Higher National Unit specification

General information for centres

Unit title: Food Science: Theory and Practice

Unit code: DH9Y 35

Unit purpose: This Unit is designed to provide candidates with an introduction to the theory and practice of food science.

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

1. Describe the major nutrients and their occurrence in foodstuffs.
2. Investigate applications of biotechnology in the food industry.
3. Use practical techniques to investigate the properties and composition of foodstuffs.

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

**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 is recommended that candidates should have experience of studying chemistry and microbiology at Higher National level.

Core Skills: There may be opportunities to gather evidence towards the Core Skill in Communication at higher level in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: This Unit is included in the framework of the Group Award, HND Biotechnology. It is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: The assessment for this Unit consists of a supervised closed-book assessment for Outcome 1, an unsupervised extended piece of writing for Outcome 2, and a checklist to show achievement of practical skills in at least four techniques and the submission of reports for Outcome 3.

Higher National Unit specification: statement of standards

Unit title: Food Science: Theory and Practice

Unit code: DH9Y 35

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

Describe the major nutrients and their occurrence in foodstuffs

Knowledge and/or Skills

- Structure and classification of major nutrients: carbohydrates, fats, proteins
- Importance of nutrients in human nutrition
- Composition of important foodstuffs: dairy produce, carbohydrate foods, protein foods, fruit and vegetables

Evidence Requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can describe the major nutrients and their occurrence in foodstuffs. Evidence for this Outcome will be provided on a sample basis. This will take the form of written responses to questions, which cover the following:

- descriptions of the structure and classification of nutrients (carbohydrates or fats or proteins).
- descriptions of the importance of these nutrients in human nutrition.
- classification of foodstuffs into groups (dairy produce, carbohydrate foods, protein foods, fruit and vegetables) and description of the nutrients found in a group.

Assessment Guidelines

It is recommended that the assessment will take the form of a closed-book test under supervised conditions lasting approximately one hour. It is recommended that a cut-off score of 60% be applied.

Higher National Unit specification: statement of standards (cont)

Unit title: Food Science: Theory and Practice

Outcome 2

Investigate applications of biotechnology in the food industry

Knowledge and/or Skills

- Traditional fermentation processes in food production
- Modern uses of micro-organisms or enzymes in the food industry
- Genetic engineering and food production

Evidence Requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can describe and evaluate applications of biotechnology in the food industry. Evidence for this Outcome will be provided by an unsupervised extended piece of writing (1000 - 2000 word assignment), which covers examples taken from each of the sections detailed in the knowledge and/or skills section. The assignment should describe all and critically evaluate one of the following:

- traditional fermentation processes: one example from the dairy industry (eg cheese or yoghurt production) and one example of the use of a yeast (eg brewing or bread making)
- modern uses of micro-organisms or enzymes: one example – eg production and use of single cell protein or high fructose corn syrup or other suitable example
- genetic engineering: one example of a foodstuff of plant or animal origin which has been modified and the advantages conferred

Assessment Guidelines

Candidates should be provided with the specification for the assignment as soon as teaching of this Outcome starts. They should be encouraged to use a range of resources to obtain information. These resources should include books, notes/handouts, periodicals and material available via the Internet.

Where evidence is found to be unsatisfactory, candidates may be questioned to elicit appropriate responses. A verbal test of the candidates' knowledge may provide evidence of sufficient depth or breadth of knowledge. Suitable remedial action is to allow candidates to amend the assignment and re-submit. During remediation only the inadequate sections require to be reassessed.

Higher National Unit specification: statement of standards (cont)

Unit title: Food Science: Theory and Practice

Outcome 3

Use practical techniques to investigate the properties and composition of foodstuffs

Knowledge and/or Skills

- Practical skills used in food analysis, such as gravimetric and volumetric techniques, colourimetry, separation methods, pH measurement
- Data analysis and calculation of results
- Keeping a laboratory logbook
- Preparing full laboratory reports

Evidence Requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can use at least four practical techniques to investigate the properties and composition of foodstuffs. Evidence for this Outcome will be provided by a combination of a checklist to show that a logbook of results has been kept and that practical skills have been achieved and by submission of two full laboratory reports.

Assessment Guidelines

Candidates should be observed and a checklist completed to record the achievement of practical skills in at least four techniques. They should keep a laboratory logbook to record all results and observations. This should be inspected at regular intervals. As appropriate, full laboratory reports should include:

- title and date
- introduction, including aims and theory
- materials and methods
- results, including tables, calculations and graphs
- discussion
- conclusion
- references

Administrative Information

Unit code: DH9Y 35

Unit title: Food Science: Theory and Practice

Superclass category: NH

Original date of publication: August 2004

Version: 02 (June 2009)

History of changes:

Version	Description of change	Date
02	Minor text changes to Support Notes.	03/06/09

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: Food Science: Theory and Practice

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 introduce the candidate to some important theoretical and practical aspects of Food Science.

Outcome 1 deals with the structure and classification of the major nutrients, their importance in nutrition and their occurrence in foodstuffs. Candidates will become familiar with the following:

- Carbohydrates: mono, di, oligo and polysaccharides
  sugars, starches and non-starch polysaccharides (NSP)
  energy source, digestibility and NSP in diet

- Lipids: esters of glycerol and fatty acids
  simple and mixed triglycerides
  saturated, mono and poly unsaturated acids
  cis and trans unsaturation
  essential fatty acids

- Proteins: amino acids, polypeptides
  essential and non-essential amino acids
  protein quality vs quantity

Survey of the major food categories and the nutrients they contain.

- Dairy products: milk, butter, yoghurt, cheese
- Carbohydrate foods: sugars, cereals, bread, pasta
- Protein foods: meat, fish, eggs, soya
- Fruit and vegetables

Outcome 2 deals with the investigation of applications of biotechnology in the food industry. Candidates will become familiar with the following:

- Traditional fermentation processes used in food production, such as the production of cheese and yoghurt and the use of yeasts in brewing, winemaking and bread making

- Modern uses of micro-organisms or enzymes in the food industry: single cell protein, high fructose corn syrup, organic acids, amino acids

- Genetic engineering and food production: comparison of traditional plant and animal breeding methods with transgenic organisms; examples from:
  - resistance to herbicides, pests, diseases
  - improved post harvest characteristics

Outcome 3 allows the candidates to investigate the properties and composition of some foodstuffs using appropriate practical techniques. It is envisaged that approximately fifteen hours will be spent on the practical work for this Outcome. Candidates will be expected to keep a logbook of their observations and results. A checklist will be used to record achievement of practical skills in at least four techniques. Two full laboratory reports are also required. This Outcome could be covered using a selection from a wide range of experiments. Some possible experiments are:

- determination of moisture content by drying to constant weight
- determination of fat content by Soxhlet extraction
- colourimetric determination of available carbohydrate
- determination of lactose and protein in milk
- determination of ascorbic acid by DCP
- acidity of fruit juices by titration
- acetic acid content of vinegar
- determination of lactic acid in dairy products
- determination of L-lactic acid by enzymatic method
- study of leavening agents
- properties of sugars
- properties of proteins

Guidance on the delivery and assessment of this Unit

This Unit is likely to form part of a Group Award, which is primarily designed to prepare candidates for employment in a biological science related post. The Unit builds on basic concepts of chemistry and microbiology and hence would be expected to be delivered after these have been studied at Higher National level.

The use of candidate-centred resource-based methodologies should be as extensive as possible to promote independent study.

Assessment for Outcome 1 is on the basis of written evidence obtained from a supervised closed-book test and in Outcome 2 by an unsupervised piece of extended writing of 1000 – 2000 words. Assessment of practical skills in Outcome 3 is by observation, a checklist and submission of 2 laboratory reports. Where evidence for Outcomes 2 and 3 is found to be unsatisfactory, candidates may be questioned to elicit appropriate responses.

Higher National Unit specification: support notes (cont)

Unit title: Food Science: Theory and Practice

Open learning

If this Unit is delivered by open or distance learning methods additional planning resources may be required for candidate support, assessment and quality assurance, particularly given the practical element of each Outcome.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

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: Food Science: Theory and Practice

This is a 1 credit HN Unit at SCQF level 8 intended for candidates undertaking a biological sciences related qualification. It is designed to introduce you to the theory and practice of food science.

On completion of this Unit you should be able to:

1. Describe the major nutrients and their occurrence in foodstuffs.

2. Investigate applications of biotechnology in the food industry.

3. Use practical techniques to investigate the properties and composition of foodstuffs.

The three Outcomes which make up this Unit are described below:

Outcome 1

You will study the major nutrients and their occurrence in foodstuffs. Consideration of the structure and classification of carbohydrates, fats and proteins will be followed by an introduction to their importance in human nutrition. Major groups of foodstuffs, such as dairy produce, carbohydrate foods, protein foods, fruit and vegetables, and the nutrients they contain will then be considered.

Outcome 2

You will study the application of biotechnology in the food industry. Traditional fermentation processes, such as yoghurt and cheese production, bread making and brewing and wine making, will be considered. Some modern uses of micro-organisms and enzymes in the food industry, such as the production of single cell protein and high fructose corn syrup, will be covered. The use of genetic engineering to modify plants and animals used as foodstuffs and the advantages and disadvantages will then be considered.

Outcome 3

You will use appropriate practical techniques to investigate the properties and composition of some foods. You will keep a logbook of your observations and results and you will prepare two laboratory reports.

General information for candidates (cont)

Unit title: Food Science: Theory and Practice

Assessment

The three Outcome of this Unit will be assessed as follows:

Outcome 1 A closed-book test, lasting about one hour, under supervised conditions which will sample the knowledge of the Outcome.

Outcome 2 An unsupervised assignment of 1000 - 2000 words.

Outcome 3 A checklist to verify that a logbook has been kept and practical skills have been achieved. Two full laboratory reports and observation.