



Higher National Unit specification

General information for centres

Unit title: Forestry: Woody Plant Biology

Unit code: F405 34

Unit purpose: This Unit is designed to provide the candidate with a good understanding of woody plant biology, including morphology, growth and development, physiology and reproduction.

It will also give the candidate an appreciation of the role of woody plant biology in arboricultural, silvicultural and horticultural practice.

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

- 1 Explain the physiology of woody plants.
- 2 Explain the morphology and growth of roots and shoots in woody plants.
- 3 Explain secondary development in woody plants.
- 4 Explain reproduction and plant breeding in woody plants.

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 is at the discretion of the centre. Prior knowledge via HN Unit F3YW 34 *Forestry: Forest Science* or other botanical units would be helpful to the candidate.

Core Skills: There are opportunities to develop the Core Skill of *Communication* to SCQF level 5, although there is no automatic certification of Core Skills or the 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 within the subject area of the Group Award to which it contributes.

Assessment: It is recommended that the assessment for each Outcome in this Unit takes the form of a closed-book assessment.

Higher National Unit specification: statement of standards

Unit title: Forestry: Woody Plant Biology

Unit code: F405 34

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 physiology of woody plants

Knowledge and/or Skills

- ◆ C3 photosynthesis
- ◆ Respiration
- ◆ Transpiration
- ◆ Water uptake
- ◆ Translocation of photosynthates
- ◆ Mineral nutrition
- ◆ Plant growth substances

Evidence Requirements

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

- ◆ explain C3 photosynthesis and respiration and how the following factors affect the performance of these processes: light, temperature and carbon dioxide
- ◆ explain the process of the movement of water, mineral nutrients and the translocation of photosynthates around the plant
- ◆ explain the role of the mineral nutrients essential for plant growth and metabolism
- ◆ describe the five groups of plant growth substances and explain the role they fulfil

The assessment of this Outcome must take the form of closed-book restricted response questions.

Assessment Guidelines

As per the Evidence Requirements the assessment of this Outcome takes the form of a closed-book restricted response assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Forestry: Woody Plant Biology

Outcome 2

Explain the morphology and growth of roots and shoots in woody plants

Knowledge and/or Skills

- ◆ Mitosis
- ◆ Meristems
- ◆ Root structure
- ◆ Root growth
- ◆ Phyllotaxis
- ◆ Shoot structure
- ◆ Dormancy

Evidence Requirements

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

- ◆ explain vegetative cell division (mitosis) as it relates to the activity of apical and lateral meristems.
- ◆ explain how the root systems of a woody plant develop from meristematic activity and cell differentiation. Each explanation must include root structure, root growth and dormancy.
- ◆ explain how the shoot systems of a woody plant develop from meristematic activity and cell differentiation. Each explanation must include shoot structure, phyllotaxis and dormancy.

The assessment of this Outcome must take the form of closed-book restricted response questions.

Assessment Guidelines

As per the Evidence Requirements the assessment of this Outcome takes the form of a closed-book restricted response assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Forestry: Woody Plant Biology

Outcome 3

Explain secondary development in woody plants

Knowledge and/or Skills

- ◆ Vascular cambium
- ◆ Xylem
- ◆ Phloem
- ◆ Annual rings
- ◆ Arboricultural and silvicultural practice

Evidence Requirements

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

- ◆ describe the initiation, development and cellular structure of the vascular cambium.
- ◆ explain how meristematic activity of the cambium results in the formation of xylem and describe its structure and formation of annual rings in at least one of each ring porous and diffuse porous tree species.
- ◆ explain how meristematic activity of the cambium results in the formation of phloem and describe its structure. The candidates must also explain the development, form and function of phloem.
- ◆ explain the implications for arboricultural and silvicultural practice of the role of cambium in repairing wounds.

The assessment of this Outcome must take the form of closed-book restricted response questions.

Assessment Guidelines

As per the Evidence Requirements the assessment of this Outcome takes the form of a closed-book restricted response assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Forestry: Woody Plant Biology

Outcome 4

Explain reproduction and plant breeding in woody plants

Knowledge and/or Skills

- ◆ Meiosis
- ◆ Flower structure and development
- ◆ Pollination and fertilisation
- ◆ Fruit and seed development
- ◆ Seed dispersal
- ◆ Seed dormancy
- ◆ Seed germination
- ◆ Vegetative propagation
- ◆ Genetic material
- ◆ Mendelian inheritance
- ◆ Plant breeding methods
- ◆ Genetic modification

Evidence Requirements

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

- ◆ explain the importance of meiosis to genetic uniqueness including its role in the evolution of species and plant improvement
- ◆ explain the structure and development of flowers in relation to their reproductive function
- ◆ explain the ecological and cultural significance of seeds; their structure, dispersal and germination
- ◆ explain the significance of natural and artificial vegetative propagation
- ◆ explain the role of DNA, genes, chromosomes and Mendelian inheritance in plant breeding and genetic engineering
- ◆ explain the processes of clonal selection, plant breeding and genetic engineering

The assessment of this Outcome must take the form of closed-book restricted response questions.

Assessment Guidelines

As per the Evidence Requirements the assessment of this Outcome takes the form of a closed-book restricted response assessment.

Administrative Information

Unit code: F405 34
Unit title: Forestry: Woody Plant Biology
Superclass category: SB
Original date of publication: August 2008
Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

© Scottish Qualifications Authority 2008

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.

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: Forestry: Woody Plant Biology

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 designed as a mandatory part of the following SQA Group Awards:

- ◆ HNC Arboriculture and Urban Forestry
- ◆ HND Arboriculture and Urban Forestry

The content of this Unit should provide the candidate with a good understanding of woody plant biology, including morphology, growth and development, physiology and reproduction, placing particular emphasis on the role of plant biology in relation to arboricultural and silvicultural practice.

Outcome 1

- ◆ C3 photosynthesis (water + carbon dioxide in presence of light energy = sugar), effect of light intensity and quality, temperature, carbon dioxide concentration and gross and net photosynthesis
- ◆ respiration, aerobic and anaerobic
- ◆ light compensation point; shade tolerance
- ◆ macronutrients, micronutrients, trace elements: their role in plant metabolism; deficiencies, visual symptoms
- ◆ transpiration, stomata, water and mineral nutrient uptake, translocation of metabolites
- ◆ abscisic acid, auxin, cytokinins, ethylene and gibberellins: their role in plant growth and development

Outcome 2

- ◆ idealised meristematic cell, the process of mitosis, cell division in three planes
- ◆ structure of shoot and root apices, root hairs, mycorrhizae
- ◆ structure of leaves and buds, phyllotaxy, shoot and root elongation
- ◆ structure of cambial layer; xylem, phloem
- ◆ epicormic shoots, coppicing, pruning practice

Outcome 3

- ◆ structure of cambium; development of secondary xylem and phloem
- ◆ annual rings; species variation; sapwood/heartwood; ring/diffuse porous
- ◆ repair of wounds

Higher National Unit specification: support notes (cont)

Unit title: Forestry: Woody Plant Biology

Outcome 4

- ◆ structure of flowers; sepals, petals, stamens, stigma, ovary, ovules
- ◆ pollination process and agencies, fertilisation process, development of fruits and seeds, mast years
- ◆ seed dispersal, seed dormancy, germination process, effect of temperature, moisture and light
- ◆ genes and genetic inheritance
- ◆ clones and cultivars
- ◆ plant breeding and genetic engineering

Please note that the examples given are for guidance and should not be considered as an exhaustive list.

Guidance on the delivery and assessment of this Unit

As per the Evidence Requirements for each Outcome the assessment for this Unit takes the form of a series of closed-book restricted response questions.

Opportunities for developing Core Skills

The candidates will have the opportunity to develop the Core Skill of *Communication* to SCQF level 5 in this Unit when completing the restricted response questions as part of the assessments for each Outcome, although there is no automatic certification of Core Skills or Core Skill components.

Open learning

All Outcomes are appropriate for open and distance learning approaches with candidate packs and tutor input and support at all stages. Centre-devised supervision agreements should entail controlled conditions to ensure authenticity of evidence.

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

General information for candidates

Unit title: Forestry: Woody Plant Biology

This Unit is designed to provide you with a good understanding of woody plant biology, including morphology, growth and development, physiology and reproduction. Emphasis is placed on the role of plant biology in relation to arboricultural, horticultural and silvicultural practice.

The Outcomes that you will acquire on completion of the Unit are as follows:

Outcome 1 will give you a basic understanding of woody plant physiology and its significance to ecology and cultural practice.

Outcome 2 will provide you with a basic understanding of the dynamics underpinning the form and structure of roots and shoots.

Outcome 3 will give you a basic understanding of the dynamics of the growth, form and function of woody tissues.

Outcome 4 will give you a basic understanding of the genetic material and how this relates to plant improvement.

Overall, the knowledge acquired in this Unit will help you understand the dynamics of plant physiology, the components of woody plant form and function and their relation to ecology and arboricultural horticultural and silvicultural practice.

For candidates already in employment, this Unit provides an opportunity to gain a basic understanding of the dynamics of plant physiology, the components of woody plant form and function and how they relate to ecology and arboricultural horticultural and silvicultural practice.

This Unit will give you the opportunity to develop your *Communication* Core Skill to SCQF level 5.

This Unit will be assessed by closed-book restricted response assessments.