Higher National Unit specification

General information for centres

Unit title: Forest Mensuration and Thinning Control

Unit code: F3YF 34

Unit purpose: This Unit is designed to deliver the relevant knowledge and skills for the candidate to measure and forecast the volumes of both felled and standing forest crops and also to carry out necessary thinning operations. The Unit would be useful to candidates involved in the measurement of timber and standing crops in a forest supervisory/management capacity.

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

1   Measure the volume of felled timber.
2   Measure the volume of a standing forest crop.
3   Apply a thinning regime to a standing forest crop.
4   Evaluate the uses of production forecasting in forestry.

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. However, it would be beneficial if candidates had studies the Unit F3YD 34 *Forest Harvesting*.

Core Skills: There are opportunities to develop the Core Skills of *Information Technology*, *Communication*, *Working with Others* and *Numeracy* 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 to be 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.

This Unit is mandatory in the following Group Awards:

♦   HNC Forestry
♦   HND Forestry

General information for centres (cont)

Unit title: Forest Mensuration and Thinning Control

Assessment: The assessment evidence for this Unit could be in the form of three separate assessments. Outcome 1 could be by a supervised practical assessment and report; Outcomes 2 and 3 could be assessed holistically by a project based on a practical field exercise and report; and Outcome 4 could be restricted response questions.

Higher National Unit specification: statement of standards

Unit title: Forest Mensuration and Thinning Control

Unit code: F3YF 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

Measure the volume of felled timber

Knowledge and/or Skills

- Measurement conventions for felled timber
- Measurement methods for felled timber
- Individual felled tree volumes
- Individual log volumes
- Stack volume
- Formulae and ready reckoner tables
- Calculation methods

Evidence Requirements

Each candidate will need evidence to show he/she can for both felled single tree and stack volume:

- select an appropriate measurement method.
- measure and record the necessary measurements while adhering to the measurement conventions.
- analyse the measurements and carry out the necessary calculations.
- present the results in a clear and accurate manner. Candidates must indicate the source figures and the nature of the calculation.

The evidence will cover two out of the following three — length and mid diameter of three felled trees; length and top diameter of five logs; and one stack volume.

The exercise should include as per the sample:

- mid diameter
- length
- top diameter
- over bark or under bark
- stack length, height samples, depth (log length)
- stack volume: solid volume ratio
- use of ready-reckoner and or tables

Higher National Unit specification: statement of standards (cont)

Unit title: Forest Mensuration and Thinning Control

Candidates will be allowed to use formulae and other ready-reckoner tables and can use a calculator and or a computer program. Where formulae and other ready-reckoner tables are used, they should be identified and referenced.

Assessment Guidelines

Evidence could be generated in a real or a simulated, supervised work situation, with a report submitted on the findings.

Candidates will be allowed to refer to the Forestry Commission Mensuration Handbook, other standard ready-reckoner tables and can use a calculator and or a computer program.

Candidates could work in pairs to collect the field data, but all analysis and calculation will be done on an individual basis.

Outcome 2

Measure the volume of a standing forest crop

Knowledge and/or Skills

♦ Measurement conventions for standing timber
♦ Measurement method for standing timber
♦ Mensuration equipment
♦ Field data
♦ Volume estimates

Evidence Requirements

Each candidate will need evidence to show he/she can measure the volume of a standing forest crops using appropriate measuring equipment and applying appropriate measuring conventions. Candidates will gather field data using sample plots. The candidate must

♦ select an appropriate measurement method for the crop to be measured
♦ accurately measure and record the necessary measurements. Measurements must include diameter breast height, basal area, and top height. Measuring equipment must include girth tape or callipers, relascope, and hypsometer or clinometer
♦ analyse the measurements and carry out the necessary calculations for basal area and volume. Candidates will use volume tables in the calculation of volume estimates
♦ present the results in a clear and accurate manner per hectare and per tree stand

Assessment Guidelines

It is recommended that Outcomes 2 and 3 be assessed holistically. See Outcome 3 for details.

Higher National Unit specification: statement of standards (cont)

Unit title: Forest Mensuration and Thinning Control

Outcome 3

Apply a thinning regime to a standing forest crop

Knowledge and/or Skills

♦ Thinning regimes
♦ Thinning grade and target volume
♦ Tree selection and marking methods
♦ Yield calculation methods
♦ Thinning control stage

Evidence Requirements

Each candidate will need evidence to show he/she can:

♦ explain the reasons for thinning a given forest crop. This must include the following: competition, production, early return, amenity, access, and conservation.
♦ explain the components of a thinning regime. This must include: thinning type, thinning cycle and thinning intensity.
♦ select an appropriate thinning regime for a standing crop.
♦ select the appropriate thinning grade and estimate the required target volume.
♦ select and mark the appropriate trees to be removed to achieve target thinning yield. Candidates must be able to identify four of the following tree categories in relation to thinning: wolf trees, whips, suppressed, sub-dominant, co-dominant, dominant.
♦ measure and record the necessary measurements. Candidates must assess the sampling intensity and individual plot size for the crop to be thinned and measure the required: top height sample trees, basal area, diameter breast height.
♦ analyse the measurements and carry out the necessary calculations to demonstrate the accurate calculation of thinning yield and that a control stage has been carried out that relates to the thinning yield sample.

Assessment Guidelines

It is recommended that Outcomes 2 and 3 are assessed holistically.

The assessment could be either a real or a simulated, supervised work situation, with a project report (a suggested word limit of 800 words or equivalent).

Higher National Unit specification: statement of standards (cont)

Unit title: Forest Mensuration and Thinning Control

Candidates could work in groups to collect the field data, (given forest area, ground conditions, past treatments, plot size and sampling density, top height, tree stocking, diameter breast height, basal area, tariff number) but the report must be done on an individual basis. Follow up questions may be used to authenticate the individual work of candidates.

One measurement method could be used to establish the standing volume of the crop, but all candidates will be required to make use of tree measuring equipment.

Candidates could select and apply an appropriate thinning regime to the same forest crop and carry out a thinning control exercise (thinning sample plot measurement and thinning yield calculation, adjustment of marking related to the thinning yield result).

Each candidate could submit a report describing the work carried out, including the data collected and presenting the necessary calculations.

Higher National Unit specification: statement of standards (cont)

Unit title: Forest Mensuration and Thinning Control

Outcome 4

Evaluate the uses of production forecasting in forestry

Knowledge and/or Skills

♦ Reasons for production planning
♦ Sources of data
♦ Constraints
♦ Methods of predicting crop growth and yield
♦ Factors influencing felling age and retention
♦ Production plans, industry timber demand and marketing

Evidence Requirements

Each candidate will need evidence to show he/she can evaluate the uses of production forecasting in forestry. Candidate must

♦ explain:
  — what is meant by production forecasting in a forestry context.
  — the reasons for production planning including budgeting, industry needs, operational programming.
  — where data comes from including compartment records and forest plans.
  — relevant constraints.
♦ evaluate the uses of production forecasting in forestry to predict crop growth, yield, felling ages, reasons for retaining crops, industry timber demands and marketing. This must include the steps to be followed in a forestry production plan forecast and the limitations of production forecasting in forestry.

Assessment Guidelines

The assessment of this Outcome could be by restricted response questions.

Administrative Information

Unit code: F3YF 34

Unit title: Forest Mensuration and Thinning Control

Superclass category: SG

Original date of publication: August 2008

Version: 01

History of changes:

Version	Description of change	Date

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Higher National Unit specification: support notes

Unit title: Forest Mensuration and Thinning Control

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 part of the following SQA Group Awards:

♦   HNC Forestry (mandatory)
♦   HND Forestry (mandatory)

The Unit could be undertaken as a standalone Unit by candidates who are in employment or full-time/part-time candidates who are taking one of the two Higher National qualifications indicated above.

The content of this Unit should provide the candidate with the necessary knowledge and skills to measure both standing and felled trees and timber; an understanding of the use of production forecasting; and the necessary knowledge and skills to carry out a full thinning control exercise.

The following support notes cover the mandatory requirements of the Unit and recommended aspects that could be covered in teaching and learning.

Outcome 1

♦   measurement conventions for mid diameter, top diameter, length
♦   use of Huber's formula
♦   Smalian's formula
♦   solid and stack volume
♦   air space conversion factors
♦   volume to weight ratios

Outcome 2

♦   measurement conventions for breast diameter height
♦   use of sample plots
♦   total height; top height
♦   timber height; tariff numbers
♦   tariff tables; tariff system
♦   precision levels
♦   bias issues
♦   Basal area
♦   form height
♦   form factor
♦   use of relascope, clinometer and hypsometer
♦   Callipers

Unit title: Forest Mensuration and Thinning Control

♦ stratification applications
♦ net and gross area
♦ general yield class

Outcome 3

♦ thinning intentions/goals
♦ silvicultural characteristics
♦ shade tolerance
♦ silvicultural systems
♦ thinning regimes
♦ tree categories
♦ marginal thinning intensity
♦ harvesting considerations
♦ principles of control
♦ subsequent thinnings
♦ stocking considerations
♦ delayed thinnings.

Outcome 4

♦ an aid to management — planning
♦ resource allocation and requirements
♦ satisfying market commitments
♦ justification and security of supply for new and future markets
♦ description of the future growing stock
♦ database
♦ working blocks
♦ long term retentions
♦ yield models
♦ felling ages
♦ cutting regimes
♦ production class
♦ local yield class
♦ assortment tables

Higher National Unit specification: support notes (cont)

Unit title: Forest Mensuration and Thinning Control

Guidance on the delivery and assessment of this Unit

The approach to the delivery of the Unit will be determined by the background knowledge and experience of the candidate. It may be possible for a candidate to have assessment on demand, although it may have to link into the normal assessment timetable and arrangements.

With appropriate supervision and testimony arrangements it is also possible for candidates to take the assessments at sites remote from the learning centre.

Where timetabled sessions are offered, these could include lecture and field based inputs. It is essential for the candidate to consolidate the necessary field skills and knowledge to permit the development of the level of competence expected by the forest industry.

It would be good practice for candidates to also receive support materials and have access to textbooks and other industry publications.

Outcome 1 could be a practical to test the use of measurement conventions on singled felled trees, logs and stacks of logs.

Outcome 2 and 3 could be a holistic practical project assessment where the candidates works as part of a small team to practice using equipment and the application of conventions to measure a given forest or woodland crop and then to mark a thinning in that or a similar area.

The results could be complied into an individual project where the candidate describes the site, lists the tools and describes the work carried out. In relation to the thinning section of the report, target thinning yield will be estimated, marking done and a thinning control exercise carried out with the results of this being evaluated and corrective action suggested and carried out and checked again. Reasons for the thinning control results should be explained.

Outcome 4 could take the form of restricted response questions to test knowledge on production forecasting, its methods and reasons and uses.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skills of *Information Technology*, *Communication*, *Working with Others* and *Numeracy* to SCQF level 5 in this Unit. Oral Communication and *Working with Others* can be developed in the practical activities for Outcomes 2 and 3, where candidates can plan the measuring tasks and carry these out. Written Communication can be developed through formative work assessment and the production of a written report. *Numeracy* can be developed through the calculations and presentation of results that candidates will undertake as part of the measuring tasks. If candidates use computer programmes for calculations, researching information and producing reports, this will contribute to the development of *Information Technology*.

Higher National Unit specification: support notes (cont)

Unit title: Forest Mensuration and Thinning Control

Open learning

All Outcomes are appropriate for open and distance learning approaches, and it would be good practice to provide candidate packs and tutor input and support at all stages. Centre-devised supervision agreements should detail any 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: Forest Mensuration and Thinning Control

This Unit is designed to enable you to develop timber measurement skills that will have wide ranging applications within the forest industry — although it will initially be set primarily within the context of forest harvesting. The Unit also covers thinning control and production forecasting. In the case of thinning control you will have the knowledge and skills to carry out a marking of thinnings and apply the necessary controls. In terms of production forecasting you will have a clear understanding of its purpose and use.

You will cover the background knowledge of the topics, but will also have the opportunity to develop the necessary field skills and work towards an industry level of competence. The assessments will be relevant and set in an applied context and will very much reflect the skills required and expected by the forest industry. The learning and assessment approach will encourage the development and consolidation of your applied practical skills.

There are four Outcomes in this Unit.

Outcome 1 covers the different measurement conventions to be applied and how to measure individual felled tree volumes; individual log volumes and stacks of felled timber. You will be able to use appropriate formulae and ready-reckoner tables and carry out the necessary calculations and present the information in a clear and understandable manner.

Outcome 2 covers the different measurement conventions to be applied and how to measure the volume of standing forest crops, using a range of methods. You will be able to use a range of measurement equipment, including — girth tapes, hypsometers and relascopes. You will be able to carry out the necessary calculations and present the information in a clear manner and have an understanding of the many applications of such information.

Outcome 3 covers the reasons for thinning a forest crop and what makes up the components of a thinning regime. You will be able to select an appropriate thinning regime for a forest crop. You will select and mark trees to be removed — in accordance with the selected thinning regime and carry out a full and valid thinning control.

Outcome 4 covers the reasons for production forecasting and the sources of data and the constraints to be considered. You will have an understanding of the methods of predicting crop growth and yield and the factors influencing felling age and retention. You will also be able to relate production forecasting to a number of applications and uses.

Overall, the knowledge and skills acquired in this Unit will help you understand and carry out forest measurement tasks accurately.

For candidates already in employment this Unit provides an opportunity to extend existing knowledge and skills and lays a sound grounding for further study in forest management.

This Unit will give you the opportunity to develop the Core Skills of *Information Technology*, *Communication*, *Working with Others* and *Numeracy* to SCQF level 5.

The assessment for this Unit is likely to be a mix of practical exercises, reports and restricted response questions.