Level 2 Certificate, Extended Certificate and Diploma in Forestry and Arboriculture (0077-02)

www.cityandguilds.com
September 2017
Version 2.1

Qualification handbook for centres
500/8552/9
500/8587/6
500/8718/6

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

Copyright

The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute and may not be copied, reproduced or distributed without prior written consent. However, approved City & Guilds centres and candidates studying for City & Guilds qualifications may photocopy this document free of charge and/or include a PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* (see the City & Guilds website) also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

Published by City & Guilds, a registered charity established to promote education and training.

Publications

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: feedbackandcomplaints@cityandguilds.com.

Publications are available from **www.cityandguilds.com** under the 'Qualifications' tab and then click on 'Land-based industries'.

Level 2 Certificate, Extended Certificate and Diploma in Forestry and Arboriculture (0077-02)

www.cityandguilds.com
September 2017
Version 2.1

Qualification handbook for centres

Qualification title	Number	QAN
Level 2 Certificate in Forestry and Arboriculture	0077-02	500/8552/9
Level 2 Extended Certificate in Forestry and Arboriculture	0077-02	500/8587/6
Level 2 Diploma in Forestry and Arboriculture	0077-02	500/8718/6

Version and date	Change detail	Section
V2.1 September 2017	• Added TQT and GLH details. • Removed QCF	Qualification at a glance Appendix 2, Guidance for delivery, unit summary

City & Guilds
Skills for a brighter future

www.cityandguilds.com

Contents

1	Introduction to the qualifications	7
2	Centre requirements	13
3	Course design and delivery	15
4	Assessment	16
5	Units	17
6	Registration and Certification	19
Unit 201	Undertake Work Related Experience in the Land-based Industries	23
Unit 202	Environmental and Land-based Business	30
Unit 203	Disposal of Wood Arisings and Residues from Work on Trees	37
Unit 204	Establish Trees and Shrubs	42
Unit 205	Identify and Select Trees and Shrubs	48
Unit 206	Carry Out Ground-based Arboricultural Operations	54
Unit 207	Felling and Extraction of Timber from Woodland	59
Unit 208	Understand and Carry out Silviculture and Habitat Management	64
Unit 209	Understand and Carry out Basic Visual Tree Inspections	70
Unit 210	Undertake Tree Felling Operations	76
Unit 211	Undertake Tree Climbing and Pruning Operations	82
Unit 212	Introduction to Land-Based Machinery Operations	88
Unit 213	Participate in Providing Estate Maintenance	95
Unit 214	Introduction to the Principles of Land-based Machinery	102
Unit 215	Understand the Basic Principles of Plant Science	108
Unit 216	Understand the Basic Principles of Soil Science	112
Unit 217	Introduction to Land-based Workshop Practice	119
Appendix 1	Relationships to other qualifications	126
Appendix 2	Sources of general information	127

City & Guilds
Skills for a brighter future

www.cityandguilds.com

1 Introduction to the qualifications

This document contains the information that centres need to offer the following qualifications:

Qualification title and level	GLH	TQT	City & Guilds qualification number	Qualification accreditation number
Level 2 Certificate in Forestry and Arboriculture	90	150	0077-02	500/8552/9
Level 2 Extended Certificate in Forestry and Arboriculture	180	300	0077-02	500/8587/6
Level 2 Diploma in Forestry and Arboriculture	360	600	0077-02	500/8718/6

Qualification summary

Qualification title and level	Credits	Guided Learning Hours (GLH)
Level 2 Certificate in Forestry and Arboriculture	15	90
Level 2 Extended Certificate in Forestry and Arboriculture	30	180
Level 2 Diploma in Forestry and Arboriculture	60	360

These qualifications meet the needs of learners in a centre-based environment who may wish to work within the forestry and arboricultural industry or progress to further learning and/or training. These qualifications allow learners to develop underpinning knowledge whilst practising skills that could be used within employment in the forestry and arboricultural industry. These qualifications replace the Level 2 National Certificate in Horticulture (Forestry) (0345-42) which expires on 31/07/2010 (QAN 500/4111/3) and Horticulture (Arboriculture) (0345-23) which expires on 31/07/2010 (QAN 500/4111/3).

These qualifications were developed in association with Lantra SSC, Landex and the industry.

1.1 Qualification structure

Level 2 Certificate

To achieve the **Level 2 Certificate in Forestry and Arboriculture**, learners are required to achieve 15 credits from any of the units within the qualification.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Optional group				
J6011563	Unit 203	Disposal of Wood Arisings and Residues from Work on Trees	5	
R6011565	Unit 204	Establish Trees and Shrubs	5	
F6011674	Unit 205	Identify and Select Trees and Shrubs	5	
R6011677	Unit 206	Carry Out Ground-based Arboricultural Operations	10	
R6011680	Unit 207	Felling and Extraction of Timber from Woodland	10	
H6010369	Unit 208	Understand and Carry Out Silviculture and Habitat Management	10	
F6010394	Unit 209	Understand and Carry Out Basic Visual Tree Inspections	10	
Y6010398	Unit 210	Undertake Tree Felling Operations	10	
D6010399	Unit 211	Undertake Tree Climbing and Pruning Operations	10	

Level 2 Extended Certificate

To achieve the **Level 2 Extended Certificate in Forestry and Arboriculture**, learners must achieve 30 credits from any of the units.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Optional group				
J6011563	Unit 203	Disposal of Wood Arisings and Residues from Work on Trees	5	
R6011565	Unit 204	Establish Trees and Shrubs	5	
F6011674	Unit 205	Identify and Select Trees and Shrubs	5	
R6011677	Unit 206	Carry Out Ground-based Arboricultural Operations	10	
R6011680	Unit 207	Felling and Extraction of Timber from Woodland	10	
H6010369	Unit 208	Understand and Carry Out Silviculture and Habitat Management	10	
F6010394	Unit 209	Understand and Carry Out Basic Visual Tree Inspections	10	
Y6010398	Unit 210	Undertake Tree Felling Operations	10	
D6010399	Unit 211	Undertake Tree Climbing and Pruning Operations	10	
T6009596	Unit 212	Introduction to Land-based Machinery Operations	10	

Level 2 Diploma

To achieve the **Level 2 Diploma in Forestry and Arboriculture**, learners are required to achieve a total of 60 credits: 20 credits must be from the units in the mandatory group and the remaining 40 credits from any of the units in the optional group.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Mandatory group				
H6009335	Unit 201	Undertake Work Related Experience in the Land-based Industries	10	
F6009357	Unit 202	Environmental and Land-based Business	10	
Optional group				
J6011563	Unit 203	Disposal of Wood Arisings and Residues from Work on Trees	5	
R6011565	Unit 204	Establish Trees and Shrubs	5	
F6011674	Unit 205	Identify and Select Trees and Shrubs	5	
R6011677	Unit 206	Carry Out Ground-based Arboricultural Operations	10	
R6011680	Unit 207	Felling and Extraction of Timber from Woodland	10	
H6010369	Unit 208	Understand and Carry Out Silviculture and Habitat Management	10	
F6010394	Unit 209	Understand and Carry Out Basic Visual Tree Inspections	10	
Y6010398	Unit 210	Undertake Tree Felling Operations	10	
D6010399	Unit 211	Undertake Tree Climbing and Pruning Operations	10	

T6009596	Unit 212	Introduction to Land-based Machinery Operations	10	
Y6009364	Unit 213	Participate in Providing Estate Maintenance	10	
K6009594	Unit 214	Introduction to the Principles of Land-based Machinery	5	
T6009808	Unit 215	Understand the Basic Principles of Plant Science	5	
H6009819	Unit 216	Understand the Basic Principles of Soil Science	5	
F6009794	Unit 217	Introduction to Land-based Workshop Practice	10	

Total Qualification Time

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

Title and level	GLH	TQT
Level 2 Certificate in Forestry and Arboriculture	90	150
Level 2 Extended Certificate in Forestry and Arboriculture	180	300

1.2 Opportunities for progression

On completion of these qualifications learners may progress into employment or to the following City & Guilds qualifications:

- Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma in Forestry and Arboriculture
- Level 2 or 3 qualifications in Forestry and Arboriculture
- Other related qualifications

1.3 Qualification support materials

City & Guilds also provides the following publications and resources specifically for these qualifications:

Description	How to access
Assignment guide	www.cityandguilds.com
Marking guide	information@cityandguilds.com
Information Sheets	www.cityandguilds.com
Fast track approval forms/generic fast track approval form	www.cityandguilds.com

2 Centre requirements

This section outlines the approval processes for Centres to offer these qualifications and any resources that Centres will need in place to offer the qualifications including qualification-specific requirements for Centre staff.

Centres already offering the Level 2 National Certificate in Horticulture (Forestry) (0345-42) and Horticulture (Arboriculture) (0345-23)

Centres approved to offer the Level 2 National Certificate in Horticulture (Forestry) (0345-42) and Horticulture (Arboriculture) (0345-23) may apply for approval for the new Level 2 Certificate, Extended Certificate and Diploma in Forestry and Arboriculture using the fast track approval form, available from the City & Guilds website.

Centres may apply to offer the new qualifications using the fast track form

- providing there have been no changes to the way the qualifications are delivered, and
- if they meet all of the approval criteria specified in the fast track form guidance notes.

Fast track approval is available for 12 months from the launch of the qualification. After this time, the qualification is subject to the standard Qualification Approval Process. It is the centre's responsibility to check that fast track approval is still current at the time of application.

New centres must apply for centre and qualification approval. Further information on this process is available on the City & guilds website.

Existing City & Guilds centres that do not offer Level 2 National Certificate in Horticulture (Forestry) (0345-42) and Horticulture (Arboriculture) (0345-23) will need to get specific qualification approval to run these qualifications (contact your City & Guilds Local Office).

2.1 Resource requirements

Human resources

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be technically competent in the areas for which they are delivering training and/or have experience of providing training. This knowledge must be at least to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- be occupationally knowledgeable in the area of forestry and arboriculture for which they are delivering training. This knowledge must be at least to the same level as the training being delivered
- have credible experience of providing training.

Centre staff may undertake more than one role, e.g. tutor and assessor or internal verifier, but must never internally verify their own assessments.

Assessors and internal verifiers

The centre must provide Assessor personnel who must be occupationally competent in the industry either qualified to at least level 2 and/or have current experience of working in the industry at this level.

The centre must provide Internal Quality Assurance personnel who must be occupationally competent in the land-based sector either qualified to at least level 2 and/or have current experience of working in the industry at this level.

Assessors/Internal Quality Assurance personnel may hold relevant qualifications such as D32/33/34 or A1/V1 or TAQA however they are not a mandatory requirement for this qualification. They should have had formal training in assessment/IQA, which may be the qualifications above, or other training that allows the assessor to demonstrate competence in the practice of assessment/IQA. This training may be carried out in-house or with an external agency.

TAQA qualifications are considered very appropriate as Continuing Professional Development (CPD) or as best practice standards for new centre staff to work towards.

Continuing professional development (CPD)

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and verification, and that it takes account of any national or legislative developments.

2.2 Learner entry requirements

There are no formal entry requirements for learners undertaking these qualifications. However, centres must ensure that learners have the potential and opportunity to gain the qualifications successfully.

As part of the assessment for the Level 2 Diploma qualification, learners must have access to a work setting/placement.

Age restrictions

These qualifications have been approved and accredited for 16 – 18, 18 + and 19 + learners. However, there are no age limits attached to learners undertaking the qualification unless this is a legal requirement of the process or the environment.

3 Course design and delivery

3.1 Initial assessment and induction

Centres will need to make an initial assessment of each learner prior to the start of their programme to ensure they are entered for an appropriate type and level of qualification.

The initial assessment should identify:

- any specific training needs the learner has, and the support and guidance they may require when working towards their qualifications. This is sometimes referred to as diagnostic testing.
- any units the learner has already completed, or credit they have accumulated which is relevant to the qualifications they are about to begin.

City & Guilds recommends that centres provide an induction programme to ensure the learner fully understands the requirements of the qualifications they will work towards, their responsibilities as a learner, and the responsibilities of the centre. It may be helpful to record the information on a learning contract.

3.2 Recommended delivery strategies

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualifications before designing a course programme.

Centres may design course programmes of study in any way which:

- best meets the needs and capabilities of their learners
- satisfies the requirements of the qualifications.

When designing and delivering the course programme, centres might wish to incorporate other teaching and learning that is not assessed as part of the qualifications. This might include the following:

- Functional skills
- Personal learning and thinking skills (PLTS)

Where applicable, this could involve enabling the learner to access relevant qualifications covering these skills.

4 Assessment

4.1 Summary of assessment methods

For these qualifications, learners will be required to complete the following assessments:

- one assignment for each unit

City & Guilds provides the following assessments:

- Assignment guide containing assignments for each unit

Time constraints

The following time constraints must be applied to the assessment of these qualifications:

- All assignments must be completed and assessed within the learners' period of registration. Centres should advise learners of any internal timescales for the completion and marking of individual assignments.

4.2 Assignments

The assignment guide for these qualifications is available to download from www.cityandguilds.com.

4.3 Recognition of prior learning (RPL)

Recognition of Prior Learning (RPL) recognises the contribution a person's previous experience could contribute to a qualification. RPL is allowed and is also sector specific.

4.4 Resubmission of Assignments

Centres are advised to adopt the following policy on the re-submission of work:

Learners who fail an assignment on the formal (summative) submission, or who would like the opportunity to improve their grade, may re-submit once only and may then achieve either a Pass, Merit or Distinction as appropriate. An appropriate time period between formal submission and re-submission should be set by the centre. Multiple re-submissions are not permitted. Learners who fail to hand in work on the formal submission date, where there is no legitimate reason, should be capped to a maximum of a Pass grade only at the re-submission stage. It is at the discretion of the centre to set informal (formative) submission dates, if appropriate, and a formal submission date.

Units

Summary of units

City & Guilds unit number	Title	Unit number	Credits
201	Undertake Work Related Experience in the Land-based Industries	H6009335	10
202	Environmental and Land-based Business	F6009357	10
203	Disposal of Wood Arisings and Residue from Work on Trees	J6011563	5
204	Establish Trees and Shrubs	R6011565	5
205	Identify and Select Trees and Shrubs	F6011674	5
206	Carry Out Ground-based Arboricultural Operations	R6011677	10
207	Felling and Extraction of Timber from Woodland	R6011680	10
208	Understand and Carry Out Silviculture and Habitat Management	H6010369	10
209	Understand and Carry Out Basic Visual Tree Inspections	F6010394	10
210	Undertake Tree Felling Operations	Y6010398	10
211	Undertake Tree Climbing and Pruning Operations	D6010399	10
212	Introduction to Land-based Machinery Operations	T6009596	10
213	Participate in Providing Estate Maintenance	Y6009364	10
214	Introduction to the Principles of Land-based Machinery	K6009594	5
215	Understand the Basic Principles of Plant Science	T6009808	5
216	Understand the Basic Principles of Soil Science	H6009819	5
217	Introduction to Land-based Workshop Practice	F6009794	10

Certification/grading modules

City & Guilds unit number	Title
901	Certification module for Level 2 Certificate in Forestry and Arboriculture - pass grade
902	Certification module for Level 2 Certificate in Forestry and Arboriculture - merit grade
903	Certification module for Level 2 Certificate in Forestry and Arboriculture - distinction grade
904	Certification module for Level 2 Extended Certificate in Forestry and Arboriculture - pass grade
905	Certification module for Level 2 Extended Certificate in Forestry and Arboriculture - merit grade
906	Certification module for Level 2 Extended Certificate in Forestry and Arboriculture - distinction grade
907	Certification module for Level 2 Diploma in Forestry and Arboriculture - pass grade
908	Certification module for Level 2 Diploma in Forestry and Arboriculture - merit grade
909	Certification module for Level 2 Diploma in Forestry and Arboriculture - distinction grade
922	Certification module for Level 2 Certificate in Forestry and Arboriculture – distinction*
923	Certification module for Level 2 Extended Certificate in Forestry and Arboriculture – distinction* grade
924	Certification module for Level 2 Diploma in Forestry and Arboriculture – distinction* grade

5 Registration and Certification

The Level 2 Certificate, Extended Certificate and Diploma in Forestry and Arboriculture qualifications have been grouped into one programme for registration.

Tutors and Examination Officers should ensure that learners are registered onto 0077-02 and that all 0077-02 documentation for teaching and administration with City & Guilds is used.

When learners' results are submitted to City & Guilds, centres should also submit the relevant Certificate, Extended Certificate and Diploma component, according to which units the learner has achieved, so that the appropriate certificate is generated. The overall grade can be calculated using the formula in the assignment guide.

Please note: There are four certification/grading modules for each of the qualifications which differentiates the four grades – pass, merit, distinction and distinction*. Once the overall grade for the assignments has been calculated, the correct certification/grading module needs to be indicated on the results entry.

For example, if a learner achieves the Level 2 Certificate in Forestry and Arboriculture at an overall merit grade, then the certification module 902 needs to be submitted. Please see the Rules of Combination below or the City & Guilds catalogue.

Level 2 Certificate in Forestry and Arboriculture QAN 500/8552/9	
Rules for achievement of qualification	15 credits from (203 – 211) Plus 901 for certification at pass grade

Level 2 Certificate in Forestry and Arboriculture QAN 500/8552/9	
Rules for achievement of qualification	15 credits from (203 – 211) Plus 902 for certification at merit grade

Level 2 Certificate in Forestry and Arboriculture QAN 500/8552/9	
Rules for achievement of qualification	15 credits from (203 – 211) Plus 903 for certification at distinction grade

Level 2 Certificate in Forestry and Arboriculture QAN 500/8552/9	
Rules for achievement of qualification	15 credits from (203 – 211) Plus 922 for certification at distinction* grade

Level 2 Extended Certificate in Forestry and Arboriculture QAN 500/8587/6

Rules for achievement of qualification	30 credits from (203 – 212) Plus 904 for certification at pass grade

Level 2 Extended Certificate in Forestry and Arboriculture QAN 500/8587/6	
Rules for achievement of qualification	30 credits from (203 – 212) Plus 905 for certification at merit grade

Level 2 Extended Certificate in Forestry and Arboriculture QAN 500/8587/6	
Rules for achievement of qualification	30 credits from (203 – 212) Plus 906 for certification at distinction grade

Level 2 Extended Certificate in Forestry and Arboriculture QAN 500/8587/6	
Rules for achievement of qualification	30 credits from (203 – 212) Plus 923 for certification at distinction* grade

Level 2 Diploma in Forestry and Arboriculture QAN 500/8718/6	
Rules for achievement of qualification	20 credits from (201 – 202), plus a minimum of 40 credits from (203 – 217) Plus 907 for certification at pass grade

Level 2 Diploma in Forestry and Arboriculture QAN 500/8718/6	
Rules for achievement of qualification	20 credits from (201 – 202), plus a minimum of 40 credits from (203 – 217) Plus 908 for certification at merit grade

Level 2 Diploma in Forestry and Arboriculture QAN 500/8718/6	
Rules for achievement of qualification	20 credits from (201 – 202), plus a minimum of 40 credits from (203 – 217) Plus 909 for certification at distinction grade

Level 2 Diploma in Forestry and Arboriculture QAN 500/8718/6	
Rules for achievement of qualification	20 credits from (201 – 202), plus a minimum of 40 credits from (203 – 217) Plus 924 for certification at distinction* grade

- Learners must be registered at the beginning of their course. Centres should submit registrations using Walled Garden or Form S (Registration), under scheme/complex 0077-02.

- When assignments have been successfully completed results should be submitted on Walled Garden or Form S (Results submission). One of the certification/grading modules 901 to 909 or 922 to 924 need to be submitted to generate the appropriate certificate and grade. Centres should note that results will not be processed by City & Guilds until verification records are complete.

- Learners achieving one or more assessment components will receive a Certificate of Unit Credit listing the assessment components achieved. Learners achieving the number and combination of assessment components required to meet a defined Rule of Combination will, in addition, be issued with a certificate. Centres must submit a certification/grading component to allow this to happen.

Full details on the procedures for all City & Guilds qualifications registered and certificated through City & Guilds can be found on the City & Guilds on-line catalogue.

Unit 201 Undertake Work Related Experience in the Land-based Industries

Level: 2

Credit value: 10

Unit aim

The aim of this unit is to give learners the skills needed to identify, participate in and review work experience in a land-based environment. The unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learning outcomes

There are four learning outcomes to this unit. The learner will:

1. Know the range and scope of job roles within an environmental and land-based industry
2. Be able to use relevant documents and skills relating to work experience
3. Be able to plan and review self development during work experience
4. Be able to report on the work experience

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 201 Undertake Work Related Experience in the Land-based Industries

Outcome 1 Know the range and scope of job roles within an environmental and land-based industry

Assessment Criteria

The learner can:

1. Describe different **types of jobs** within an environmental and land-based industry
2. Describe the **skills and qualifications** required for different types of jobs within an environmental and land-based industry

Unit content

Types of jobs

Types of jobs relevant to the industry: managerial, supervisory, team worker, trainee, volunteer, common job titles within the relevant industry, main duties and responsibilities

Skills needed to fulfil duties and responsibilities of appropriate jobs: job specific, vocational and personal

Skills and qualifications

Types of qualifications available to the industry, e.g. GCSE and A level, the Diploma(including Functional Skills), Apprenticeships (including Work-based Learning qualifications), Foundation Learning (Entry Level and Level 1), standalone/industry specific vocational, e.g. Centre-based (City & Guilds, Edexcel and others), practical competence based e.g. Certificates of Competence, other

Progression pathways from trainee or team worker positions to supervisory and management posts. Skills, qualifications and experience required to achieve career progression

Evaluate career and progression opportunities: advantages and disadvantages of identified pathways, suitability to personal interests, skills and qualifications, role of work experience in preparing for a selected career

Skills valued by employers: commitment and reliability, time management, people skills, confidentiality and discretion

Unit 201 Undertake Work Related Experience in the Land-based Industries

Outcome 2 Be able to use relevant documents and skills relating to work experience

Assessment Criteria

The learner can:

1. Locate three advertisements for jobs from **different sources** available within the environmental and land-based industry
2. Produce an **application** for work experience in the environmental and land-based sector
3. **Prepare for an interview** for work experience
4. **Undertake an interview** for work experience

Unit content

Different sources

Locate three advertisements from for example trade magazines, websites, employer approaches to the centre, local paper, Countryside Jobs Service

Application

Suitable work experience position based on existing skills, experience, qualifications, development of skills and experience to achieve future employment goals
Personal details, education and training, professional membership, training, employment history, qualifications held, skills and general information, declarations

Prepare for an interview

Interview preparation: research the business and job role, suitable dress and personal presentation, information to find out and suitable questions to ask

Undertake an interview

Interview performance: attend punctually and dressed appropriately, answering questions, completion of other tests (e.g. practical, aptitude), and reflection on interview performance

Unit 201 Undertake Work Related Experience in the Land-based Industries

Outcome 3 Be able to plan and review self development during work experience

Assessment Criteria

The learner can:

1. **Review own skills and experience** against the requirements for a specific industry
2. Prepare a **self development plan** for work experience
3. **Review** self development plan during and after work experience

Unit content

Review own skills and experience

Current skills and experience compared with those required for the job, identify training and development needs

Self development plan

New skills, knowledge, understanding, experience, development of existing knowledge and skills, training needed

Review

Skills, knowledge, understanding and experience that have been developed during work experience, impact on technical ability to perform the job role, work as a member of a team, future employability, future employment ambitions, further training and development

Unit 201 Undertake Work Related Experience in the Land-based Industries

Outcome 4 Be able to report on the work experience

Assessment Criteria

The learner can:

1. **Gather and prepare evidence** during the work experience
2. **Present information** to others on work experience

Unit content

Gather and prepare evidence

Position within the organisation structure, job description of work role, working practices, health and safety, daily work routine, diary of work activities, report from work experience provider

Present information

Written or oral report on the work experience, name of work experience provider, nature of the organisation (type of business, products or services), job role, health and safety, skills and knowledge developed

Unit 201 Undertake Work Related Experience in the Land-based Industries

Notes for guidance

Learners on centre-based courses should have experience of the type of work that they hope to do and of the expectations of potential future employers. Some level 2 learners are likely to already have experience of working in the land-based and environmental industries, so this unit seeks to provide new experience opportunities for these learners.

This unit should be undertaken in a real business environment relevant to the subject interest of the learner but work experience may be gained by a number of routes, e.g. as part of an industrial placement whilst within the programme, whilst working on a planned daily or weekly basis on the centre's commercial and/or educational facilities, whilst undertaking voluntary work within the industry, or as a member of a group of learners invited to carry out practical work on a suitable business.

Any Act or legislation that is sector specific should be adhered to. This includes duty of care if working with animals.

Learners should complete the equivalent of 4 weeks (or 150 hours) work experience to achieve this unit. Centres should be mindful of their responsibilities for ensuring that work placements have appropriate supervision, insurance and health and safety policies in place and that learners have access to appropriate support whilst on placement.

In Outcome 1, learners will explore the different job roles, responsibilities and job titles commonly associated with them in their specialist sector. This background understanding is likely to require some classroom teaching but learners should be encouraged to explore the range of employment opportunities within their specialist sector. It would be appropriate for employers to be invited to outline to learners their expectations in the workplace. Learners will be required to consider the skills and qualifications that are required for appropriate jobs, and should be encouraged to think about the skills and qualifications that they may need to acquire to achieve their employment ambitions. This should also help them to identify a suitable work experience placement.

Outcome 2 involves learners undertaking the process of applying for work experience. They will need to locate suitable job adverts but can be supported by centres suggesting suitable placements. When applying for work experience learners should produce, as a minimum, a detailed curriculum vitae and letter of application using a computer. Learners may need to be given supported workshop time on computers to develop these documents. Before attending a work experience interview, it would be appropriate for learners to role play an interview and be given feedback on their interview technique. After attending an interview, they should reflect on their performance and how they could improve their effectiveness.

In Outcome 3, learners will review their existing skills, knowledge and experience against those required for a specific job role and how they will seek to develop these during the work experience. This development will be reviewed at a mid-point during the work experience and at the end, when they will reflect on how the work experience has helped to develop their future employability in line with their employment ambitions. Whilst learners are on work experience, and especially if this is an extended placement away from the centre, it is important that they have access to and support available from tutors.

Outcome 4 requires learners to gather basic evidence on their work experience, including the organisation name, main products or services, organisation staffing structure and their role within the organisation. The learner does not need to keep a diary of all duties undertaken each day but should produce a detailed description of the usual work routine and supplement this with a diary of any additional tasks, events, activities or items that represent learning opportunities. They should also note how health and safety of staff and, if relevant, customers is managed in the workplace. A feedback report from the work experience provider will form part of the evidence for this outcome. The final report on work experience could be presented in written form or as a presentation to tutors and other learners. As a minimum, it should include the range listed. It would be appropriate to include the final review and reflection on work experience from Outcome 3 in this report.

Unit 202 Environmental and Land-based Business

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of business within the environmental and land-based sector, and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will investigate the structure of one industry within the land-based sector and the principal organisations within it. They will explore regulations and legislation relevant to that industry. The learner will develop the knowledge of common business operations and the simple administrative tasks.

Learning outcomes

There are four learning outcomes to this unit. The learner will:

1. Know an industry within the environmental and land-based sector
2. Know the relevant legislation and codes of practice within the environmental and land-based sector
3. Know common business operations
4. Know how to carry out simple administrative tasks

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 202 Environmental and Land-based Business

Outcome 1 Know an industry within the environmental and land-based sector

Assessment Criteria

The learner can:

1. Describe the **structure** of one industry within the environmental and land-based sector covering:
    - size
    - employment
    - main activities
    - geographical influence
    - economic contribution
2. Identify the **principal organisations and trade associations** within an industry in the environmental and land-based sector.

Unit content

Structure

Features and characteristics of the industry, different types of businesses and organisations and the type of goods and services they provide, size of these businesses/organisations e.g. numbers employed, regional differences, allied industries (what they are, the goods and services they supply and the role they play), trends and issues currently affecting the industry

Principal organisations and trade associations

Roles and aims of key selected organisations in the industry e.g. statutory, Department for Environment, Food and Rural Affairs ((Defra) England), Welsh Assembly Government (Wales), Scottish Executive Environment and Rural Affairs Department (SEERAD), or Department of Agriculture and Rural Affairs (DARD (Northern Ireland), Health and Safety Executive, Department of Trade and Industry (DTI), Environment Agency, Food Standards Agency, non-governmental, major land-owning or representative e.g. The Royal Society for the Prevention of Cruelty to Animals (RSPCA), British Veterinary Association (BVA), Royal Horticultural Society (RHS), Institute of Groundsmanship (IOG), Lantra Sector Skills Council, British Horse Society (BHS), National Farmers Union (NFU), National Trust, Natural England

Unit 202 Environmental and Land-based Business
Outcome 2 Know the relevant legislation and codes of practice within the environmental and land-based sector

Assessment Criteria
The learner can:
1. Identify the main United Kingdom or European **legislation and codes of practice** relating to one industry within the environmental and land-based sector
2. Identify key requirements of current **employment law** on the environmental and land-based sector

Unit content

Legislation and codes of practice
United Kingdom legislation: consideration of the main relevant current legislation relating to an industry in the land and environment sector for example Agriculture Tenancies Act (1995), Animal Health Act (2002), Welfare of Animal (Transport) Order 2006, Animal Welfare Act 2006, Environment Protection Act 1990 (as amended 1995), Control of Pesticides Regulations 1986 (COPR), Riding Establishments Act 1970, Horse Passports (England) Regulations 2004, Control of Dogs Order 1992, Dangerous Dogs Act 1991(as amended 1997), codes of practice e.g. welfare of farm or companion animals
European legislation: relevant European directives e.g. relating to employment, the environment and the specific industry in the land and environment sector

Employment law
The main relevant current legislation relating to employment e.g. Health and Safety at Work etc Act 1974, Control of Substances Hazardous to Health Regulations (2002) (COSHH), Working Time Regulations 1998 (as amended 2002), Disability Discrimination Acts 1995 (as amended 2005), Employment Act 2002, National Minimum Wage Act 1998, Race Relations Act 1976 (as amended 2003), Sex Discrimination Act 1975

Unit 202 Environmental and Land-based Business
Outcome 3 Know common business operations

Assessment Criteria

The learner can:

1. Describe how **common IT software** can be used in everyday business operations
2. State the purpose and operation of **common business tasks**
    - financial and banking
    - marketing
    - administrative tasks

Unit content

Common IT software

Examples of business uses of: word processor (e.g. letters, notices), spreadsheets (e.g. records, timesheets), database (e.g. records), graphics (e.g. advertisements, posters), e-mails

Common business tasks

Financial and banking: taking payments by cash, cheque, debit card and credit card, ordering procedure for supplies, invoices, types of bank account (current, savings), loans, overdraft, methods of payment (debit card, cheques, bank giro credit, standing order, direct debit)
Marketing: ways to promote a business (advertisements, promotional events, referral / word of mouth, importance of customer care), preparation of promotional materials
Administrative tasks: file documents, complete simple records (e.g. production, customers), check stock levels and complete stock control records, communicate using written and electronic media, importance of security and confidentiality of business records

Unit 202 Environmental and Land-based Business
Outcome 4 Know how to carry out simple administrative tasks

Assessment Criteria
The learner can:
1. Use appropriate methods to **prepare, present, sort and retrieve information**
2. Carry out simple **accounting and administrative tasks** appropriate to the business

Unit content

Prepare, present, sort and retrieve information
Use of IT and paper filing systems, completion of simple business records, preparation of business documents (e.g. letters, advertisements)

Accounting and administrative tasks
Completion of orders, invoices, cheques, conduct stock check and complete stock records

Unit 202 Environmental and Land-based Business
Notes for guidance

This unit can be applied to any of the industries in the environmental and land-based sector, and delivery should be specifically tailored to the vocational interests of learners and the qualification being studied. They will learn about the industry and legal context in which businesses in the chosen sector takes place, and important operations necessary to manage a business.

In Outcome 1, learners will study the structure of their industry. They may be encouraged to represent graphically the range of businesses and their products/services, and also the ancillary businesses on which the primary businesses depend. They could relate these ideas to a specific business, whilst also investigating the range of businesses found locally and nationally. Learners will also find out about the principal organisations and trade associations concerned with their industry, and will investigate the roles and impact of selected organisations. They will investigate some of the key trends and issues facing their industry and how it is responding. Delivery of this outcome would be enriched by speakers from selected organisations.

Outcome 2 examines the UK and European legal framework affecting businesses in the particular land-based industry. Learners are not expected to become legal experts, but to develop an awareness of the main pieces of legislation and how they impact on business in their industry. Delivery of this outcome could be enhanced by guest speakers with experience of running a business or becoming self employed for the first time.

In Outcome 3, learners will identify how common IT software can be used to perform a range of everyday business operations. Some of these are common to all businesses (e.g. writing letters), but tutors should ensure that examples are vocationally relevant to the subject area of the learners. It would be helpful for learners to have the opportunity to practice some of the IT skills to carry out simulated business tasks. Learners should find out about day-to-day business activities involving finance and banking, but will not be expected to learn about accounts. It would help learners to have the opportunity to study a range of records (financial and non-financial) that are kept in a specific business, and how these are maintained and used.

Outcome 4 links closely with Outcome 3 and gives learners the opportunity to understand and engage in operations and tasks identified previously. This should include preparing a range of business outputs using the IT applications listed. These could relate to other items in the content, e.g. advertisements, posters, specific records appropriate to businesses in their industry. They will also complete examples of paper based records and ensure that both IT and paper records are filed appropriately.

References

Books

Carysforth, C. Neild, M. 2006. *BTEC First Business*. 2nd ed. Oxford: Butterworth Heinemann.
Canwell, D., Sutherland, J. 2006. *BTEC First Business*. Cheltenham: Nelson Thornes.

Websites

www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government

www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)
www.bized.ac.uk	Business Education Websites
www.hse.gov.uk	Health and Safety Executive
www.dti.gov.uk	Department for Trade and Industry
www.environment-agency.gov.uk	Environment Agency
www.food.gov.uk	Food Standards Agency
www.rspca.org.uk	Royal Society for the Prevention of Cruelty to Animals
www.bva.co.uk	British Veterinary Association
www.rhs.org.uk	Royal Horticultural Society
www.iog.org.uk	Institute of Groundsmanship
www.lantra.co.uk	Lantra Sector Skills Council
www.bhs.org.uk	British Horse Society
www.nfuonline.com	National Farmers Union
www.nationaltrust.org.uk	The National Trust
www.naturalengland.org.uk	Natural England

Unit 203 Disposal of Wood Arisings and Residues from Work on Trees

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the skills required to dispose of wood wastes from work on trees and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required to dispose of all types of wood wastes and treat or remove stumps following work on trees.
The relevant health and safety and legislation is also covered including waste disposal site, burning adjacent to the highway and regional electricity companies distribution safety rules.

Learning outcomes

There are **two** learning outcomes to this unit. The learner will:

1. Know how to dispose of wood residues and stumps
2. Be able to dispose of arisings and residues from work on trees

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW29 Treat and dispose of stumps and roots.

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 203 Disposal of Wood Arisings and Residues from Work on Trees

Outcome 1 Know how to dispose of wood residues and stumps

Assessment Criteria

The learner can:

1. Describe how to **secure the work site** in relation to the method of disposal and public access
2. Comply with **industry guidelines** and legislation
3. State **possible causes of environmental pollution** and **how to avoid or deal with them**
4. Explain how **the species and condition** of trees impact on **disposal of residues and treatment of stumps**

Unit content

Secure the work site

Secure work site: signage, exclusion zones, safe working distances, banks man

Industry guidelines

Types of information: Code of Practice (ACOPS), Arboriculture & Forestry Advisory Group (AFAG) leaflets, and guidance notes
Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipments Regulations 1998 (LOLER), Environment Protection Act 1990 (as amended 1995)

Possible causes of environmental pollution

Causes: Fuel and pesticide spillages, leaching of chipping residues, smoke from fires

How to avoid or deal with them

Preventative measures: spill mats, pesticide mixing area away from water courses, requirement for storage areas for chippings
Fires: in accordance with highway guidelines, wind direction assessed, local bye laws adhered to, fires continually monitored, fire fighting procedures in place

Species and condition of trees

Use and value of tree species: suitability for wood turning, manufacture, logging and sale, no value
Condition: good/poor condition, rot, age, presence of pests and/or disease, damage and environmental effects

Disposal of residues and treatment of stumps

Methods of disposal: brushwood chippers (gravity feed and roller), waste disposal, eco sites, on-site burning
Stump treatment: chemical/pesticide treatment, stump grinders, mechanical and hand winching, excavation

Unit 203 Disposal of Wood Arisings and Residues from Work on Trees

Outcome 2 Be able to dispose of arisings and residues from work on trees

Assessment Criteria

The learner can:

1. Carry out and **comply with risk assessment**
2. **Prepare equipment and select appropriate method of disposal**
3. **Dispose of residues safely**
4. **Dispose of arising safely**
5. **Convert residues** into a saleable product

Unit content

Comply with risk assessments

Site, task, and machine, emergency procedures, communication to all site operatives

Prepare equipment and select appropriate method of disposal

Prepare equipment: pre-start checks, running checks and safety devices operational

Requirements under Provision and Use of Work Equipment Regulations 1998 (PUWER)

Method of disposal: brushwood chipper, waste disposal sites, eco sites, logged into specified length, on-site burning

Dispose of residues safely

Methods of disposal: brushwood chippers, gravity fed and roller, waste disposal, eco sites, on-site burning

Relevant requirements of by-laws and the Road Traffic Act 1984 (as amended 1991)

Dispose of arising safely

Factors affecting safety: Personal Protective Equipment (PPE), safe working distances, all machines comply to current safety guide lines, risk assessment

Convert residues

Types of product from residues: reasons for each type

Mulches, firewood, wood chips and wood fuel options

Unit 203 Dispose of Wood Arisings and Residues from Work on Trees

Notes for guidance

This unit is designed to provide the learner with an understanding of the disposal of residues and treatment of stumps. The knowledge gained, when combined with practical experience, will provide the learner with the necessary skills to plan, select an appropriate method and carry out the disposal of residues and arisings.

Where applicable appropriate Personal Protective Equipment (PPE) must be provided and worn. The learner must be aware of relevant legislation and the need to carry out risk assessments.

Outcome 1 enables the learner to understand the legal implications of disposal of wood wastes and then be able to implement any necessary controls to reduce risk to self, colleagues, public and the environment. The underpinning knowledge of these requirements will be the main consideration of this outcome.

In Outcome 2, the learner will be required to plan, risk assess and select the correct method of disposal. Emphasis will be on health and safety throughout this outcome. The method of delivery will be through practical situations where the learner can use and select a range of tools and equipment that would be expected in a commercial working environment.

Delivery will be in a practical setting where the learner can select and implement and control measures in a real working environment.

Centres are encouraged to introduce employers and specific professionals from the forestry and arboriculture industries, such as specialised machinery suppliers and dealers, or fellingcontractors to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying machinery in operation.

It is accepted that formal lectures may be necessary at level 2 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of tasks on different sites and situations which reflects current industry practice.

References

Books

James, N.D.G. 1990. *The Arboriculturalist's Companion: A Guide to the Care of Trees.* Sussex: Wiley Publishing.

Watson, B. 2007. Trees Their Use, Management, Cultivation and Biology. Norwich: Crowood Press Ltd.

Ireland, D. 2004. *Winching Operations in Forestry: Tree Takedown and Vehicle Debogging.* Edinburgh: Forestry Commission. ISBN 085538638X.

Journals

Arboriculture Forestry Advisory Group (AFAG) leaflets:
Brushwood Chipper
Petrol driven chainsaws
Crosscut and stack timber
HSE information sheet (AIS 38)

Websites

www.pesticidelibrary.org	The Pesticide Library

Unit 204 Establish Trees and Shrubs

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the establishment of trees and shrubs and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required to prepare the site and plant trees and shrubs safely and without damage to the plants or environment.

Learning outcomes

There are three learning outcomes to this unit. The learner will:

1. Be able to prepare for planting trees and shrubs
2. Know the requirements for planting and establishment of trees and shrubs
3. Be able to plant trees and shrubs

Guided learning hours

It is recommended that 30 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 204 Establish Trees and Shrubs
Outcome 1 Be able to prepare for planting trees and shrubs

Assessment Criteria
The learner can:
1. **Prepare the site** to receive the plants
2. **Check plants** against specification
3. **Transport and handle plants** to minimise damage
4. Distribute planting stock in accordance with the **planting plan**

Unit content

Prepare the site
Ground preparation: weeding, digging
Tools and equipment selected: spades, forks, post hole borer
Personal Protective Equipment (PPE) as per risk assessment
Storage of plants: heeling in bays, cold storage, straw bale and wrap protection, lining out, how plants are secured and root protection
Utilities

Check plants
Specification, size and species and why this is important
Recognise healthy plants: no damage to roots, stem and crown, pest and disease free, buds healthy, roots well formed/fibrous, crown good form/structure

Transport and handle plants
Methods of transportation: security, root protection methods, prevention of desiccation
Handling: keeps roots covered, plants handled with care, plants stacked to avoid damage, plants secured, plants bundled and tied
Personal Protective Equipment (PPE): gloves, safety boots

Planting plan
To include: spacing, layout, planting mix, orientation, location relation to ground preparation and obstructions

Unit 204 Establish Trees and Shrubs

Outcome 2 Know the requirements for planting and establishment of trees and shrubs

Assessment Criteria

The learner can:

1. State the **advantages and disadvantages** of a range of planting stock
2. Describe a range of **soil preparation, planting and support methods** available
3. State how to recognise **healthy planting stock**
4. Explain the importance of keeping **planting records**
5. Describe the **protection and aftercare** needed for a successful establishment

Unit content

Advantages and disadvantages
Cost, landscaping, availability, speed/ease of planting
Size, support requirements, spacing

Soil preparation, planting and support methods
Soil preparation: digging, weeding, fertilizing, humus or top soil, replacing poor soil
Planting methods: pit planting, mound planting, notch planting
Support methods: related to tree size, long stake, short stake, oblique staking, and guying

Healthy planting stock
Recognise healthy plants: no damage to roots, stem and crown, pest and disease free, buds healthy, roots well formed/fibrous, crown good form/structure.

Planting records
Condition of funding/grants, legal requirements, estate records, future planning

Protection and aftercare
Protection from pests to include rabbits, mice and deer
Protection from wind and weed competition
Aftercare to include irrigation in, use of guards, weeding, formative pruning, staking, mulching, eventual removal of guards and stakes

Unit 204 Establish Trees and Shrubs
Outcome 3 Be able to plant trees and shrubs

Assessment Criteria
The learner can:
1. **Plant** trees and shrubs safely to an appropriate depth and spacing
2. Provide **appropriate support** for trees
3. Provide appropriate **protection** from pests
4. Provide **aftercare** to newly planted trees and shrubs

Unit content

Plant
Appropriate method, firmness, depth, and spacing

Appropriate support
Staking method: long or short stake, gate method, oblique staking, guying
Reasons why different methods are used

Protection
Guards, fencing, shelters, approved repellents, approved traps, pesticides

Aftercare
Aftercare to include irrigation where appropriate, use of guards, weeding, formative pruning, treading up, staking, mulching, eventual removal of guards and stakes

Unit 204 Establish Trees and Shrubs
Notes for guidance

This unit is designed to give the learner knowledge and skills to carry out tree planting with a range of plant sizes and have the knowledge and understanding to undertake appropriate aftercare to aid establishment. Delivery of this unit will be in practical situations and formal lectures.

Throughout this unit health and safety and safe working practices will be an important part of this process. It would be expected that learners will be familiar with these requirements. The appropriate Personal Protective Equipment (PPE) must be provided and worn and safe working practices adhered to.

In Outcome 1, the learner will be expected to prepare the site for the delivery of the planting material. Emphasis will be on checking the plants to the given specification. Transport and storage, where applicable, of the plants will be important in this outcome. Learners will need to know how to handle plants without incurring damage to plant material. The planting stock will be distributed as per the planting plan and the learner will have responsibility for this operation.

In Outcome 2, the learner will gain knowledge and experience of the specific requirements for planting various types of plant stock. The learner needs to understand the importance of healthy stock for successful establishment. Site visits will play an important part in emphasising how species type and size will impact on the urban and rural environment. The learner will gain an understanding of the requirements of keeping planting records, including legal requirements and what information needs to be collated. Protection and aftercare is part of this outcome.

Outcome 3 enables the learner to gain the knowledge and practical skills to plant trees and shrubs. This outcome covers the different size planting stock and the learner will select the correct planting method and provide the correct support. The importance of the after care is crucial to this unit and the learners will need to know how and when to provide this service. Health and safety is an integral part of this outcome.

Centres are encouraged to introduce employers and specific professionals from the arboricultural and forestry industries, such as contractors and consultants to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects and the impact of weather extremes on operations.

It is accepted that some formal lectures may be necessary at level 2 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of planting operations on different sites and situations which reflects current industry practice.

References

Books

Agate, E. 2000. *Toolcare: A Maintenance and Workshop Manual.* London: BTCV. ISBN 0946752249.

Agate, E. 2001. *Tree Planting and Aftercare: A Practical Handbook.* London: TCV. ISBN 0946752257.

Agate, E. 2002. *Woodlands: A Practical Handbook.* London: BTCV. ISBN 0946752338.

Buffin, M.W. 2007. *Using and Growing Trees in Your Garden: A Complete Guide to Choosing, Landscaping, Planting, Pruning, Propagating and Caring for Trees.* London: Southwater Publishing.

Dawson, P. 2006. *A Handbook for Horticultural Students.* Surrey: Dawson Books.

Forestry Commission. 1991. *Treeshelters.* Edinburgh: Forestry Commission. ISBN 0117102881

McIndoe, A., McIndoe, R. 2007. *Planting with Trees Hilliers gardeners guide.* Devon: David & Charles.

Morgan, J. 1999. *Forest tree seedlings - best practice in supply, treatment and planting.* Edinburgh: Forestry Commission. ISBN 0855384042.

Watson, B. 2007. *Trees Their Use, Management, Cultivation and Biology.* Norwich: Crowood Press Ltd.

Websites

www.rhs.co.uk The Royal Horticultural Society

Unit 205 Identify and Select Trees and Shrubs

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the identification and selection of trees and shrubs and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will able to develop the skills and knowledge required to identify woody plants and select appropriate species for site, soil, climate and aesthetic reasons. They will also explore the use of trees and shrubs in natural and maintained settings.

Learning outcomes

There are three learning outcomes to this unit. The learner will:

1. Be able to identify trees and shrubs
2. Understand the selection of trees and shrubs to meet specific requirements
3. Be able to select appropriate trees and shrubs to meet specific requirements

Guided learning hours

It is recommended that 30 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH14 Identify and classify plants accurately using their botanical names

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 205 Identify and Select Trees and Shrubs
Outcome 1 Be able to identify trees and shrubs

Assessment Criteria
The learner can:
1. Identify **a range of trees and shrubs**, by genus, species and, where appropriate, cultivar or variety

Range

For a range of broad-leaved and conifer plants: deciduous and evergreen

Unit content

A range of trees and shrubs
At least 100 varieties of an appropriate balance between trees and shrubs
A range of identification techniques: summer leaf, autumn colour, winter twig, flower, bark, fruit, habit and form
The use of simple keys to establish identification features

Unit 205 Identify and Select Trees and Shrubs

Outcome 2 Understand the selection of trees and shrubs to meet specific requirements

Assessment Criteria

The learner can:

1. State and explain the range of **plant stock** available in a nursery sale catalogue
2. Describe the **advantages and disadvantages of various nursery stock**

Unit content

Plant stock

Stock types: transplants, undercut, cuttings, plugs, whips, feathered trees, light standard, standard, heavy standard, semi mature
Stock categories: bare-root, root balled, containerised

Advantages and disadvantages of various nursery stock

Advantages and disadvantages to include: ease of handling, weight, size, ease and speed of establishment, requirement for aftercare, maintenance and watering, requirement for staking and/or support structures, danger of drying out prior to planting, transportation, instant effect, cost, likelihood of losses

Unit 205 Identify and Select Trees and Shrubs

Outcome 3 Be able to select appropriate trees and shrubs to meet specific requirements

Assessment Criteria

The learner can:

1. List trees and shrubs that provide, **attractive flowers, fruits or bark, coloured, bold or autumn coloured foliage and utilisable timber**
2. List trees which are **native to the British Isles**
3. List trees and shrubs appropriate for use on **acidic, calcareous, permanently wet, dry or freely drained soils**
4. List trees and shrubs that are appropriate for use in **polluted atmospheres or in exposed salt laden or inland positions**

Unit content

Attractive flowers, fruits or bark, coloured, bold or autumn coloured foliage and utilisable timber
Flowers: colours, size and shape, time of year for flowering, how colour, size and shape can contribute to site amenity, wild life benefits, landscape values
Fruits: berries, pods, colour, size and shape
Ornamental bark: colour, texture and fissured
Foliage: pigments and breakdown of pigments

Native to the British Isles
Conifers and broad leaf

Acidic, calcareous, permanently wet, dry or freely drained soils
A range of trees for each of the soil types

Polluted atmospheres or in exposed salt laden or inland positions
A range of trees for each situation

Unit 205 Identify and Select Trees and Shrubs
Notes for guidance

This unit will give the learner the underpinning knowledge and skills required for tree and shrub identification. This information will enable the learner to select appropriate trees and shrubs for a range of sites. Delivery of this unit would be a combination of formal lectures and site visits to study trees in a variety of situations.

Outcome 1 requires the learner to identify a range of trees and shrubs, using keys where appropriate. It is expected that each week the learner will be required to study and identify a number of trees and shrubs. A range of broad-leaved, coniferous, evergreen and deciduous trees and shrubs will be selected at different times of the year to help emphasise key identification points such as autumn colour, winter twigs and spring colour.

Outcome 2 the learner will be required to have an understanding of a range and type of plant stock available and select the appropriate stock to suit site, situation and customer requirements.

In Outcome 3 the learner will be required to select appropriate trees and shrubs to meet specific requirements. These include soil types and conditions, environmental conditions and client requirements.

A learner working towards level 2 is likely to have some experience of practical forestry and/or arboricultural activities. This unit aims to develop the learner's knowledge of trees and shrubs.

Centres are encouraged to introduce employers and specific professionals from the forestry and arboriculture industries, such as planting contractors and landscape architects, to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites, such as tree nurseries, parks and gardens, as well as trade shows to add depth to the learner experience.

The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of tree characteristics.

It is accepted that some formal lectures will be necessary at level 2 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to study wide range of plants in a variety of different situations.

References

Books

Mitchell, A. 1992. *Trees of Britain and Northern Europe*. 2nd ed. Hammersmith: Harper Collins.
Hillier, J. 2007. *The Hillier Manual of Trees and Shrubs*. 2nd ed. Devon: David and Charles.
Johnson, O. 2006. *Collins Tree Guide*. Hammersmith: Harper Collins.
Starr, C. 2005. Woodland Management a Practical Guide. Norwich: Crowood Press Ltd.
Watson, B. 2007. Trees, Their management, Cultivation, and Biology. Norwich: Crowood Press Ltd.

Other sources of information

Arboricultural Association
International Society of Arboriculture
The British Standard of Nursery Stock 3936

Websites

www.treesaregood.com	Trees are Good
www.forestry.gov.uk	Forestry Commission

Unit 206 Carry Out Ground-based Arboricultural Operations

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of ground based arboricultural operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to carry out the daily tasks required to support ground-based operations. They will be able to maintain and implement a range of machinery and hand tools relevant to arboriculture. Legal and health and safety requirements will also be examined. The learner will also be able to fell and process small trees as well as operate and carry out basic maintenance on powered equipment and deal with tree stumps.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

Learning outcomes

There are **two** learning outcomes to this unit. The learner will:

1. Be able to carry out maintenance on a range of powered equipment and hand tools
2. Be able to set out the job site

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW25 Support arboricultural operations

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 206 Carry Out Ground-based Arboricultural Operations

Outcome 1 Be able to carry out maintenance on a range of powered equipment and hand tools

Assessment Criteria

The learner can:

1. Carry out **daily maintenance** tasks safely on chainsaws and hand tools
2. Carry out **operator maintenance** on relevant powered equipment safely

Scope

Chainsaws: at least 2 different models or chainsaw manufacturers
Felling Aids: all of wedges, felling leavers/turning hooks, pulp hooks, timber tongs, winches (at least 2 different models) and associated cables, strops and shackles
Hand Tools: secateurs, pruning saws, saws, axes, sledgehammers, files, hammers
Brushwood Chipper: machine above 100mm diameter feed capability

Unit content

Daily maintenance
Cleaning, inspection, fault diagnosis, sharpening, full preparation and testing
Knowledge and understanding of the requirements Provision and Use of Work Equipment Regulations 1998 (PUWER) regulations for operators

Operator maintenance
Cleaning, inspection and full preparation and testing of machine in accordance with manufacturer's handbook
Reasons for operator maintenance and timescales

Unit 206 Carry Out Ground-based Arboricultural Operations
Outcome 2 Be able to set out the job site

Assessment Criteria

The learner can:

1. Describe **legal and environmental requirements** when carrying out work on trees
2. **Set out and put away equipment** and resources relevant to operations and to meet the requirements of the job
3. **Carry out risk assessment**
4. Ensure the work site is left **clean and tidy**

Scope

Urban tree work in small or large gardens. Arboricultural operations on farm land, public parks, open fields or work adjacent to public footpaths, farm tracks or low traffic public roads

Unit content

Legal and environmental requirements
Health and safety at Work etc Act 1974, Provision and Use of Work Equipment Regulations 1998 (PUWER), Management of Health and Safety at Work regulations 1999, Environmental Protection Act 1990 (as amended 1995), Town and Country Planning Act 1961 (as amended 1990
Conservation Areas, Areas of Outstanding Natural Beauty, Site of Special Scientific Interest. Hedgerows Regulations

Set out and put away equipment and resources
Signage/barrier tape/set up communications/pedestrian control, placement of machinery, stacking of arising, environmental/wildlife considerations

Risk Assessment
Risk assessment relates to site, operator, task and machines in use, hazards, risks, control measures, emergency action plans, Ordnance Survey (OS) grid referencing, communicating and abiding with control measures

Clean and tidy
All signs, tools and equipment removed, litter, wood residues, waste products removed, damage repaired, agreed remains stacked as required, ground made good

Unit 206 Carry Out Ground-based Arboricultural Operations
Notes for guidance

This unit is designed to provide the learner with the sound knowledge and the skills required to safely undertake ground-based arboricultural operations. Consideration should be given to the seasons and timing of the work.

Throughout the unit, emphasis should be on safe working. It is expected that the learner will be aware of basic safe working practices in chainsaw and tree work, as well as be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used and aerial tree work must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will be required to carry out routine maintenance on chainsaws and felling aids. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is expected that the learner will be given access to appropriate workshop facilities and tools to maintain and service the chainsaw. It is essential that the manufacturers' manuals are available to undertake this work. The learner should be able to service and maintain the chainsaw to be operated in a realistic working environment. The learner should be encouraged to use a range of chainsaw makes and models as well as to obtain and review manufacturers' information.

Outcome 2 covers how to set out the job site, including the relevant legislation. A requirement of this outcome is that the learner can set out the appropriate equipment in accordance with plans of work and after the operation put the equipment away in a suitable manner. The learner will know the requirements of, and be able to carry out, a risk assessment.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds.

Centres are encouraged to introduce employers and specific professionals from the arboricultural industry, such as contractors and consultants to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of aerial arboricultural work and the impact of weather extremes on operations.

It is accepted that formal lectures are necessary at level 2 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of arboricultural operations on different sites and situations which reflects current industry practice.

References

Books

James, N.D, G.1990. *The Arboriculturalist's Companion: A Guide to the Care of Trees*. Sussex: Wiley Publishing.
Kestel, B. 2009. *Chainsaw Operator's Manual: The Safe Use of Chainsaws*. 7th ed. Australia: Landlinks Press.
Mynors, C. 2010. *The Law of Trees, Forests and Hedgerows. 2nd ed*. London: Sweet and Maxwell.

Journals

Arboricultural Advisory Information Service publications
Arboricultural Association newsletter
Journal of Arboriculture
Arboriculture Forestry Advisory Group (AFAG) leaflets
Machining Operators Manuals

Unit 207 Felling and Extraction of Timber from Woodland

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the felling and extraction of timber from woodland and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required to carry out felling and extraction of timber from woodland. They will also assess an area of woodland to determine an appropriate system of felling and extraction and calculate the volume of standing and felled timber.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

Learning outcomes

There are **two** learning outcomes to this unit. The learner will:

1. Be able to fell trees in a woodland situation
2. Understand the requirements for felling and extraction of timber

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW9 Select, mark and measure trees
TW10 Fell small trees using a chainsaw
TW12 Crosscut small diameter timber using a chainsaw
TW15 Fell trees mechanically
TW16 Process trees mechanically

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 207 Felling and Extraction of Timber from Woodland
Outcome 1 Be able to fell trees in a woodland situation

Assessment Criteria
The learner can:
1. **Fell a conifer or broadleaved tree** safely
2. Remove side branches using an **appropriate procedure**
3. **Cross cut produce** into required lengths and stack safely and neatly
4. **Safely extract trees** from woodland site

Range

Tree with diameter at felling height between 380 mm and 760 mm

Unit content

Fell a conifer or broad-leaved tree
Prepare and inspect the site, identification of problem trees, adherence to industry safety guidance and operator's manual, selection of felling direction, safe and efficient chainsaw operation, appropriate Personal Protective Equipment (PPE) worn, appropriate work positioning, monitoring of chainsaw performance, effective communications, awareness of hazards and escape routes, safe working distances, use of felling aids, first aid provision, routine and non-routine maintenance cleaning and inspection of chainsaw for defects

Appropriate procedure
Snedding (lever method and pendulum method) or delimbing, tension and compression cuts, appropriate work positioning, safe and efficient chainsaw operation

Cross-cut procedure
Cutting to specifications, tension and compression cuts, appropriate work positioning, how to remove a trapped saw safely, safe and efficient chainsaw operation

Safely extract trees
Extraction equipment: grapple skidders, line skidders, clambunk skidders, forwarders, cable cranes, horse extraction
Safety: matching equipment to task and fellingmethod, safe loads (size and weight), ground and site conditions, operator training and safe systems of work

Unit 207 Felling and Extraction of Timber from Woodland

Outcome 2 Understand the requirements for felling and extraction of timber

Assessment Criteria

The learner can:

1. State the **legal and environmental restrictions and requirements** of tree felling
2. Compare the use of **purpose built and adapted machinery**
3. Review the **different types of extraction and ancillary equipment**
4. Assess an area of woodland to determine an **appropriate felling system**

Unit content

Legal and environmental restrictions and requirements

Provision and Use of Work Equipment Regulations 1998 (PUWER), Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Environmental Protection Act 1990 (as amended 1995), Forestry Act 1967 (as amended 1991)
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
Identification of appropriate hazards and risks: site, weather conditions, operator, machine and task, public access and rights of way/highways, power lines and underground services, noise levels
Risk control and reduction: establishment of safety zones, emergency procedures, PPE
Felling controls: felling licenses and Tree Preservation Orders (TPOs)
Environmental: oil and fuel spillage and storage, nesting and breeding seasons, protected species, waste disposal, watercourses

Purpose built and adapted machinery

Dedicated machinery e.g. clambunk skidder, agricultural based machinery e.g.agricultural tractor and forwarding trailer, construction based machinery e.g. excavator fitted with a fellinghead, machinery performance (capacity and efficiency)

Different types of extraction and ancillary equipment

Extraction equipment: grapple skidders, line skidders, clambunk skidders, forwarders, cable cranes, horse extraction
Traction aids: tracks, double wheels and chains
Floatation devices: wide wheels and low pressure systems
Chokering systems: wire chokers, chain chokers and multiple chokers

Appropriate felling system

Felling system: tree length system, shortwood system and whole-tree extraction
Market products and specifications - customary log lengths, customary cross-sectional sizes, taper, species characteristics, end products

Unit 207 Felling and Extraction of Timber from Woodland
Notes for guidance

This unit is designed to provide the learner with knowledge and the skills required to fell and extract timber from woodland. The unit should cover as wide a range of felling and extraction machinery as possible, appropriate to the woodland sites available as well as those locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of basic safe working practices with a chainsaw and familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will be required to harvest medium sized trees in a woodland situation. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. The tree to be felled should have a diameter at felling height between 380mm and 760mm, and the maximum recommended guide bar length is 380mm.

In Outcome 2, the learner will be able to understand the requirements for felling and extraction of timber. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be primarily delivered in practical situations. It is expected that the learner will be introduced to a range of machinery and given the opportunity to consider their advantages and limitations with reference to market requirements and specifications. Emphasis should be placed on current machinery technology and it would be beneficial to include new innovations and developments as they arise in the marketplace. It would be beneficial to include learning within the wider context of market products and specifications, for example how the wood characteristics of different tree species influence the common end products.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds.

A learner working towards level 2 is likely to have some experience of practical forestry activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws and the felling of trees. Emphasis should be placed upon 'doing' and developing practical experience, the learner should be given appropriate time to develop their skills. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree felling and machinery operation.

Centres are encouraged to introduce employers and specific professionals from the forestry industry, such as specialised machinery suppliers and dealers, or machinery operators to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying machinery in operation. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of forest and woodland work and the impact of weather extremes on operations.

It is accepted that formal lectures may be necessary at level 2 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of felling and extraction activities on different sites and situations which reflects current industry practice. It is anticipated that the range of machinery may include equipment adapted from the construction or agricultural industries as well as purpose built forestry equipment.

References

Books

Ireland, D. 2004. *Winching Operations in Forestry*. Norwich: Stationary Office Books. ISBN 085538638X.

Hathaway, L. 1994. *Tractors: Fundamentals of Machine Operation*. Davenport: John Deere Publishing. ISBN 0866912126.

Kestel, B. 2005. Chainsaw Operator's Manual: The Safe Use of Chainsaws. Australia: Landlinks Press. ISBN 0643090282.

Mackie, E.D., Matthews, R.W. 2006. *Forest Mensuration: A Handbook for Practitioners*. Edinburgh: Forestry Commission. ISBN 0855386215.

Mackie, E.D., Matthews, R.W. 2008. *Timber Measurement*. Edinburgh: Forestry Commission. ISBN 97800855387495.

Journals

Forestry and British Timber

Unit 208 Understand and Carry out Silviculture and Habitat Management

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the silviculture and habitat management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required to carry out management activities in woodlands. They will also explore the types of silvicultural systems in UK forestry and multi-use objectives of woodlands.

Learning outcomes

There are three learning outcomes to this unit. The learner will:

1. Describe silvicultural systems in UK forestry
2. Understand the possible objectives of managing woodland
3. Be able to carry out management of woodlands

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

T21 Extract wood products using a horse
CU22 Construct, maintain and repair boundaries and access points
CU 88 Manage habitats

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 208 Understand and Carry Out Silviculture and Habitat Management

Outcome 1 Describe silvicultural systems in UK forestry

Assessment Criteria

The learner can:

1. Explain the different **silvicultural systems** in use in UK Forestry
2. Identify the **components** of a silvicultural system
3. Explain different **thinning regimes** in UK forestry
4. Identify the different **canopy classes** applied to trees

Unit content

Silvicultural systems
Coppice, coppice with standards, clear-cutting system, selection system, group system, strip system, shelterwood system, agroforestry systems continuous cover systems

Components
Felling, thinning and replacement of crops are the main components of a silvicultural system, regeneration may be by natural or artificial means (planting) different silvicultural systems will tend to form different crops (even/uneven aged)

Thinning regimes
Systematic e.g. line and row thinning
Selective e.g. low thinning, crown thinning

Canopy classes
Dominant, co-dominant, sub-dominant, suppressed, wolf, whip, dead or dying

Unit 208 Understand and Carry Out Silviculture and Habitat Management

Outcome 2 Understand the possible objectives of managing woodland

Assessment Criteria

The learner can:

1. Identify the **uses and conservation benefits** of rides, glade and paths
2. State the relevant **legal and environmental constraints and considerations** in the management of woodlands
3. Identify **appropriate tools and equipment** and **associated maintenance needs**

Unit content

Uses and conservation benefits

Access (wildlife corridors, pedestrian, vehicular), increase biodiversity (habitat diversity, wildlife diversity), manage ground and understorey micro-climate conditions, wildlife management and sport, fire breaks, landscape impact

Legal and environmental constraints and considerations

Provision and Use of Work Equipment Regulations 1998 (PUWER), Forestry Act 1967 (as amended 1991), Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Control of Substances Hazardous to Health Regulations 2002 (COSHH), Environmental Protection Act 1990 (as amended 1995)
Wildlife and Countryside Act 1981 (as amended 1991)
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
Health and Safety Executive Information Sheets
Identification of appropriate hazards and risks (site, weather conditions, operator, machine and task, public access, rights of way and highways), risk control and reduction (establishment of safety zones, emergency procedures) felling controls (felling licenses and Tree Preservation Orders (TPOs))
Awareness of requirements under control of pollution legislation (oil and fuel spillage and storage, nesting and breeding seasons, protected species, waste disposal, watercourses)

Appropriate tools and equipment

Machinery: chainsaw, brushcutter, clearing saw, lawnmower
Hand tools: saws, axes, hammers, spirit level, slashers, bill hooks, brushing hooks

Associated maintenance needs

Inspection and cleaning, regular maintenance (sharpening blades, re-handling, fuelling, air filters)

Unit 208 Understand and Carry Out Silviculture and Habitat Management

Outcome 3 Be able to carry out management of woodlands

Assessment Criteria

The learner can:

1. **Maintain rides and paths** in woodlands
2. Carry out **coppice management** safely
3. Carry out **boundary maintenance**

Unit content

Maintain rides and paths

Prepare and inspect the site, identification of appropriate hazards and risks (site, weather conditions, operator, machine and task, public access and rights of way/highways, noise levels), risk control and reduction (establishment of safety zones, emergency procedures), select appropriate equipment (manual, motor-manual, mechanised), correct working techniques, safe and efficient use of Personal Protective Equipment (PPE), appropriate work positioning, effective communications, first aid provision), work to specifications, awareness of environmental considerations (oil and fuel spillage and storage, nesting and breeding seasons, protected species, waste disposal, watercourses)

Coppice management

Appropriate species, coppice activity (in-cycle coppicing or reviving derelict coppice), select appropriate equipment (manual, motor-manual), correct working techniques, safe and efficient use of PPE, appropriate work positioning, effective communications, first aid provision), fell and cut coppice products and stack to specifications, awareness of environmental considerations (oil and fuel spillage and storage, nesting and breeding seasons, protected species, waste disposal, watercourses), protection of coppice regrowth

Boundary maintenance

Fencing to include post and rail, wire, netting
Equipment, post erection, strainers, fitting netting and wire, gates and fittings
Hedge maintenance to include trimming, gap filling
Hedge laying to include terminology, types of hedge laying style, select appropriate manual or motor-manual equipment, preliminary trimming, cutting and laying pleachers, staking the pleachers, binding, final trimming, nesting and breeding seasons, protected species, waste disposal, watercourses
Dry stone walling to include walling terms, types of dry stone walling, stone wall features, build a wall (foundation, correct layering techniques, filling, troughs, coping)
Working techniques to include PPE, first aid provision, work to specifications, awareness of environmental considerations (waste disposal, watercourses)

Unit 208 Understand and Carry Out Silviculture and Habitat Management

Notes for guidance

This unit is designed to provide the learner with knowledge of silvicultural systems and habitat management of woodlands, as well as the skills to be able to carry out associated activities. The unit should cover as wide a range of common operations as possible to enable the learner to adapt and apply their knowledge to the range of forest and woodland types that they may encounter, but focus on methods locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working and sound environmental practices. It is expected that the learner may not be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. Any legal permission required to fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. The learner should be actively involved in comprehensive risk assessments. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is not a requirement for the learner to use pesticides or other approved chemical methods of vegetation management. Simulation and demonstration could be used to illustrate appropriate methods and equipment which are commonly used, but are unavailable to the learner.

In Outcome 1, the learner will be required to understand common silvicultural systems. It is accepted that this outcome will require formal delivery but it should be primarily delivered in practical situations. It would be beneficial to include learning within the wider context of silvicultural systems. For example, reference and links to appropriate nomenclature and tree species characteristics would enhance the learner's experience. In addition, current and topical issues should be highlighted as and when they arise.

In Outcome 2, the learner will understand the possible objectives of managing woodland. It is anticipated that the delivery of this outcome will require formal delivery but it should be primarily delivered in practical situations. The learner should be able to experience as wide a range of real examples of woodland sites and equipment as possible.

A learner working towards level 2 is likely to have some experience of practical forestry activities. This unit aims to develop the learner's knowledge and skills involved with the management of healthy forests and woodlands. Emphasis should be placed upon 'doing' and developing practical experience, the learner should be given appropriate time to develop their skills. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to forest and woodland management.

In Outcome 3 the learner will be required to carry out management of woodlands. It is anticipated that the delivery of this outcome will require some formal delivery but it should be primarily delivered in practical situations. The learner could use any appropriate methods to maintain rides, including handtools, brushcutters and ride-on machinery. If chainsaws are used to undertake coppice management or hedgelaying, it is advisable that learners hold the Level 2 Award in Chainsaw and Related Operations. The learner is required to carry out maintenance on fences or hedges or drywalling as well as carry out hedge laying or drystone walling or fencing. The learner can use any fencing or hedge laying or dry stone walling style but should focus on a style appropriate to the locality of the worksite. The learner can rebuild a free standing dry stone wall, or build a new wall, depending upon

the work site available. It would be beneficial to relate this learning within the wider context of forestry and woodland work. For example, opportunities to be involved in public access and recreational provision, or installation of gates and stiles would enhance the learner's experience. In addition, current and topical issues should be highlighted as and when they arise.

Centres are encouraged to introduce employers and specific professionals from the forestry industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying woodland activities and machinery in operation. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of forest and woodland work and the impact of weather extremes on operations.

It is accepted that formal lectures may be necessary at level 2 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to undertake a range of woodland management activities on different sites and situations which reflect current industry practice.

References

Books

Agate, E. 1996. *Footpaths: A Practical Handbook*. London: BTCV. ISBN 0946752311.

Agate, E. 2000. *Toolcare: A Maintenance and Workshop Manual.* London: BTCV. ISBN 0946752249.

Agate, E. 2001. *Fencing: A Practical Handbook*. London: BTCV. ISBN 094675229X.

Agate, E. 2001. *Tree Planting and Aftercare: A Practical Handbook.* London: BTCV. ISBN 0946752257.

Agate, E. 2002. *Woodlands: A Practical Handbook*. London: BTCV. ISBN 0946752338.

Agate, E., Brooks, A. 1998. *Hedging: A Practical Handbook*. London: BTCV. ISBN 0946752176.

Brooks, A., Adcock, S., Agate, E. 1999. *Dry Stone Walling: A Practical Handbook.* London: BTCV. ISBN 0946752192.

Evans, J. 1984. Silviculture of Broadleaved Woodlands. Norwich: Stationary Office Books. ISBN 0117101540.

Hart, C. 1995. *Alternative Silvicultural Systems to Clear Cutting in Britain: A Review*. Norwich: Stationary Office Books. ISBN 0117103349.

Hibberd, B.G. 1989. *Urban Forestry Practice*. Norwich: The Stationery Office Books. ISBN 0117102814.

Kerr, G. 1993. *Growing Broadleaves for Timber.* Edinburgh: Forestry Commission. ISBN 0117103144.

Matthews, J.D. 1991. *Silvicultural Systems*. Oxford: Oxford University Press. ISBN 019854670X.

Mason, W.L. 1999. *Cultivation of Soils for Forestry*. Edinburgh: Forestry Commission. ISBN 085538400X

Potter, M.J. 1991. Treeshelters. Edinburgh: Forestry Commission. ISBN 0117102881.

Rollinson, T. 1988. *Thinning Control*. Edinburgh: Forestry Commission. ISBN 0117102563.

Savill, P. 1991. *The Silviculture of Trees used in British Forestry*. Oxford: CABI Publishing. ISBN 0851987397.

Savill, P., Evans, J., et al. 1997. *Plantation Silviculture in Europe*. Oxford: Oxford University Press. ISBN 0198549083.

Trout, R.C. 2006. *Forest Fencing. Edinburgh*: Forestry Commission. ISBN 0855386886.

Journals

Forestry and British Timber

Quarterly Journal of Forestry

Unit 209 Understand and Carry out Basic Visual Tree Inspections

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the tree management activities and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required to maintain trees and woodlands and carry out investigations to diagnose tree problems. The learner will review woody plants in open countryside, parks, streets, housing areas and small gardens and be familiar with the relevant legislation, British Standards and Codes of Practice.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Understand basic tree health
2. Be able to collect and interpret data to assist in the diagnosis of problems
3. Understand the diagnosis of tree problems

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW3.1 Carry out site surveys
TW7 Carry out post-planting protection and maintenance
CU76.2 Remove unwanted plant growth
GWT14.2 Manage coppice rotations

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 209 Understand and Carry Out Basic Visual Tree Inspections

Outcome 1 Understand basic tree health

Assessment Criteria

The learner can:

1. Describe the **natural requirements for healthy growth**
2. Explain the **remedial measures** to aid tree growth
3. Describe how trees **interact with fungi and respond to wounding**

Unit content

Natural requirements for healthy growth

Light, water, nutrients, oxygen, rooting substrate, free from pests and diseases and free from competition

Photosynthesis and respiration processes: how carbon dioxide, oxygen, water and sunlight combined produce sugars that are utilised in the respiration process to produce energy

Nutrients: major and minor, importance for growth and symptoms of deficiency should be included

Remedial measures

Soil amelioration and aeration, removal of competition, irrigation and drainage, fertilization

Types of tree support: staking methods, guying

Protection: to include protection from people, rabbit and deer and the elements

Mychrrohizae

Interact with fungi and respond to wounding

Mycorrhizae associations: symbiotic relationships, how these are beneficial to tree health/growth

Pathogenic fungi: principle fungi detrimental to tree health

Trees response to wounding: trees natural defence, Compartmentalisation of Decay in Trees (CODIT), wound wood, natural target pruning

Unit 209 Understand and Carry Out Basic Visual Tree Inspections

Outcome 2 Be able to collect and interpret data to assist in the diagnosis of problems

Assessment Criteria

The learner can:

1. Carry out a simple **tree survey** and record your findings in an **appropriate format**
2. Carry out a **basic visual inspection** on an individual tree and record your findings in an appropriate format
3. **Interpret data** collected from tree surveys or inspections

Unit content

Tree survey

Tree surveys/inspections: difference between the two
Format of data collection: paper/hand held computerised systems
Simple format to include: tree number, species, height, spread, and condition
Equipment to carry out surveys: measuring tapes, clinometers, callipers, DBH tapes, recording equipment

Appropriate format

Computer or hard copy: use of tables, graphs, reports
Format to include: tree number, species, height, spread and condition

Basic visual inspection

Basic inspection to include: presence of decay, pests and diseases, girth, height and spread, condition, safe useful life expectancy
Introduction to decay detection equipment to include invasive, semi-invasive and non invasive techniques

Interpret data

To include: trends, problem trees of concern, recommendations for future work, summary information

Unit 209 Understand and Carry Out Basic Visual Tree Inspections

Outcome 3 Understand the diagnosis of tree problems

Assessment Criteria

The learner can:

1. Explain how a **basic visual inspection** of an individual tree can help to assess its health and condition

Unit content

Basic visual inspection

Basic inspection to include: presence of decay, pests and diseases, girth, height and spread, condition, safe useful life expectancy

Introduction to decay detection equipment to include invasive, semi-invasive and non invasive techniques

Unit 209 Understand and Carry Out Basic Visual Tree Inspections

Notes for Guidance

This unit is designed to equip the learners with the knowledge and skills to manage trees and woodland. There will be an emphasis on health and safety and safe working practice. The delivery of this unit will be classroom based for some theory sessions, combined with practical application. Tutors need to provide examples of tools and equipment to emphasise the range of resources needed in the industry.

Outcome 1 covers the knowledge and understanding to promote healthy tree growth. The growing media of tree and shrubs are of crucial importance and the requirement to improve the soil through a range of improvement strategies should be covered by the learner. The learner should be aware of the influence of light, water, nutrients, oxygen, rooting substrate, pests and diseases and competition on tree growth.

In Outcome 2, the learner will be required to collect pre-determined data for a simple tree survey and detailed visual tree inspection. The learner should know the difference in the information requirements between a simple and detailed survey. Interpreting the data collected will form an important part of the activity and the tutor will provide the guidance on how this will influence any recommendations. Theory combined with practical application will be conducive to the learning experience and this will help the learner apply their knowledge to a commercial environment. Reasons for surveys and inspection and legal obligations will help put in context the importance of the tree inspection process.

In Outcome 3, the learner will know how specialist equipment can play an important role within the tree inspection/survey process and be able to input data into the relevant format. The learner should be able to use this equipment for collecting detailed information about the internal condition of the tree. Emphasis should be made that decisions on trees are a combination of visual and detailed inspection and not just the results of decay detection alone. The particular requirements for specific types of trees will form part of this outcome.

Centres are encouraged to introduce employers and specific professionals from the forestry and arboriculture industries to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner's experience. In addition, current and topical issues regarding tree and woodland management activities should be highlighted as and when they arise.

It is anticipated that the delivery of this unit will be delivered through supervised practical training and the learner be able to consolidate operational skills within realistic working environments. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of tree work and the impact of weather extremes on operations. It is accepted that some formal lectures will be necessary at level 2 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of equipment in different situations which reflect current industry practice.

References

Books

Brown, G.E. Kirkham, T. 2009. *The Pruning of Trees, Shrubs and Conifers*. 2nd ed. Portland: Timber Press. ISBN 0881926132.

Cowan, A. 2003. *Trees and Bats*. Cheltenham: Arboricultural Association. ISBN 0900978376.

Fay, N., Dowson, D. et al. *Tree Surveys: A Guide to Good Practice*. Cheltenham: Arboricultural Association. ISBN 0900978388.

Helliwell, R. 2003. *Visual Amenity Valuation of Trees and Woodlands*. Cheltenham: Arboricultural Association. ISBN 0900978432.

James, N.D.G. 1990. *The Arboriculturalists Companion: A Guide to the Care of Trees*. 2nd ed. Sussex: Wiley Publishing.

Lonsdale, D. 1999. The Principles of Tree Hazard Assessment and Management. Norwich: Stationery Office Books. ISBN 0117533556.

Mattheck, C., Breloer, H. 1995. *The Body Language of Trees: A Handbook for Failure Analysis*. Norwich: Stationery Office Books.

Watson, B. 2006. *Trees- Their Use, Management, Cultivation and Biology*. Wiltshire: The Crowood Press Ltd.

Websites

www.treesaregood.com Trees are Good

Unit 210 Undertake Tree Felling Operations

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the tree felling operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to carry out the tasks required during tree felling operations. They will be able to maintain chainsaws and felling aids. The learner will also be able to comply with health and safety codes of practice and legislation relevant to tree felling operations. Forestry specific elements will also be examined. The learner will be able to safely fell and sned/de-limb small trees.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Be able to carry out routine operator maintenance on a chainsaw
2. Be able to comply with legislation and codes of practice relevant to tree felling operations
3. Be able to fell small trees using a chainsaw and felling aids

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW10 Fell small trees using a chainsaw
TW15 Fell trees mechanically

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 210 Undertake Tree Felling Operations

Outcome 1 Be able to carry out routine operator maintenance on a chainsaw

Assessment Criteria

The learner can:

1. Identify **standard safety features of common chainsaws**
2. Carry out **appropriate daily and weekly maintenance and pre-start checks**
3. **Identify and rectify common faults with chainsaws**

Unit content

Standard safety features of common chainsaws
Standard safety features: working on-off switch, statutory warning labels, front hand guard or inertia chain break, chain catcher, safety throttle, anti-vibration mounts, guide bar and chain combination, rear hand guard, exhaust directing fumes away from the operator, chain cover, optional heated handles

Appropriate daily and weekly maintenance and pre-start checks
Maintenance: replacement and adjustment of operator serviceable components as per manufacturers' guidance and operator's manual, clean chainsaw and inspect for damage, sharpen and maintain chain, maintain guide bar, maintain air filter, maintain chain break, inspect and maintain sprocket, service recoil starting mechanism, service spark plug, inspect and maintain fuel and oil filters
Pre-start checks: chain tension checked, safety features checked and condition assessed, external nuts and bolts checked for security, sufficient fuel and chain oil

Identify and rectify common faults with chainsaws
Common faults: incorrect fuel mix, uneven and excessive guide bar and chain wear, saw not cutting in a straight line, excessive vibration, chain creep at tick over, bar and chain overheating, chain oil mechanism not working, blocked filters, engine stalls and will not tick over
Use of manufacturers' part numbers

Unit 210 Undertake Tree Felling Operations

Outcome 2 Be able to comply with legislation and codes of practice relevant to tree felling operations

Assessment Criteria

The learner can:

1. Identify **legislation relevant to tree felling operations**
2. **Carry out a risk assessment appropriate to tree felling operations**
3. Identify and use **appropriate Personal Protective Equipment (PPE)**

Unit content

Legislation relevant to tree felling operations

Provision and Use of Work Equipment Regulations 1998 (PUWER), Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Environmental Protection Act 1990 (as amended 1995), Forestry Act 1967 (as amended 1991)
Health and safety: risk assessment, need for training and certification, requirement for Personal Protective Equipment (PPE), statutory warning notices
Felling controls: felling licenses and Tree Preservation Orders (TPOs)
Environmental considerations: oil and fuel spillage and storage, nesting and breeding seasons, protected species, waste disposal, watercourses and noise

Carry out a risk assessment appropriate to tree felling operations

Identification of appropriate hazards and risks: site and ground conditions, tree condition, weather conditions, operator, work colleagues, machine and task, public access and rights of way/highways, power lines, noise levels
Risk control and reduction: establishment of safety zones, emergency procedures, refuelling sites, PPE
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Appropriate Personal Protective Equipment (PPE)

Personal Protective Equipment: boots, trousers/leggings, gloves jacket, helmet with visor and ear protection
Legislation and suitability: all approved for chainsaw use, CE marked and within time limits for approved use, correct size

Unit 210 Undertake Tree Felling Operations

Outcome 3 Be able to fell small trees using a chainsaw and felling aids

Assessment Criteria

The learner can:

1. Carry out **felling operations safely using appropriate felling methods**

Range

Tree with diameter at felling height between 200 mm and 380mm

Unit content

Felling operations safely using appropriate felling methods

Identification of problem trees, prepare and inspect the site, adherence to industry safety guidance and operator's manual, selection of felling direction, safe and efficient chainsaw operation, appropriate PPE worn, appropriate work positioning, monitoring of chainsaw performance, effective communications, awareness of hazards and escape routes, safe working distances, use of felling aids, first aid provision, worksite left in a safe and tidy condition

Unit 210 Undertake Tree Felling Operations
Notes for guidance

This unit is designed to provide the learner with knowledge and the skills required to fell small trees. The unit should cover as wide a range of felling opportunities as possible, appropriate to the woodland sites available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be unaware of basic safe working practices with a chainsaw but is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate PPE appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will be required to carry out routine maintenance on chainsaws. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is expected that the learner will be given access to appropriate workshop facilities and tools to maintain and service the chainsaw. It is essential that the manufacturers' manuals are available to undertake this work. The learner should be able to service and maintain the chainsaw to be operated in a realistic industrial environment. The learner should be encouraged to experience a range of chainsaw makes and models as well as to obtain and review manufacturers' information.

In Outcome 2 the learner will be required to comply with legislation and codes of practice relevant to tree felling operations. This outcome should be undertaken in conjunction with Outcome 3.

In Outcome 3, the learner will be required to fell small trees in a woodland situation. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. The trees to be felled should have a diameter at felling height between 200mm and380mm, and the maximum recommended guide bar length is 380mm. The learner must not be required to fell trees on a windthrown or other high risk forestry site. In addition, the operations of chainsaws off the ground and of polesaws are excluded from this unit.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds .

A learner working towards level 2 is likely to have some experience of practical forestry activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws and the felling of small trees. Emphasis should be placed upon 'doing' and developing practical experience,

the learner should be given appropriate time to develop their skills. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree felling operations.

Centres are encouraged to introduce employers and specific professionals from the forestry industry, such as specialised machinery suppliers and dealers, or felling contractors to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying machinery in operation. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of forest and woodland work and the impact of weather extremes on operations.

It is accepted that some formal lectures may be necessary at level 2 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of felling activities on different sites and situations which reflects current industry practice.

References

Books

Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package.* Cheltenham: Arboricultural Association. ISBN 0900978406.

Ireland, D. 2004. *Winching Operations in Forestry: Tree Takedown and Vehicle Debogging.* Surrey: Forestry Commission. ISBN 085538638X

Kestel, B. 2009. *Chainsaw Operator's Manual: The Safe Use of Chainsaws.* 7th ed. Australia: Landlinks Press. ISBN 0643090282

Journals

Forestry and British Timber

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Unit 211 Undertake Tree Climbing and Pruning Operations

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the tree pruning operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to carry out the tasks required during tree pruning operations. They will be able to maintain chainsaws, hand tools and climbing equipment. The learner will also be able to comply with health and safety codes of practice and legislation relevant to tree pruning operations. The learner will also be able to describe theory behind pruning operations in relation to tree biology and seasonality.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Be able to access trees safely
2. Be able to carry out pruning operations
3. Be able to comply with legislation and best practice relevant to tree pruning operations

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

T26 Support colleagues undertaking off ground arboricultural operations

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 211 Undertake Tree Climbing and Pruning Operations
Outcome 1 Be able to access trees safely

Assessment Criteria
The learner can:
1. Carry out a **pre climb hazard inspection**
2. Carry out **appropriate inspection procedures for climbing equipment**
3. Access a tree using **safe and appropriate techniques**
4. Demonstrate **installation of climbing anchor point**
5. Demonstrate **safe work positioning within the tree canopy**

Unit content

Pre climb hazard inspection
Identification of hazards and risk levels: Site and ground conditions, weather conditions, tree condition, task, public access and rights of way/highways, power lines, noise levels,
Risk control and reduction: establishment of safety zones, emergency procedures, rescue equipment, first aid provision, refuelling site, Personal Protection Equipment (PPE),
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Appropriate inspection procedures for climbing equipment
Equipment appropriate to selected working methods, definition and status of a 'competent person', requirements for independence, Certificates of Conformity, categories of equipment, appropriate examination intervals, marking of individual items of equipment, wear patterns and types of damage, wear limits and tolerances

Safe and appropriate techniques
Safe access methods: ladders, Mobile Elevated Work Platforms (MEWPs), rope and harness, throwlines, climbing irons

Installation of climbing anchor point
Selection of appropriate anchor points for operation, use of cambium savers

Safe work positioning within the tree canopy
Selection of appropriate anchor points and supplementary anchor points, use of cambium savers, changing of anchor points, rope organisation, branch walking, controlled descent

Unit 211 Undertake Tree Climbing and Pruning Operations
Outcome 2 Be able to carry out pruning operations

Assessment Criteria
The learner can:
1. Carry out **tree pruning operations using hand tools safely**
2. Demonstrate knowledge of appropriate **tree pruning methods**
3. Demonstrate knowledge of **target pruning**

Unit content

Tree pruning operations using hand tools safely
Adherence to industry safety guidance, appropriate work positioning, effective communications, awareness of hazards and escape routes, safe working distances, correct pruning techniques, correct operation of equipment, safe working practices, safe use of ancillary equipment, first aid provision, appropriate disposal of waste, prevention of pollution, minimise environmental impact, leave the worksite in a safe and tidy condition

Tree pruning methods
British Standard 3998, crown thinning, crown reduction, crown reshaping and formative pruning, crown lifting, deadwooding, brashing, pollarding, coppicing

Target pruning
Timing of operations, branch collars, branch bark ridge, British Standard 3998

Unit 211 Undertake Tree Climbing and Pruning Operations

Outcome 3 Be able to comply with legislation and best practice relevant to tree pruning operations

Assessment Criteria

The learner can:

1. Identify **legislation relevant to tree pruning operations**
2. Describe **legal and environmental considerations when dealing with arisings** resulting from tree pruning operations
3. Carry out a **risk assessment appropriate to tree pruning operations**

Unit content

Legislation relevant to tree pruning operations

Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting operations and Lifting Equipment Regulations 1998 (LOLER), Work at Height Regulations 2005
Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Town and Country Planning Act 1961 (as amended 1990), Town and Country Planning (Trees) Regulations 1999

Legal and environmental considerations when dealing with arisings

Environment Protection Act 1990 (as amended 1995), Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003), Waste Management Licensing Regulations 1994 (as amended 1997), Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 (as amended 1998)
Registered professional collector and/or dealer of waste (agricultural waste only), registered waste carrier or broker, register with Environment Agency (or equivalent), Waste Transfer Notes (WTNs) and record keeping

Risk assessment appropriate to tree pruning operations

Identification of appropriate hazards and risk levels: site and ground conditions, weather conditions, tree condition, operator, machine and task, public access and rights of way/highways, power lines, noise levels
Risk control and reduction: establishment of safety zones, emergency procedures, rescue equipment, first aid provision, refuelling site, PPE
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Unit 211 Undertake Tree Climbing and Pruning Operations
Notes for guidance

This unit is designed to provide the learner with knowledge and practical skills associated with the requirement to prune trees. The unit should cover a range trees, as well as techniques and equipment such as polesaws. Consideration should be given to the seasonal nature and timing of tree pruning, as well as when signs and symptoms associated with causes of potential failure (e.g. pathogens) may be easily observed.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of basic safe working practices in chainsaw and aerial treework, as well as familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery and climb trees, therefore health and safety issues relevant to the operation of the machinery used and aerial treework must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to prune trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998 and Lifting operations and Lifting Equipment Regulations 1998 (LOLER). Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcomes 1 and 2 the learner will be required to access and work in trees. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is expected that the learner will be given access to appropriate climbing and access equipment to undertake this outcome and to have received sufficient preparatory training in safe tree climbing and work positioning techniques. It is important that the learner must cover a good range of pruning methods however it is not expected that every method listed must be covered. The learner should be encouraged to work in trees in a variety of situations and meet with arboricultural contractors and statutory undertakers to discuss real case studies of the need for tree pruning. The learner must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

In Outcome 3, the learner will be required to carry out pruning operations within tree canopies. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is necessary for the learner to be given access to appropriate climbing and access equipment to undertake this outcome and to have received sufficient preparatory training in the safe use of tree climbing, pruning equipment and work positioning. It is also necessary for the learner to be given the opportunity to undertake a range of types of pruning work in realistic working environments. The learner must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.
This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations or the Level 3 Certificate of Competence in the Thorough Examination of Arboricultural Equipment.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds .

A learner working towards level 2 is likely to have some experience of practical forestry and arboricultural activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws and tree climbing. Emphasis should be placed upon 'doing' and developing practical experience, the learner should be given appropriate time to develop their skills. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree pruning operations.

Centres are encouraged to introduce employers and specific professionals from the arboricultural industry, such as specialised machinery suppliers and dealers, or arboricultural contractors to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying treework in operation. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of treework and the impact of weather extremes on operations.

It is accepted that some formal lectures may be necessary at level 2 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of tree pruning on different sites and situations which reflects current industry practice.

References

Books

Arboricultural Association. 1994. *A Guide to Tree Pruning*. Cheltenham: Arboricultural Association. ISBN 090097821X.

Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package*. Cheltenham: Arboricultural Association. ISBN 0900978406.

British Standards Association. 1966. *BS 3998: Recommendations for Tree Work.* British Standards Institute. ISBN 0580171701.

British Standards Association. 1966. *BS 3998: Recommendations for Tree Work.* British Standards Institute. ISBN 0580171701.

Brown, G., Kirkham, T. 2009. *The Pruning of Trees, Shrubs and Conifers.* Portland: Timber Press. 2004. ISBN 0881926132.

Cottam, M., McKeown, L., White, C. 2006. *A Guide to Good Climbing Practice*. Cheltenham: Arboricultural Association. ISBN 0900978392.

Donzelli, P.S., Lilly, S.J. 2001. *The Art and Science of Practical Rigging*. Canada: International Society of Arboriculture.

Jepson, J. 2000. *The Tree Climber's Companion: A Reference And Training Manual For Professional Tree Climbers*. Springfield: Access Publishing Inc.. ISBN 0615112900.

Mynors, C. 2010. *The Law of Trees, Forests and Hedgerows.* 2nd ed. London: Sweet and Maxwell. ISBN 0421590408.

Shigo, A.L. 1989. *Tree Pruning: A Worldwide Photo Guide.* Snohomish: Shigo and Trees Associates. ISBN 0943563089

Journals

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Forestry and British Timber

Journal of Arboriculture

Quarterly Journal of Forestry

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Unit 212 Introduction to Land-Based Machinery Operations

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of land-based machinery operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge to select, prepare, operate, and maintain a range of land- based equipment and machines appropriate to their area of study. The learner will also cover the health and safety requirements associated with the use and maintenance of machines.

Learning outcomes

There are four learning outcomes to this unit. The learner will:

1. Understand safe working principles when using equipment and machinery
2. Be able to prepare land-based equipment and machinery for use
3. Be able to operate land-based equipment and machinery
4. Be able to maintain land-based equipment and machinery

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU27 Maintain equipment and machines
L27 Use and maintain non-powered and hand held powered tools and equipment.

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 212 Introduction to Land-based Machinery Operations

Outcome 1 Understand safe working principles when using equipment and machinery

Assessment Criteria

The learner can:

1. Select **appropriate equipment** for land-based tasks
2. Explain why **manufacturers' instructions** should be followed when working with land-based equipment and machines
3. Explain the **legal and environmental requirements** associated with specific machines
4. Identify the **controls/devices/instruments** and other health and safety requirements for machinery and equipment

Range

Agriculture

As appropriate from:
Types: powered and powered machines, tractor mounted, trailed or self propelled, seeding/ planting equipment
Purposes: seedbed preparation, crop harvesting, materials application, liquids, solids, granules, powders

Horticulture/Landscape

As appropriate from:
Types: non powered tools and equipment, hand held power tools, pedestrian controlled machines, ride on machines
Purposes: ground preparation, grass cutting and collection, materials application, liquids, granules, powders, pelleting, chipping, shredding

Unit content

Appropriate equipment

As outlined above, selection, fit for purpose, ground conditions, suitability for scale of work, training/certification requirements

Manufacturers' instruction

Dealer installation process, operator instruction manuals, manufacturer web sites

Legal and environmental requirements

Health and Safety at Work etc Act 1974 (HASWA), Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER Control of Substances Hazardous to Health Regulations (2002) (COSHH),
Control of Pesticides Regulations 1986 (COPR), Environmental contamination, Personal Protective equipment (PPE)

Controls/devices/instruments

Operator controls, power unit controls, manual, hydraulic, electronic, machine adjustment/performance settings - safe start devices, clutches, performance/load limiters, seat occupation switches, guards – warning lights, analogue/digital information

Unit 212 Introduction to Land-Based Machinery Operations
Outcome 2 Be able to prepare land-based equipment and machinery for use

Assessment Criteria
The learner can:
1. Carry out **adjustments** on land-based equipment and machines to meet specific requirements prior to use
2. Explain the **benefits** of correct adjustment of equipment and machines
3. Carry out **pre-start checks,** including **fuelling**

Range

Agriculture
As appropriate from:
Types: powered and powered machines, tractor mounted, trailed or self propelled, seeding/ planting equipment
Purposes: seedbed preparation, crop harvesting, materials application, liquids, solids, granules, powders

Horticulture/Landscape
As appropriate from:
Types: non powered tools and equipment, hand held power tools, pedestrian controlled machines, ride on machines
Purposes: ground preparation, grass cutting and collection, materials application, liquids, granules, powders, pelleting, chipping, shredding

Unit content

Adjustments
Operator fit, working height/depth/speed/calibration/tilth/work rate

Benefits
Specific work rates/outputs achieved, power/fuel consumption, risk of premature wear/damage to equipment, operator fatigue

Pre-start checks
Lubricants, cooling, fuel level, wheel equipment, safety guards, road legal, machine/vehicle security, PPE

Fuelling
Fuel types, fuel contamination checks, correct storage, machine power isolation, ventilation, spillage, safe areas, fire hazards, PPE

Unit 212 Introduction to Land-Based Machinery Operations

Outcome 3 Be able to operate land-based equipment and machinery

Assessment Criteria

The learner can:

1. **Operate** equipment and machines safely and **efficiently** for different land-based activities
2. Carry out activities to achieve the **desired results** when operating land-based equipment and machines

Range

Agriculture

As appropriate from:
Types: powered and powered machines, tractor mounted, trailed or self propelled, seeding/ planting equipment
Purposes: seedbed preparation, crop harvesting, materials application, liquids, solids, granules, powders

Horticulture/Landscape

As appropriate from:
Types: non powered tools and equipment, hand held power tools, pedestrian controlled machines, ride on machines
Purposes: ground preparation, grass cutting and collection, materials application, liquids, granules, powders, pelleting, chipping, shredding

Unit content

Operate

Attachment to power unit, engagement of power, assess test runs and re-adjust, site assessment for hazards/risks, continuous monitoring of performance, over/under lapping

Efficiency

Acceptable work rates, back up power availability, economy of fuel, wearing component lifespan

Desired results

All area covered, correct application rates/tilth of seedbed, quality of cut, avoid undesirable results (compaction of soil, wheel marks in seedbed)

Unit 212 Introduction to Land-Based Machinery Operations

Outcome 4 Be able to maintain land-based equipment and machinery

Assessment Criteria

The learner can:

1. Identify **routine maintenance** for land-based equipment and machines using manufacturers' instructions
2. Identify **hazards** and comply with risk assessments **during maintenance activities**
3. Carry out different **routine maintenance activities** safely on a range of equipment and machines
4. **Record maintenance activities** in an **appropriate format**

Range

Agriculture

As appropriate from:
Types: powered and powered machines, tractor mounted, trailed or self propelled, seeding/ planting equipment
Purposes: seedbed preparation, crop harvesting, materials application, liquids, solids, granules, powders

Horticulture/Landscape

As appropriate from:
Types: non powered tools and equipment, hand held power tools, pedestrian controlled machines, ride on machines
Purposes: ground preparation, grass cutting and collection, materials application, liquids, granules, powders, pelleting, chipping, shredding

Unit content

Routine maintenance

Pre-work assessment of machine condition, routine/periodic maintenance, adjustments for wear, lubrication, replacement components, preparation for storage, cleaning, lubrication and protection

Hazards during maintenance activities

Identify hazards according to operations

Record maintenance activities

Complete maintenance record sheet/job cards, record service/maintenance interval/date/work done, record replacement of wearing components, working life

Appropriate format

Manufacturers documentation, service record book, service record charts, company procedures, electronic record storage, service interval label on machine

Unit 212 Introduction to Land-based Machinery Operations
Notes for guidance

This unit is designed for learners who will be given responsibility for field/groundwork using machines typical to their area of study. The unit will provide learners with knowledge and understanding, operational skills and service procedures to prepare, use, maintain and store machines and equipment. Throughout the unit the emphasis will be on acceptable health and safety procedures and safe working practices. It is expected that where tractor mounted machines are to be utilised, prior learning on tractor operations will have been assessed to ensure the learner has reached an acceptable level of skills and knowledge.

The range covered during delivery should include electric vehicles and machinery.

Health and safety - Centres and tutors aware of the need to safeguard learners, particularly in relation to pre-16 learners, when delivering and assessing units where the operation of machinery is involved. This unit requires the learner to undertake machinery operations under close supervision, and this is the same for any unit within the qualification that requires the learner to operate or use machinery. This is a largely practical-based unit which looks at the basic preparation, operation and maintenance of equipment and machinery. There is significant emphasis on safe practices throughout the unit and reference to risk assessment in learning outcome 4. Throughout the unit the emphasis is on acceptable health and safety procedures and safe working practices. The guidance in this unit requires that Health and Safety must be strictly enforced and repeated throughout. The HSE guidance AS10 'Preventing Accidents to Children on Farms' provides practical guidance on how to reduce the risk of injury to children under 13 and older children below the minimum school leaving age (usually 16).

In Outcome 1 the learner will be able to select a suitable item of equipment to perform a range of land-based tasks to achieve given outcomes. The learner will be able to understand basic working principles of the equipment and any environmental and legal issues relating to the machines' use. Manufacturers' instructions are to be followed at all times to interpret operator controls and instrumentation information.

In Outcome 2 the learner is expected to demonstrate skills in the use of machines and equipment used in the area of their study. This may entail operator set up, connection to power source and initial setting prior to moving on site. Where tractor trailed, mounted or self propelled equipment is to be used an understanding of safe fuelling and transportation must be demonstrated. With ever-increasing costs on fuel, wearing components and operator time, an understanding of the benefits of correct operating procedures, setting linked to work rate targets must be understood.

In Outcome 3 the learner needs to be aware of a range of machine capabilities to achieve specified performance criteria. These may be work rate targets, quality of work, height/depth of work or delivery rates. Field/site procedures need to be correctly chosen where subsequent operations are to follow. Seeding requires a specific depth of seedbed, a fineness of tilth to suit seed type, minimum seedbed compaction with no wheel marks evident.

In Outcome 4 the learner must be able to identify from the manufacturers' instructions, and demonstrate maintenance requirements and procedures. Where power sources are used, maintenance of those sources will need to be identified. Risks of injury/damage to self, others, the environment or equipment need to be identified by the learner and control measures put in place prior to commencement of any maintenance tasks. To enable evaluations and costings to be done an accurate

record of work, maintenance and replacement parts must be recorded. This may also be of benefit where warranty procedures are to be implemented to recoup costs of breakdowns.

References

Books

Bell B. 2005. *Farm Machinery.* Old Pond Publishing. ISBN: 1-903-36668-2.
Culpin C. 1992. *Farm Machinery, 12th edition.* Blackwell Scientific. ISBN: 0-632-03159-X.

Journals

Horticultural Weekly
Profi International
Manufacturers publications and manuals
Lubrication charts and data sheets

Websites

www.bagma.com	British Agricultural and Garden Machinery Association
www.defra.gov.uk	Dept for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)
www.hse.gov.uk	Health and Safety Executive

Unit 213 Participate in Providing Estate Maintenance

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of estate skills and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The aim of this unit is allow learners from a range of land-based disciplines to develop the skills and knowledge to maintain boundaries, surfaces or habitats.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to select, transport and use a range of hand tools and equipment for estate maintenance
2. Be able to maintain estate boundaries
3. Be able to maintain surfaces or habitats
4. Know how to work safely and minimise environmental damage

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU2.2 Maintain good standards of health and safety for self and others
CU20.1 Maintain structures and surfaces
CU20.2 Repair structures and surfaces
CU22.1 Construct, maintain and repair boundaries
CU23.1 Construct, maintain and repair paths

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SCC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 213 Participate in Providing Estate Maintenance

Outcome 1 Be able to select, transport and use a range of hand tools and equipment for estate maintenance

Assessment Criteria

The learner can:

1. Select appropriate **tools and equipment** for specific **estate maintenance tasks**
2. **Lift tools and equipment safely** using appropriate techniques
3. **Transport and use tools** and equipment **safely**
4. **Maintain and store** tools and equipment according to instructions

Unit content

Tools and equipment

Selection of appropriate tools and equipment (hammer, saw, spade, shovel, pickaxe, post driver, wire strainers, hoe, rake, fork, secateurs, shears, power tools)

Estate maintenance tasks

Constructing, maintaining and mending boundaries, structures and surfaces

Lift tools and equipment safely

Use of appropriate safe lifting techniques, in line with manual handling guidelines and Manual Handling Operations Regulations 1992, straight back, bend knees

Transport and use tools safely

Manual transport, mechanically assisted transport, security of tools

Maintain and store

Routine maintenance, (preparation, checking, adjusting, cleaning), storage, according to instructions

Unit 213 Participate in Providing Estate Maintenance
Outcome 2 Be able to maintain estate boundaries

Assessment Criteria
The learner can:
1. Assess the **condition of boundaries** to determine the maintenance requirement
2. Carry out **routine maintenance** of boundaries safely
3. Carry out **routine repairs** of boundaries safely
4. Dispose of **waste materials** in line with instructions

Range

Boundaries
Living boundaries: hedge, bank, ditch
Constructed boundaries: fence (post and rail, post and wire, electric, netting), wall (stone, brick)

Unit content

Condition of boundaries
Identified purpose, fitness for purpose, visual appearance, state of repair, health and safety implications (for people, livestock or vehicles and access)

Routine maintenance
Appropriate identified maintenance tasks, for example trimming hedges, clearing ditches, restoring banks, checking and adjusting wire tension, improving/maintaining access infrastructure (for example gaps, gates, stiles)

Routine repairs
Appropriate identified repair tasks (wood, brick or stone replacement or treatment)

Waste materials
By-products of repair or maintenance (hedge clippings, debris, litter, rotten wood)

Unit 213 Participate in Providing Estate Maintenance
Outcome 3 Be able to maintain surfaces or habitats

Assessment Criteria
The learner can:
1. Assess the condition of **surfaces** or **habitats** to determine the maintenance requirement
2. Carry out appropriate **maintenance or repairs** of surfaces or habitats

Unit content

Surfaces
Appropriate to the sector: solid (decking, concrete, paving), loose (gravel, wood chippings, sand), horse riding arena surfaces

Habitats
Appropriate to the sector: pond, woodland, heath, field margins, grassland, grazing land

Maintenance or repairs
Identified tasks: adding surface, applying a surface treatment, levelling surface, clearing or restoring a habitat, improving/maintaining access infrastructure (for example boardwalks, stone pitching, grass sward management)

Unit 213 Participate in Providing Estate Maintenance

Outcome 4 Know how to work safely and minimise environmental damage

Assessment Criteria

The learner can:

1. State the current environmental and health and safety **legislation and codes of practice**
2. Describe how to overcome **problems** presented by **services**
3. Describe how **environmental damage** can be minimised
4. Describe how **organic and inorganic waste** may be **disposed** of

Unit content

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Control of Substances Hazardous to Health Regulations (2002) (COSHH), Waste Management (England and Wales) Regulations 2006 (as amended 2008)

Problems

Damage, leakage, disruption to supply, health and safety/emergency procedures, reporting to supervisor

Services

Water, electricity, gas, telephone

Environmental damage

Pollution (water courses, through litter or debris, noise), damage to habitats, wastage of resources

Disposal of organic and inorganic waste: organic waste (recycling, composting, chipping, burning), inorganic waste (recycling, discarding safely, landfill)

Organic and inorganic waste

Organic: wood and plant products, soil, weeds, green waste, animal dung and waste

Inorganic: metal, plastics, concrete, brickwork, oils and lubricants

Disposed

Organic: composting, recycling, chipping, burning, burial

Inorganic: recycling, landfill, approved disposal contractor

Unit 213 Participate in Providing Estate Maintenance
Notes for guidance

This unit has a very practical focus and aims to enable learners to develop estate skills which can be applied to a range of situations and circumstances. The unit has been written such that naturally occurring and locally relevant opportunities can be used in selecting boundaries, structures and surfaces, to repair and maintain.

As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE) and appropriate risk assessments should be undertaken. Learners should also be made aware of the impact on the environment, and sustainability concepts should also be demonstrated where possible. Where learners are using tools, they should be supervised and must be made aware of the safety of themselves and others around them.

Learners should have the opportunity to undertake estate skill activity in a setting appropriate to their area of work wherever possible to maximise the vocational relevance. It will be most beneficial if the structures, boundaries, and surface or habitat selected are for a clear purpose.

Outcome 1 is likely to be predominantly practical, as learners are required to select and safely transport and use a range of hand tools. It is not expected that learners demonstrate a practical ability for the full range shown in the unit content, but a minimum of four hand tools should be covered.

Outcomes 2 and 3 require opportunities for supervised practical experience. This may link with an appropriate work placement. It is anticipated that the tutor will guide selection of the repair or maintenance work required. It is particularly important that due regard is given to health and safety, including the use of appropriate PPE.

Outcome 4 will be largely embedded throughout delivery of the practical aspects of this unit. Learners should view working safely, with due regard to the environment as an integral feature of estate skills tasks, rather than as stand alone components.

It is anticipated that most delivery of this unit will take place in a practical setting, with supervised practice of skills. Delivery will also include some classroom based activity in ensuring learners have a good understanding of safe techniques and underpinning knowledge.

References

Books

Agate, E. 2001. *Fencing: A Practical Handbook*. Doncaster: BTCV. ISBN 094675229X.

Agate, E. 1996. *Footpaths: A Practical Handbook*. Doncaster: BTCV. ISBN 0946752311.

Agate, E. 2000. *Toolcare: A Maintenance and Workshop Manual*. Doncaster: BTCV. ISBN 0946752249.

Agate, E. 2001. *Tree Planting and Aftercare: A Practical Handbook*. Doncaster: BTCV. ISBN 0946752257.

Agate, E. 2002. *Woodlands: A Practical Handbook*. Doncaster: BTCV. ISBN 0946752338.

Agate, E., Brooks, A. 1998. *Hedging: A Practical Handbook*. Doncaster: BTCV. ISBN 0946752176.

Agate, E., Brooks, A. 2001. *Waterways and Wetlands: A Practical Handbook*. Doncaster: BTCV. ISBN 0946752303.

Agate, E., Brooks, A., Adcock, S. 999. *Dry Stone Walling: A Practical Handbook.* Doncaster: BTCV. ISBN 0946752192.

MacLean, M. 1992. *New Hedges for the Countryside*. Ipswich: Farming Press Books and Videos. ISBN 0852362420.

Journals

Scottish Executive Rural Affairs Department — Prevention of Environmental Pollution from Agricultural Activity: Code of Good Practice Dos and Don'ts Guide
(Scottish Executive, 2002) ISBN 0755905180

Websites

www.btcv.org.uk	British Trust for Conservation Volunteers
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of agriculture and Rural Affairs (Northern Ireland)
www.fwag.org.uk	Farm Wildlife and Advisory Group
www.hse.gov.uk	Health and Safety Executive
www.lantra.co.uk	Lantra Sector Skills Council

Unit 214 Introduction to the Principles of Land-based Machinery

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the principles of land-based machinery and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to recognise the basic roles and functions of engines as the major power source for Land-based machines. It covers knowledge and skills including the working principles of engines and typical engine maintenance activities that may be carried out by the operator.

Learning outcomes

There are three learning outcomes to this unit. The learner will:

1. Know the working principles of combustion engines
2. Know the maintenance requirements of machines
3. Be able to maintain engines on land-based machines

Guided learning hours

It is recommended that 30 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU27 Maintain equipment and machines
L27.1 Use and maintenance of non-powered and hand held power tools and equipment
L27.2 Carry out routine maintenance to equipment and machinery

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SCC.

Assessment and grading

This unit will be assessed by:

- An assignment covering assessed practical competencies and underpinning knowledge

Unit 214 Introduction to the Principles of Land-based Machinery

Outcome 1 Know the working principles of combustion engines

Assessment Criteria

The learner can:

1. Describe the uses of **combustion engines** on a range of machines within a land-based industry
2. Describe the **working cycles of 2 stroke and 4 stroke engines**
3. State the **functions of component parts** of a combustion engine
4. Describe methods of **transmitting drive** from engines to the working parts of machines

Unit content

Combustion engines

Compression Ignition (CI), Spark Ignition (SI)

Working cycles of 2 stroke and 4 stroke engines

Otto cycle, 2 stroke cycle, air induction, exhaust emissions

Function of component parts

Crankshaft, pistons, connecting rods and bearings, piston rings, bore types, camshaft, valves and springs, oil pump, flywheel

Transmitting drive

Friction plate clutches centrifugal clutches, hydraulic clutches, belt and pulleys, chain and sprocket, gears, electrical generator, compressed air, hydraulics

Unit 214 Introduction to the Principles of Land-based Machinery

Outcome 2 Know the maintenance requirements of machines

Assessment Criteria

The learner can:

1. Describe **common hazards** associated with machine use and maintenance
2. State the purpose of common **workshop tools**

Range

All Learners: activities in maintenance workshop and on site, periodic maintenance, preventative maintenance, unscheduled maintenance

Unit content

Common hazards

Machine power isolation, machine stability and contamination from fuels/lubricants/chemicals/sharps/heat/pressure/fumes

Workshop tools

Spanners/sockets and wrenches, torque wrenches and multipliers, screwdrivers, hammers, punches, service gauges and measuring equipment, tool kit and on site tool kit

Unit 214 Introduction to the Principles of Land-based Machinery

Outcome 3 Be able to maintain engines on land-based machines

Assessment Criteria

The learner can:

1. Carry out a **risk assessment** for machine **maintenance activities**
2. Carry out **pre-start checks and starting procedures** on machines

Unit content

Risk assessment

Risks to self, risks to others, risk to environment, risk to machines and equipment

Pre-start checks and starting procedures

Fuel level, oil levels, coolant and cooling, safety guards and panels, fume extraction within buildings, safe operation distances, safety start devices, engine/turbocharger oil pressure

Maintenance activities

Machine preparation prior to routine/scheduled maintenance, unscheduled maintenance on site, safe use of tools, selection of correct replacement service components, preparation of service area, re-instatement of service area, post service inspection of machine

Also, need to cover:

Current Legislation

Health and Safety at Work etc Act1974 (HASWA), Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)

Maintenance records

Maintenance check lists, job cards, inspection reports, recording machine details and work hours, records of repairs/replacement parts

Unit 214 Introduction to the Principles of Land-based Machinery

Notes for guidance

This unit is designed to provide learners with knowledge and understanding of basic working principles of Land-based powered equipment, requirements for regular service, maintenance and repair and safe practical experiences while undertaking maintenance tasks.

The range covered during delivery should include electric vehicles and machinery.

Health and safety - Centres and tutors need to be aware of the need to safeguard learners, particularly in relation to pre-16 learners, when delivering and assessing units where the operation of machinery is involved. This unit requires the learner to undertake machinery operations under close supervision, and this is the same for any unit within the qualification that requires the learner to operate or use machinery. This is a largely theory based unit, but Outcome 3 requires learners to be able to maintain engines on land-based machines. Throughout the unit the emphasis is on acceptable health and safety procedures and safe working practices. The guidance in this unit requires that Health and Safety must be strictly enforced and repeated throughout. The HSE guidance AS10 'Preventing Accidents to Children on Farms' provides practical guidance on how to reduce the risk of injury to children under 13 and older children below the minimum school leaving age (usually 16).

In Outcome 1 the learner will be required to investigate working principles of the range of engine types that power land-based vehicles and machines. It is essential that the learner understands the limitations of engine types and why manufacturers designate their use to different purpose. The learners should be encouraged to develop understanding of topical issues regarding available fuel types, environmental pollution and running costs.

Outcome 2 prepares the learner for the knowledge and understanding required prior to undertaking practical maintenance work on engines and powered machines. Emphasis should be directed to safe working practices, care of machines, tools and work areas. The learner should also be encouraged to plan for unscheduled maintenance tasks. Due to the complexity of land-based vehicles and machines it is essential that learners understand that maintenance of machines and vehicles must be carried out to manufacturers recommendations and that service documentation should be available and accurately followed when performing tasks.

In Outcome 3 the learner will be required to carry out risk assessments and put appropriate control measures in place before completing the practical activities. It is anticipated that delivery of this outcome will be predominantly practical, with learners gaining experience of carrying out pre-start checks. The learner must be aware of current legislation and safe working practices and be encouraged to adopt a clean, tidy and methodical approach to work ethic. The importance of accurate completion of maintenance and work records must be highlighted.

Throughout the unit the emphasis will be on safe, legal practices, working to manufacturers' recommended procedures and attention to detail when recording information.

References

Books

Bell B. 2005. *Farm Machiner. 5th e.* Old Bond Publishing. ISBN: 1-903-36668-2.
Hillier V and Coombes P. 2004. *Hillier's Fundamentals of Motor Vehicle Technolog. 5th ed.* Nelson Thornes. ISBN: 0-748-78082-3.

Manufacturer's service charts, operator manuals

Websites

www.howstuffworks.com Discovery Communications
www.hse.gov.uk Health and Safety Executive

Unit 215 Understand the Basic Principles of Plant Science

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the basic principles of plant science. It is unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop knowledge relating to the structure of plants by identifying their external features, develop an understanding of how plants function. They will also develop an understanding of the development and physiology of plants, inclusive of growth and development, plant processes, reproduction, life cycles and stages.

Learning outcomes

There are **two** learning outcomes to this unit. The learner will:

1. Know the physical structure of plants
2. Understand the development and physiology of plants

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 215 Understand the Basic Principles of Plant Science
Outcome 1 Know the physical structure of plants

Assessment Criteria
The learner can:
1. Identify the **organs of plants**
2. Describe the main **tissues of plants**
3. Identify the **functions of** leaves, stems, roots and flowers

Unit content

Organs of plants
Roots (fibrous, tap and tuberous), leaves (petiole, lamina, midrib, veins), cotyledons, stems (woody and non-woody), buds, flowers (petals, sepals, anthers, filament, style, stigma, ovary, bract)

Tissues of plants
Main tissues of stems, roots and leaves, inclusive of cell structure, vascular tissues, xylem, phloem and cambium, root hairs: stomata and guard cells, cuticle, epidermis and endodermis

Functions
Leaves: produce food by photosynthesis, carry out transpiration, natural vegetative reproduction i.e. foliar embryos
Stems: provide support for the leaves, flowers and fruit, provide a transport system around the plant for water, nutrients and food, on occasions have a climbing and protective function
Roots: anchor the plant in the soil, absorb water and nutrients from the soil, food storage and reproduction
Flowers: pollination, fertilisation and seed and fruit formation

Unit 215 Understand the Basic Principles of Plant Science
Outcome 2 Understand the development and physiology of plants

Assessment Criteria
The learner can:
1. Summarise the **processes involved in growth and development**
2. Summarise the **processes involved in plant reproduction**
3. Define the terms **ephemeral, annual, biennial, perennial** as they relate to plant life cycles
4. Describe the characteristics of **stages of plant growth**

Unit content

Processes involved in growth and development
Photosynthesis, respiration, osmosis, transpiration and translocation: definitions and descriptions/ use simple formulae, tropisms, environmental factors affecting each process, including light, dark, water, temperature, nutrient, carbon dioxide and oxygen

Processes involved in plant reproduction
Sexual reproduction (pollination, fertilisation) stages of seed germination and types (epigeal and hypogeal), environmental requirements for successful germination (moisture, warmth etc), asexual reproduction by natural vegetative means e.g. corms, bulbs, tubers and stolons

Ephemeral, annual, biennial, perennial
Definition as they relate to plant life cycles

Stages of plant growth
Juvenile, adult, senescent

Unit 215 Understand the Basic Principles of Plant Science

Notes for guidance

The learner will be able to develop the knowledge required to understand how plants function, reproduce, grow and develop. The unit presents an opportunity for learners to consider factors which influence plant production and growth and provides supporting knowledge, understanding and decision making skills necessary for units/subjects associated with propagation, crop production, planting and aftercare.

In Outcome 1, learners develop knowledge of plant structures. They should be able to describe the external structure of plants and the function of tissues within the plant. Though not essential, it would be helpful to introduce them to the internal structure of plants in the laboratory.

In Outcome 2, learners will develop knowledge of the physiological processes that take place in the plant, including photosynthesis, respiration, osmosis, transpiration and translocation. They should appreciate the effects of environmental factors on each of these, both in terms of excesses and deficiencies and then be able to apply this knowledge to horticultural situations, including propagating plants by seed and vegetative means, growing on, planting, weed control and harvesting.

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, experimentation, investigations using microscope slides and sections, discussions, video, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show how the knowledge acquired in this unit may be applied to practical horticultural tasks. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

References

Books

Adams CR. 2008. *Principles of Horticulture*. Oxford: Butterworth-Heinemann ISBN: 9-780-75068-694-5.

Brown L. 2002. *Applied Principles of Horticultural Science*. 2nd ed. Oxford: Butterworth-Heinemann. ISBN: 9-780-75068-702-7.

Dawson P. 2006. A *Handbook for Horticultural Students*. Rushden: Dawson. ISBN: 0-9525911-11.

Ingram DS, et al. 2008. *Science and the Garden: the scientific basis of horticulture practice.* 2nd ed. Sussex: Wiley Pulishing. ISBN-13: 978-1-4051-6063-6

Roberts M. 1986. *Biology, a functional approach fourth edition*. 4th ed. Cheltenham: Nelson Thornes.

Salisbury FB and Ross C. 1991. *Plant physiology.* 4th ed. Florence: Brooks Cole.

Dutta A C. 1997. *Botany for Degree Students.* 6th ed. New Delhi: OUP India

Unit 216 Understand the Basic Principles of Soil Science

Level: 2

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the basic principles of soil science. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the knowledge required to understand the physical and chemical properties of soils and relate this to the growth of plants in the wild and in cultivation. They will also develop the skills to assess soils in order to inform soil management decisions, including the selection of appropriate fertilisers in order to encourage the desired plant growth.

Learning outcomes

There are three learning outcomes to this unit. The learner will:

1. Be able to assess the physical and chemical characteristics of soils
2. Understand the physical properties of soils
3. Understand the chemical properties of soils and fertilisers

Guided learning hours

It is recommended that 30 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

There are no relevant NOS for this unit

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 216 Understand the Basic Principles of Soil Science

Outcome 1 Be able to assess the physical and chemical characteristics of soils

Assessment Criteria

The learner can:

1. Identify the **horizons in a soil profile**
2. Analyse samples of soil to determine:
   - **textural class**
   - **pH**

Unit content

Horizons in a soil profile

Organic layer, top-soil, sub-soil, parent material
O - organic layer, A - topsoil, B - subsoil, C – (parent material) bedrock, winter water table, drainage characteristics
Soil profile pit, extending to sufficient depth to expose soil profiles O, A, B, and C

Textural class

Components of soils, clay, silt, sand, loam; use of field and laboratory textural analysis methods

pH

Soils: neutral, acid, alkali
Collection and preparation of samples: testing with a colorimetric testing kit to determine relative alkalinity/acidity

Unit 216 Understand the Basic Principles of Soil Science

Outcome 2 Understand the chemical properties of soils and fertilisers

Assessment Criteria

The learner can:

1. Describe the **formation, characteristics, texture and component parts of soils**
2. Explain how soil structure and the balance of soil air and water affect the **growth of plants**
3. Explain **factors relating to soil water;** sources, availability, effects on various soil types and terms associated with the water balance
4. Explain how organic matter and soil organisms contribute to **soil structure and fertility**

Unit content

Formation

Weathering agents, transporting agent, parent material, bedrock
Definition of soil structure and soil texture

Characteristics, texture and component parts of soils

Sandy, loam, clay and organic soils
Components: sand, gravel, loam, clay, organic matter, soil organisms, air and water, importance of air in the soil, contribution of soil organisms to fertility

Growth of plants

Individual components of soils, anchorage, balance and availability of soil air, water and nutrients, drainage, soil temperature, compaction/aeration, workability of soils

Factors relating to soil water

Sources, availability, effects on various soil types and terms associated with the water balance
Definition of: saturation, soil moisture deficit, permanent wilting point, available and unavailable water, field capacity, capillary, gravitational water, water table, drainage and irrigation
Water-holding capacity of sands, silts, clays and organic soil

Soil structure and fertility

Organic matter/humus content, amount of decay, diversity and quantity of soil organisms (invertebrates, vertebrates, fungi, bacteria), contributions made by each

Unit 216 Understand the Basic Principles of Soil Science

Outcome 3 Understand the chemical properties of soils and fertilisers

Assessment Criteria

The learner can:

1. State the **nutrient** requirements of plants and their individual effects on growth:
   - **Micro-nutrients**
   - **Macro-nutrients**
2. State the typical symptoms of nutrient deficiencies in plants:
   - **Micro-nutrients**
   - **Macro-nutrients**
3. Explain **how pH affects plant growth** and methods of adjusting the pH to meet specific requirements
4. Explain the principles of cation and anion **exchange capacity** in the soil and their relationship to texture and organic matter
5. Explain the **categories** and terminology **used to describe fertilisers**
6. **Define the terms** Plant Nutrient Ratio and Nutrient Weight Analysis.

Unit content

Nutrient

Nitrogen, phosphorus and potassium, requirements for growth and photosynthesis, growth stage requirements, availability, uptake and interaction

Micro-nutrients

Functions of : Copper, Sodium, Zinc, Iron, Boron, Manganese, Molybdenum
Main fertilisers and their nutrient content relating to a specific sector of horticulture

Macro-nutrients

Functions of primary (Nitrogen, Phosphorus, Potassium) and secondary (Magnesium, Calcium, Sulphur)
Main fertilisers and their nutrient content relating to a specific sector of horticulture

How pH affects plant growth

Availability of nutrients, specific nutritional disorders related to pH, calcicole and calcifuge, lowering and raising the pH, relationship between plat nutrition and development

Exchange capacity

Cation (positive charged ion), anion (negatively charge ion), nutrient/chemical reactions
Exchange of cations held by soil, effect on nutrient uptake, soils capacity to hold nutrients, Cation Exchange Capacity (CEC) determined by amount of clay/humus a soil contains, a measure of soils fertility, role of soil water, texture, organic matter, content of soils

Categories used to describe fertilisers

Straight, mixture, compound, complete, inorganic, organic, controlled release, granules, liquid, solid, prill, pelleted

Define the terms

Plant Nutrient Ratio and Nutrient Weight Analysis, nutrient content of packaged fertilisers
Nutrient balance, competition between nutrients for uptake, nutrient content/quantities of feeds/fertilisers

Unit 216 Understand the Basic Principles of Soil Science
Notes for guidance

The learner will be able to develop the knowledge required to understand the physical and chemical properties of soils and relate this to the growth of plants in the wild and in cultivation. They will also develop the skills to assess soils in order to inform soil management decisions.

In Outcome 1, learners will develop skills in assessing the physical and chemical properties of soils. They will require access to suitable laboratory facilities for this. Laboratory and field methods should be practised, including collection of soil samples, soil textural analysis in the hand by the 'feel method' (range to include sand, silt, clay and loam) and pH determination using the colorimetric method. Learners will be required to dig a soil profile pit, record and examine the four main horizons and characteristics of the soil.

In Outcome 2, learners will develop an understanding of the physical aspects of soils, including soil formation, soil constituents, texture and structure, pore space, soil water and soil air and factors affecting the health of the plant, including how organic matter and soil organisms contribute to soil structure and fertility. Learners will be required to explain how the structure of a given soil, including its balance of air, water, organic matter, organisms and nutrient availability may affect the growth of plants.

In Outcome 3, learners will further develop their understanding of the chemical aspects of soils, including being able to name the main macronutrients and micronutrients and their individual effects on plant growth. Learners will be able to explain the basic principles of cation and anion exchange, relating that knowledge to the plants potential for growth and development. They will know how the pH of a soil or growing media affects plant growth, including nutritional disorders and the categorisation of plants into the calcifuges and calcicole groups. Knowledge of the categories to describe fertilisers will enhance the learner's ability to select the appropriate feed and method of application. The ability to interpret nutrient content of packaged fertilisers will assist the learner in making informed decisions regarding choice of feeds to encourage desired plant growth.

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, experimentation, investigations using microscope slides and sections, discussions, video, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show how the knowledge acquired in this unit may be applied to practical horticultural tasks. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

References

Books

Adams CR. 2008. *Principles of Horticulture*. Oxford: Butterworth-Heinemann ISBN: 9-780-75068-694-5.

Brown L. 2002. *Applied Principles of Horticultural Science*. 2nd ed. Oxford: Butterworth-Heinemann. ISBN: 9-780-75068-702-7.

Dawson P. 2006. A *Handbook for Horticultural Students*. Rushden: Dawson. ISBN: 0-9525911-11.

Dutta A C. 1997. *Botany for Degree Students.* 6th ed. New Delhi: OUP India.

Ellis S and Mellor A. 1995. *Soils and Environment.* Oxon: Routledge. ISBN 0-415-06887-8(hbk) or ISBN 0-415-06888-6 (pbk)

Ingram DS, et al. 2008. *Science and the Garden: the scientific basis of horticulture practice.* 2nd ed. Sussex: Wiley Pulishing. ISBN-13: 978-1-4051-6063-6

Roberts M. 1986. *Biology, a functional approach fourth edition.* 4th ed. Cheltenham: Nelson Thornes.
Salisbury FB and Ross C. 1991. *Plant physiology.* 4th ed. Florence: Brooks Cole.
Stamp D. 2008. *Britain's Structure and Scenery.* Hammersmith: Harper Collins.

Unit 217 Introduction to Land-based Workshop Practice

Level: 2

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of land-based workshop practice and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will cover the basic work requirements within land-based workshops. They will understand the importance of Health and Safety as an integral topic. They will learn how to safely use hand and power tools and basic welding equipment commonly found in a land-based setting. The skills associated with these will be integrated with the development and use of basic maintenance and repair techniques.

Learning outcomes

There are four learning outcomes to this unit. The learner will:

1. Be able to safely use commonly found hand and power tools for the maintenance and repair of land-based machinery and installations
2. Be able to safely use basic welding and cutting equipment
3. Be able to safely use basic maintenance and/or repair techniques on land-based machinery and installations
4. Understand land-based workshop health and safety requirements.

Guided learning hours

It is recommended that 60 hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU1 Maintain safe and effective working practices
CU27 Maintain equipment and machines

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 217 Introduction to Land-based Workshop Practice

Outcome 1 Be able to safely use commonly found hand and power tools for the maintenance and repair of land-based machinery and installations

Assessment Criteria

The learner can:

1. Select and safely use **hand** and **power tools** to meet given objectives **maintaining** or **repairing** land-based machinery or installations
2. State **reasons** for the hand and power tools selected

Range

All learning disciplines: hand held manually operated tools to carry out basic service, maintenance and component replacement tasks.

Unit content

Hand tools

Spanners, wrenches, socket sets, keys, gripping tools, drivers, punches, torque setting, pressure measurement, marking out tools, measuring devices

Power tools

Drills, metal cutters, battery/mains, electrical powered, pneumatic, hand held, bench mounted

Maintaining

Routine maintenance, periodic maintenance, wearing component replacement, tool maintenance

Repairing

Workshop based, emergency on work site, belts/pulleys, chains/sprockets, gears/shafts, bearings, bushes, seals

Reasons

Justification for selection, appropriateness, availability, safety

Unit 217 Introduction to Land-based Workshop Practice

Outcome 2 Be able to safely use basic welding and cutting equipment

Assessment Criteria

The learner can:

1. Safely use **basic welding equipment** and **materials** to produce a simple welded joint to meet given objectives
2. State reasons for the **basic welding equipment** and **materials** selected

Range

All learning disciplines: preparation and metal joining of materials up to 3mm thickness for oxy/ fuel welding and up to 8mm for MMA and MIG techniques. Lap, butt and fillet welds to a given standard, Personal Protection Equipment (PPE)

Unit content

Basic welding equipment

Oxygen, propane, acetylene gasses- canisters, bottles, safe handling and storage
Gauges, hoses and fittings- mixing torch and nozzle selection, flame types and pressures, rods, flux and techniques
Manual metal arc/inert gas welder design, input/output voltage settings, amperage settings, rods, coatings and techniques
Inert gasses/argon, wire diameter, speed, nozzles and shrouds, MIG techniques

Materials

Ferrous/ non ferrous material choices, melting temperatures, suitability for purpose

Unit 217 Introduction to Land-based Workshop Practice
Outcome 3 Be able to safely use basic maintenance and/or repair techniques on land-based machinery and installations

Assessment Criteria
The learner can:
1. Safely use **basic techniques** to **maintain** or **repair** land-based machinery or installations to meet given objectives
2. State reasons for the **basic techniques** selected

Range
All learning disciplines: carry out routine, periodic and unscheduled maintenance on machines typical to the individual's area of study for example those used for grass cutting/collection, ground preparation or cultivation, crop/materials transportation, fixed equipment/installations, PPE

Unit content

Basic maintenance techniques
Systematic routine maintenance, follow manufacturers' service charts, operator manual instructions- non routine/periodic maintenance tasks, wearing component adjustments- lubrication, pressures

Basic repair techniques
Component replacement, bearings bushes, seals, driveline components- remanufacture, brackets, guards

Unit 217 Introduction to Land-based Workshop Practice

Outcome 4 Understand land-based workshop health and safety requirements

Assessment Criteria

The learner can:

1. Explain the importance of **health and safety** in the **workshop**
2. Produce a suitable **risk assessment** for the use of hand and/or power tools to meet given objectives

Range

All learning disciplines: to be made aware of Health and Safety at Work etc Act 1974, Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), Control of Substances Hazardous to Health 2002 (COSHH), first aid procedures, minor injuries and burns, fire prevention and use of fire extinguishers, Personal Protective Equipment (PPE).

Unit content

Health and safety

Safe working areas, ventilation, lighting, PPE, correct storage, electrical testing procedures, safe lifting procedures

Workshop

Designated welding, grinding areas, fume extraction, service bays, work areas on site, environmental hazards

Risk assessment

Assessing risks prior to work, injury, damage to self, others and equipment-control measures identified-recording and storing information

Unit 217 Introduction to Land-based Workshop Practice
Notes for guidance

This unit is designed to provide the learner with the knowledge, understanding and practical skills required to maintain a range of machines and equipment used in land-based operations. The maintenance tasks may be scheduled as periodic- daily, weekly, monthly or yearly or routine, where it is expected the machine is inspected at regular intervals during work to ensure efficiencies. Unscheduled repairs may need to be carried out in the event of breakdowns. These repairs may have to be carried out on site. Emphasis will be on safe and efficient working practices throughout the unit.

Health and safety - Centres and tutors need to be aware of the need to safeguard learners, particularly in relation to pre-16 learners, when delivering and assessing units where the operation of equipment and machinery is involved. This unit requires the learner to undertake equipment and machinery operations under close supervision, and this is the same for any unit within the qualification that requires the learner to operate or use machinery. This is a largely practical-based unit which looks at the basic use and maintenance of hand and power tools and equipment and machinery. There is significant emphasis on safe practices throughout the unit. Throughout the unit the emphasis is on acceptable health and safety procedures and safe working practices. The guidance in this unit requires that Health and Safety must be strictly enforced and repeated throughout. The HSE guidance AS10 'Preventing Accidents to Children on Farms' provides practical guidance on how to reduce the risk of injury to children under 13 and older children below the minimum school leaving age (usually 16).

In Outcome 1, the learner will be required to identify appropriate tools needed to perform basic maintenance and repair techniques to meet given objectives. The learner should be able to demonstrate correct and safe use of chosen tools, explain limitations and suggest alternative strategies. Delivery should also include the care and maintenance of tools.

In Outcome 2, the learner will become familiar with a range of thermal metal joining techniques and equipment needed to carry out welding tasks to meet given objectives. It is anticipated that delivery of this unit will be largely practical. As part of this outcome, the learner should be able to recognise different materials and their properties and have an understanding of alternative welding/repair strategies. Welding is potentially dangerous so particular emphasis should be placed on safe working practices.

In Outcome 3, the learner will be required to demonstrate acceptable safe working practices whilst repairing and maintaining machines and equipment. A range of tasks should be covered to include both maintenance and repair techniques. A portfolio of records for each task should contribute towards assessment material. It is expected that some tasks may have several acceptable strategies and the learner will be expected to justify the chosen strategy.

Outcome 4 the learner is expected to demonstrate understanding of health and safety procedures in the workshop and carry out risk assessments. As part of this outcome the learner should carry out an inspection to the work premises and equipment to highlight any hazards, risks or discrepancies which may impair safe working practices. The risk assessments throughout this unit may contribute to the assessment evidence for this outcome.

References

Books

Gourd L,1995. *Principles of Welding Technology*, 3rd edition Butterworth-Heinemann ISBN 0340613998
Kenyon W, 1987. *Basic Welding and Fabrication*, 2nd edition, Longman ISBN 0582005361.

Websites

www.hse.gov.uk Health and Safety Executive

Appendix 1 Relationships to other qualifications

Literacy, language, numeracy and ICT skills development

These qualifications include opportunities to develop and practise many of the skills and techniques required for success in the following qualifications:

- Functional Skills (England) – see **www.cityandguilds.com/functionalskills**
- Essential Skills (Northern Ireland) – see **www.cityandguilds.com/essentialskillsni**
- Essential Skills Wales - **www.cityandguilds.com/esw**

There might also be opportunities to develop skills and/or portfolio evidence if learners are completing any Key Skills alongside these qualifications.

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of learners
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Ensuring quality contains updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document contains information on:

- Management systems
- Maintaining records
- Assessment
- Internal verification and quality assurance
- External verification.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for learners who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- *Walled Garden*
  Find out how to register and certificate learners on line
- *Events*
  Contains dates and information on the latest Centre events
- *Online assessment*
  Contains information on how to register for GOLA assessments.

Useful contacts

Type	Contact	Query
UK learners	T: +44 (0)84 4543 0033 E: learnersupport@cityandguilds.com	• General qualification information
Centres	T: +44 (0)84 4543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com	• Exam entries • Registrations/enrolment • Certificates • Invoices • Missing or late exam materials • Nominal roll reports • Results
Walled Garden	T: +44 (0)84 4543 0000 F: +44 (0)20 7294 2405 E: walledgarden@cityandguilds.com	• Re-issue of password or username • Technical problems • Entries • Results • GOLA • Navigation • User/menu option problems
Employer	T: +44 (0)121 503 8993 E: business_unit@cityandguilds.com	• Employer solutions • Mapping • Accreditation • Development Skills • Consultancy

If you have a complaint, or any suggestions for improvement about any of the services that City & Guilds provides, email: **feedbackandcomplaints@cityandguilds.com**

Published by
City & Guilds
1 Giltspur Street
London
EC1A 9DD

T +44 (0)84 4543 0000
F +44 (0)20 7294 2413
www.cityandguilds.com

City & Guilds is a registered charity
established to promote education
and training