could be incorporated into a portfolio of work which also includes evidence for Outcomes 1 and 2.

Administrative Information

Unit code: F6VB 33

Unit title: Science for the Food Industry: An Introduction

Superclass category: NH

Original date of publication: August 2008

Version: 02

History of changes:

Version	Description of change	Date
02	Titles of Units F6VD 34 and F6VC 34 amended by removal of numeral 1 in line with QDT agreement.	26/04/10

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: Science for the Food Industry: 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

This Unit is intended to provide candidates with the scientific background which underpins the HNC in Food Science and Technology. It is intended for candidates who have not previously completed Units in chemistry or a related science at SCQF level 6. It will prepare candidates for Units in the HNC Food Science and Technology, such as F6VC 34 *Food Analysis* and F6VL 34 *Microbiology of Foods 1*.

The Unit is both theoretical and practical. Candidates are introduced to basic scientific concepts from chemistry, biology and physics but they are also required to undertake some laboratory work. This theoretical and practical foundation will help them develop suitable knowledge, understanding, skills and techniques which they can develop in the HNC Food Science and Technology particularly in Units such as F6VL 34 *Microbiology of Foods 1*, F6VM 34 *Microbiology of Foods 2* and F6VC 34 *Food Analysis*.

When carrying out laboratory work candidates 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 experiments carefully and according to the relevant procedure. They will be expected also to keep a record of their observations and results. Throughout, however, the intention is that candidates should relate their work in the Unit to the food industry. In this sense, the Unit is also an applied Unit.

Outcome 1 covers the cellular nature of food. Candidates can cover the following:

- Function of nucleus, cytoplasm, chloroplast, cell membrane and cell wall
- Respiration, photosynthesis and osmosis

Candidates should be able to produce labelled diagrams of plant and animal cells.

Outcome 2 is more substantial than Outcome 1. It covers the principles of matter formation and the different types of matter related to the study of food technology. It can include the following:

- Atomic structure, ionic and covalent bonding
- Alkanes, alkenes, alkanols, alkanoic acids and esters
- Functional groups — hydroxyl, carbonyl, carboxyl and amino
- Solutes, solvents and solutions
- Sols, gels and emulsions
- Differences between physical and chemical changes
- Kinetic theory of matter related to changes in state
- Acidity, alkalinity and pH
- Humidity, relative and absolute
- Heat: change of state — latent heat; boiling point, melting point, specific heat capacity; heat transfer — conduction, convection and radiation

Higher National Unit specification: support notes (cont)

Unit title: Science for the Food Industry: An Introduction

Candidates should be able to use chemical formulae, where appropriate when explaining chemical concepts.

Guidance on the delivery and assessment of this Unit

The delivery of this Unit should take into account that its purpose is to prepare candidates for scientifically based Units in the HNC Food Manufacture such as F6VD 34 *Food Composition* and F6VL 34 *Microbiology of Foods 1*. Candidates will be taking this Unit because they have not achieved Units in scientific subjects at SCQF level 6. It is possible that, in the past, they perhaps have found studying science difficult or uninteresting or both. Given the vital importance of scientific understanding and practical laboratory skills in the HNC in Food Science and Technology, it is important that the delivery methods adopted should engage the attention and interest of candidates.

Wherever possible, delivery should encourage candidates to be as active as possible. A combination of delivery methods may be one way to achieve this. This could range from direct exposition to asking candidates to find out information for themselves. This could be done in groups who could be guided towards different research tasks. Groups could then share information. This can also help candidates take responsibility for their own learning and help them to develop patterns of independent study. Wherever possible the material can be applied to the food industry so that candidates recognise the importance of scientific knowledge and understanding to their study of food manufacturing. If candidates realise this at an early stage, they are likely to approach later Units with a positive attitude.

Outcome 2 covers a greater amount of material than Outcome 1 and it is likely, therefore, that, during the delivery process, candidates will devote more time to the knowledge and/or skills items in Outcome 2 than to the knowledge and/or skills items in Outcome 1.

For the practical laboratory skills, the aim should be to build both skills and confidence so that candidates are in a strong position to undertake the practical parts of Units such as F6VL 34 *Microbiology of Foods 1* and F6VC 34 *Food Analysis*.

Assessment for this Unit tests the understanding of candidates and their practical work. Assessment for this Unit could take a variety of ways. For example, knowledge and understanding can be assessed through questions which ask candidates to explain relevant scientific concepts and, where appropriate, relate them to the food industry. Candidates could be asked to present their responses to these questions in a number of different ways, eg they could group their responses together in the form of a short report or they could prepare a simple poster presentation. Alternatively, they could make use of presentation software (such as Powerpoint) or use tools from a virtual learning environment.

Practical work can be assessed by observation and through reports on experimental work. Candidates should be observed during some of their 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 also provide reports of their experiments as reports also form part of the assessment, with the evidence including referencing where appropriate. They could also use a laboratory log book to do this.

Higher National Unit specification: support notes (cont)

Unit title: Science for the Food Industry: An Introduction

Candidates could submit a portfolio of work covering all the assessment for this Unit. They could build the portfolio during their study of the Unit. In this way, assessment can arise naturally out of the delivery process.

Opportunities for developing Core Skills

Communication: **Written Communication (Writing) at SCQF level 4**

As part of their work for this Unit, candidates are expected to maintain details of experimental work in a laboratory logbook. Depending on the method of presentation used, they may also be expected to use written information to demonstrate/convey their knowledge and understanding of scientific concepts. For this, they will be required to make use of a logical structure and use appropriate vocabulary to accurately convey meaning to first reading.

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: Science for the Food Industry: An Introduction

This Unit is an optional Unit in the HNC Food Science and Technology. It is designed to help you gain the underpinning knowledge and understanding that you will need to successfully tackle the scientific Units in the HNC, particularly *Microbiology of Foods 1* and *Food Composition*. It also gives you some of the scientific background that you will need to fully understand methods of food processing. It will be particularly useful if you have not previously studied scientific subjects or have not done so for a long time. Foods are chemical compounds and food processing can involve changing the physical properties of these compounds so scientific knowledge and understanding is crucial to the operation of the food industry.

The Unit is both theoretical and practical. It introduces you to scientific concepts from chemistry in particular, but also from physics, and shows how these can be applied to the food industry. It also gives you an opportunity to do some laboratory work and develop practical scientific skills that you will need for other Units in your HNC. After completing the Unit you will have a good basis in fundamental scientific principles relevant to the food industry and have some valuable practical laboratory skills. You will be able to all of this in later Units in the HNC in Food Science and Technology.

The assessment for this Unit will require you to show that you can accurately explain scientific concepts and principles. You will also have to successfully complete practical laboratory work. You will be observed while you are doing this and will also have to keep records of work that you have done in the laboratory.

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