



Higher National Unit specification

General information for centres

Unit title: Cell Biology: Theory and Practice

Unit code: DJ1K 34

Unit purpose: This unit is designed to provide candidates with a practical introduction to, and understanding of, the main concepts of eukaryotic cell biology. It is intended primarily for candidates who are in the early stages of a biological science programme of further education.

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

1. Describe the biological nature of cells.
2. Describe the structure and function of eukaryotic cell components.
3. Demonstrate basic practical skills in microscopy.
4. Demonstrate knowledge of cellular communication.

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. There are no specific entry requirements, however, it is recommended that candidates should have experience of studying Biology at Intermediate 2.

Core skills: There may be opportunities to gather evidence towards core skills 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 frameworks of a number of science group awards. It is recommended that it should be taught and assessed within the subject area of the particular group award to which it contributes.

Assessment: Outcomes 1, 2 and 4 should be assessed by a holistic closed book supervised assessment with a cut off score of 60%.

Outcome 3 is an assessment of practical skills where evidence could be recorded in the form of a checklist.

General information for centres (cont)

Candidates must meet the level of performance specified in the evidence requirements for all four assessments to achieve this unit.

Higher National Unit specification: statement of standards

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Outcome 1

Describe the biological nature of cells

Knowledge and/or Skills

- ◆ Distinction between prokaryotic and eukaryotic cells.
- ◆ Distinction between plant and animal cells.
- ◆ Cell size.

Evidence Requirements

Using holistic assessment, a candidate's response will be judged satisfactory for this outcome when the evidence provided is sufficient to show that the candidate is able to:

- ◆ identify the features that distinguish a prokaryotic from a eukaryotic cell.
- ◆ describe the structural difference between plant and animal cells.
- ◆ demonstrate an understanding of cell size in terms of surface area to volume ratios.

Evidence should be gathered using a holistic written assessment under closed book conditions, in which candidates must obtain at least 60% of the marks available in order to pass.

Assessment Guidelines

Outcomes 1, 2 and 4 should be assessed by a holistic closed book supervised assessment with a cut off score of 60%.

Higher National Unit specification: statement of standards (cont)

Unit title: Cell Biology: Theory and Practice

Outcome 2

Describe the structure and function of eukaryotic cell components

Knowledge and/or Skills

- ◆ Cell membrane structure.
- ◆ Eukaryotic transport processes.
- ◆ Eukaryotic organelles.

Evidence Requirements

Using holistic assessment a candidate's response will be judged satisfactory for this outcome when the evidence provided is sufficient to show that the candidate is able to:

- ◆ describe the cell membrane in terms of the fluid mosaic model.
- ◆ explain the mechanisms involved in transport of small and large molecules.
- ◆ describe the structure and function of eukaryotic organelles.

Evidence should be gathered using a holistic written assessment where all knowledge and skills items are assessed under closed book conditions, in which candidates must obtain at least 60% of the marks available in order to pass.

Assessment Guidelines

Outcomes 1, 2 and 4 should be assessed by a holistic closed book supervised assessment with a cut off score of 60%.

Outcome 3

Demonstrate basic practical skills in microscopy

Knowledge and/or Skills

- ◆ Preparation of slides.
- ◆ Use of a microscope.
- ◆ Interpretation of electron micrographs.

Higher National Unit specification: statement of standards (cont)

Unit title: Cell Biology: Theory and Practice

Evidence Requirements

Candidates will need evidence to demonstrate the knowledge and/or skills by showing that they can:

- ◆ prepare, fix and stain samples successfully and safely.
- ◆ demonstrate a practical ability to focus, develop contrast, use oil immersion and determine actual size.
- ◆ Correctly interpret micrographs in terms of cell type, specific structures and actual size.

Evidence for this outcome will be in the form of checklists which cover all of the points listed in the knowledge and skills. Candidates will need to successfully meet all of the requirements for this outcome in order to pass.

Assessment Guidelines

This outcome should be assessed by practical activities and all knowledge and skills must be assessed. Evidence for this outcome will be in the form of checklists.

It is strongly encouraged that formative exercises of a similar nature to the actual assessment be utilised extensively. Evidence does not necessarily have to be generated by a single instrument of assessment.

Outcome 4

Demonstrate knowledge of cellular communication

Knowledge and/or Skills

- ◆ Cell to cell recognition
- ◆ Cell to cell communication
- ◆ Errors in communication.

Evidence Requirements

Using holistic assessment, a candidate's response will be judged satisfactory for this outcome when the evidence provided is sufficient to show that the candidate is able to:

- ◆ demonstrate an understanding of the cell surface molecules involved in cell recognition.
- ◆ demonstrate an understanding of the different mechanisms involved in communication between adjacent cells and communication between distantly located cells.
- ◆ demonstrate knowledge of potential errors in communication and its consequences.

Higher National Unit specification: statement of standards (cont)

Unit title: Cell Biology: Theory and Practice

Evidence should be gathered using a holistic written assessment under closed book conditions, where all knowledge and skills items are being assessed in which candidates must obtain at least 60% of the marks available in order to pass.

Assessment Guidelines

Outcomes 1, 2 and 4 should be assessed by a holistic closed book supervised assessment with a cut off score of 60%.

Administrative Information

Unit code: DJ1K 34
Unit title: Cell Biology: Theory and Practice
Superclass category: RH
Original date of publication: August 2004
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History of changes:

Version	Description of change	Date
02	Changes made to standardise assessment guidelines.	03/06/09

Source: SQA

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Higher National Unit specification: support notes

Unit title: Cell Biology: 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 primarily intended to provide the candidate with an understanding of the main concepts of eukaryotic cell biology, namely the nature of cells, the structure and function of their components and how cells communicate with each other. In addition the integration of practical activities allows the candidate to gain experience in techniques which can be used in other Units. The essential underpinning knowledge and skills gained here will be useful in Units such as microbiology and biochemistry.

Outcome 1 provides an overview of the biological nature of cells. The emphasis here is on eukaryotic cell types, with prokaryotic cells being discussed only to allow comparison. Candidates should become familiar with the five-kingdom system and be able to understand the relationship between size and cell function.

Outcome 2 looks at the structure and function of eukaryotic cell components. Candidates should become familiar with the following:

- ◆ Fluid mosaic model: lipid bilayer; hydrophobic/hydrophilic nature; integral and peripheral proteins; attachment of carbohydrate groups; mobility; permeability.
- ◆ Transport of small molecules: active and passive transport; simple and facilitated diffusion.
- ◆ Transport of large molecules: exocytosis; receptor-mediated endocytosis; pinocytosis; phagocytosis.
- ◆ Common eukaryotic organelles: nucleus; mitochondria; chloroplasts; Golgi apparatus; lysosomes; endoplasmic reticulum (rough and smooth); vacuoles; cell walls.

Outcome 3 concentrates on allowing candidates to gain practical skills in microscopy. These skills may include slide preparations, cutting sections, and staining techniques as well as actual use of a microscope. One important aspect which should be emphasised in this outcome is the actual size difference between cells as a follow on from Outcome 1.

Outcome 4 introduces the candidate to the concept of cellular communication. Candidates should become familiar with the following:

- ◆ Cell-to-cell recognition: glycolipids and glycoproteins as cell surface markers.

Higher National Unit specification: support notes (cont)

Unit title: Cell Biology: Theory and Practice

- ◆ communication between adjacent cells: desmosomes; tight junctions; gap junctions; plasmodesmata.
- ◆ communication between distantly located cells: nerve cells; transmission of nerve impulses; extracellular signalling with hydrophobic molecules (steroid and thyroid hormones) and hydrophilic molecules via receptors (ion channels, enzyme linked, G-protein linked).
- ◆ errors in communication: fault in either, cell signal, signal detection, signal termination. These ideas could be discussed within disease states such as cancer or problems with endocrine function eg diabetes.

Guidance on the delivery and assessment of this Unit

This unit is designed to form part of the group awards in HNC Applied Sciences and HND Biotechnology. The unit requires the candidate to be familiar with the main concepts of eukaryotic cell biology.

It is essential that this unit is delivered in such a way as to emphasise the key points of cell biology as opposed to the minute detail. Instruments of assessment should be constructed with this in mind.

This unit should be assessed holistically with candidates producing evidence to meet the requirements for outcomes 1,2 and 4 in a single piece of written work.

Outcome 3 is an assessment of practical skills where evidence could be recorded in the form of checklists.

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.

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: Cell Biology: Theory and Practice

This is a 1 credit HN unit at SCQF level 7 intended for candidates undertaking an HNC Applied Sciences for HND Biotechnology. It is designed to provide you with an introduction to some of the main concepts of eukaryotic cell biology.

On completion of this unit you should be able to:

1. Describe the biological nature of cells.
2. Describe the structure and function of eukaryotic cell components.
3. Demonstrate basic practical skills in microscopy.
4. Demonstrate knowledge of cellular communication.

The four outcomes which make up the unit are described below:

Outcome 1

This outcome looks at the biological nature of cells. The lectures/tutorials for Outcome 1 will focus on particular aspects such as the differences between prokaryotes and eukaryotes, and between plants and animals. You will also learn how cell size relates to cell function.

Outcome 2

This outcome focuses on the components that make up a eukaryotic cell. Lectures / tutorials will focus on membrane structure and how materials are transported across the membrane. The structure and function of other common organelles will be described.

Outcome 3

In this outcome you will be introduced to the techniques involved in using the microscope in cell biology. Practical classes will focus on how to prepare samples for observation and how to use the microscope effectively.

Outcome 4

In this outcome you will be introduced to the concept of cellular communication. Lectures/tutorials will look at the ways that cells recognise each other as well as how cells communicate over varying distances. You will also look at what happens when these signalling processes fail.

Your knowledge of the topics covered in this unit will be tested by production of written evidence in the form of a holistic assessment under closed book conditions.

Additionally, you will be required to produce evidence of having carried out practical activities for Outcomes 3.

To succeed in this unit you must achieve a satisfactory level of performance in all assessments.