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# National 4 Skills for Work Engineering Skills Course Specification (C243 74)

**Valid from August 2013**

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Please refer to the note of changes at the end of this course specification for details of changes from previous version (where applicable).

# Course outline

**Course title:** National 4 Skills for Work Engineering Skills

**SCQF credit points:** (24 SCQF credit points)

**Course code:** C243 74

## Mandatory units

The course comprises the following mandatory units:

<b>J16F 74</b>	<b>Engineering Skills: Mechanical</b>	<b>6 SCQF credit points</b>
<b>J16G 74</b>	<b>Engineering Skills: Electrical/Electronic</b>	<b>6 SCQF credit points</b>
<b>J145 74</b>	<b>Engineering Skills: Fabrication</b>	<b>6 SCQF credit points</b>
<b>J144 74</b>	<b>Engineering Skills: Manufacture and Assembly</b>	<b>6 SCQF credit points</b>

## Recommended entry

Entry to this course is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- ◆ an interest in engineering
- ◆ an ability to work in numeracy and literacy at SCQF level 3
- ◆ some aptitude for graphical forms of communication

In terms of prior learning and experience, relevant experiences and outcomes may also provide an appropriate basis for doing this course.

## Progression

This course or its components may provide progression to:

- ◆ Scottish Progression Award in Engineering (National 5)
- ◆ SVQs and Modern Apprenticeships in Engineering areas
- ◆ further study, employment and/or training

## Core Skills

Achievement of this course gives automatic certification of the following Core Skills component:

Core Skill component                      Critical Thinking at SCQF level 4

There are also opportunities to develop aspects of Core Skills which are highlighted in the support notes of this unit specification.

## Links to National Occupational Standards

National Occupational Standards (NOS) are developed by the key employment sectors of the United Kingdom. These standards set the competences required for job roles within a particular employment sector.

The National 4 Skills for Work Engineering Skills course has been designed to link broadly to NOS, but the standards required of first-year apprentices in the engineering industry are significantly more onerous than those in this course.

Compared to NOS, this course requires either reduced scale and complexity, or more achievable tolerances, and therefore provides a useful preparation for employment or further training in the engineering industry. The general tolerance required for the practical activities in this course should be  $\pm 3\text{mm}$ . The specific tolerances required for practical unit assessments are specified in the assessment support packs (ASPs).

Further details are provided in the 'Rationale' section.

## Equality and inclusion

This Course Arrangements Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## Common rationale for Skills for Work Courses

Skills for Work Courses are designed to help learners to develop:

- ◆ skills and knowledge in a broad vocational area
- ◆ skills for learning, skills for life and skills for work
- ◆ Core Skills
- ◆ an understanding of the workplace
- ◆ positive attitudes to learning
- ◆ skills and attitudes for employability

A key feature of these courses is the emphasis on *experiential learning*. This means learning through practical experience and learning by reflecting on experience.

### Learning through practical experience

Teaching/learning programmes should include some or all of the following:

- ◆ learning in real or simulated workplace settings
- ◆ learning through role play activities in vocational contexts
- ◆ carrying out case study work
- ◆ planning and carrying out practical tasks and assignments

### Learning through reflecting at all stages of the experience

Teaching/learning programmes should include some or all of the following:

- ◆ preparing and planning for the experience
- ◆ taking stock throughout the experience, reviewing and adapting as necessary
- ◆ reflecting after the activity has been completed, evaluating and identifying learning points

The Skills for Work Courses are also designed to provide learners with opportunities for developing *Core Skills*, and *Skills for Learning*, *Skills for Life* and *Skills for Work* with a focus on enhancing skills and attitudes for *employability*.

## Core Skills

### The five Core Skills are:

- ◆ Communication
- ◆ Numeracy
- ◆ Information and Communication Technology (ICT)
- ◆ Problem Solving
- ◆ Working with Others

## Employability

The skills and attitudes for employability, including self-employment, are outlined below:

- ◆ generic skills/attitudes valued by employers
- ◆ understanding of the workplace and the employee's responsibilities, for example, time-keeping, appearance, customer care, etc
- ◆ self-evaluation skills
- ◆ positive attitude to learning
- ◆ flexible approaches to solving problems
- ◆ adaptability and positive attitude to change
- ◆ confidence to set goals, reflect and learn from experience
- ◆ specific vocational skills/knowledge

Course specifications highlight the links to NOS in the vocational area and identify progression opportunities.

Opportunities for developing these skills and attitudes are highlighted in each of the course and unit specifications. These opportunities include giving young people direct access to workplace experiences or, through partnership arrangements, providing different learning environments and experiences which simulate aspects of the workplace. These experiences might include visits, visiting speakers, role play and other practical activities.

*A Curriculum for Excellence* (Scottish Executive 2004) identifies aspirations for every young person. These are that they should become:

- ◆ successful learners
- ◆ confident individuals
- ◆ responsible citizens
- ◆ effective contributors

The learning environments, the focus on experiential learning and the opportunities to develop employability, Skills for Learning, Skills for Life, Skills for Work and Core Skills in these courses contribute to meeting these aspirations.

# Course rationale for National 4 Skills for Work Engineering Skills

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this course, and its component units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Skills for Work course is also designed to provide learners with opportunities for developing Core Skills and Skills for Learning, Skills for Life and Skills for Work, with a strong focus on enhancing skills and attitudes for employability.

The National 4 Skills for Work Engineering Skills course has been designed to provide a basis for progression into further education or for moving directly into training in employment within an engineering sector. The overall purpose of the course is to ensure that learners start to develop the generic and practical skills, knowledge and understanding and employability skills needed within an engineering sector.

The engineering sector includes the following:

Mechanical	Manufacture	Maintenance
Fabrication	Welding	Electrical
Electronic	Foundry	Automotive
Servicing	Transport	Aeronautical
Communications	Space	Energy generation
Conservation	Marine	Water
Salination	Oil/Gas	Petroleum

This course focuses on the four broad areas of mechanical, electrical/electronic, fabrication and manufacture. This will allow the learners to gain basic transferable skills which can be applied to any of the above engineering areas.

## Purposes and aims of the course

The general aims of this course are to:

- ◆ Widen participation in vocationally-related learning for school learners from S3 upwards.
- ◆ Allow learners to experience vocationally-related learning.
- ◆ Provide learners with a broad introduction to the engineering vocational sector.
- ◆ Encourage learners to foster a good work ethic, including time-keeping, a positive attitude and other relevant employability skills.
- ◆ Provide opportunities to develop a range of Core Skills in a vocational context.
- ◆ Encourage learners to take charge of their own learning and development.
- ◆ Provide a range of teaching, learning and assessment styles to motivate learners to achieve their full potential.
- ◆ Facilitate progression to further education and/or training.
- ◆ Encourage learners to plan their work and review their progress.
- ◆ Encourage learners to develop a positive attitude to waste minimisation and environmental issues.

In particular, the aims of the National 4 Skills for Work Engineering Skills course are to:

- ◆ Encourage learners to consider a career in the engineering industry.
- ◆ Develop an awareness of the opportunities there may be within engineering in terms of the types and range of career options.
- ◆ Enable learners to develop and apply practical, technical and communication skills as a foundation for future learning and progression.
- ◆ Develop the learners' awareness of their individual strengths and weaknesses in relation to the requirements of engineering, and to reflect on how this affects their employability potential.
- ◆ Give learners the technical knowledge, skills and understanding associated with a range of skills in engineering at this level.
- ◆ Encourage learners to apply their knowledge and understanding of engineering by using skills of evaluation and problem solving in a vocational context.
- ◆ Develop an awareness that health and safety issues are integral to the world of work generally and engineering in particular.
- ◆ Prepare learners for further learning opportunities, study and training for employment in engineering and related occupations.

### **Information about typical learners who might do the course**

The primary target group for this course is school learners in S3 and above. This course is designed at a level and scope such that it can be delivered in schools, if the school has suitable facilities and teaching expertise.

Due to the specialist expertise and facilities available in further education colleges and with training providers, it is anticipated that the course will rely on, and build on, existing partnerships between schools, further education colleges, training providers and employers. A partnership approach will enable the course to be delivered in a variety of appropriate learning environments enhancing the learning experience.

The course is also suitable for adult learners who are seeking to enhance their employability and develop introductory vocational skills in an engineering sector.

# Course structure and conditions of award

## Summary of course content

This course comprises four 40-hour units. The content of the course focuses on the development of basic hand skills across the disciplines of mechanical, electrical/electronic, fabrication and manufacture and assembly. Central to the content are the generic employability skills valued by employers in an engineering sector. These skills are developed in each of the four units and are assessed at least twice during the course. These add value to the development of the specific vocational skills.

All the engineering skills units, while focusing on specific skill areas, also address generic skills related to:

- ◆ engineering communications
- ◆ engineering materials
- ◆ measurement and marking
- ◆ working to tolerances
- ◆ Core Skills

The engineering skills units also include employability skills outlined below:

- ◆ time-keeping and attendance
- ◆ positive attitudes to learning
- ◆ responding positively to advice and feedback
- ◆ following instructions
- ◆ working co-operatively with others
- ◆ health and safety awareness
- ◆ necessary preparation planning
- ◆ checking own work
- ◆ problem solving

## Summary of unit content

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a variety of ways; however Skills for Work units are designed to provide an experiential learning process.

### ***Engineering Skills: Mechanical (National 4)***

This unit is designed to be the first attempted on the course. Learners are required to select the correct tools and materials required to safely manufacture an artefact. During the manufacture, learners will read simple engineering drawings, measure and mark, select appropriate materials and work to specified tolerances. Embedded into the practical activities of this unit are the employability skills that employers value. Although it is envisaged that all employability skills will be developed in this unit, not all will be assessed.

### ***Engineering Skills: Electrical/Electronic (National 4)***

In this unit learners will select the correct tools and components required to construct a basic functional extra low voltage electrical/electronic circuit from a given diagram and specification. Embedded into the practical activities of this unit are the employability skills that employers value. Although it is envisaged that all employability skills will be developed in this unit, not all will be assessed.



***Engineering Skills: Fabrication (National 4)***

In this unit learners will select the correct tools, materials and equipment required to manufacture an artefact using cutting, hot and cold forming and mechanical and thermal joining techniques. Embedded into the practical activities of this unit are the employability skills that employers value. Although it is envisaged that all employability skills will be developed in this unit, not all will be assessed.

***Engineering Skills: Manufacture and Assembly (National 4)***

This unit is designed to be attempted only after successful completion of the preceding skills units. Learners will select and safely use the correct tools and materials to manufacture, assemble and complete functionality tests on an artefact. Learners will evaluate and report their findings on the manufacture, assembly and functionality tests of the artefact. Embedded into the practical activities of this unit are the employability skills that employers value. Although it is envisaged that all employability skills will be developed in this unit, not all will be assessed.

**Conditions of award**

To achieve the award of National 4 Skills for Work Engineering Skills, learners must achieve all the required units as outlined in the course outline. They will be assessed pass/fail within centres. Skills for Work Courses are not graded.

# Assessment

## Assessment objectives

Assessment across the units in this course will primarily test practical skills but will also address the technical knowledge and understanding associated with those skills in engineering at National 4. In particular, assessment will focus on:

- ◆ practical vocational skills
- ◆ skills for employment in an engineering context

## Unit assessment

In all of the units that focus on the development of specific engineering skills, assessment follows a similar pattern involving a range of practical activities which will produce evidence for all the outcomes. The evidence will be confirmed by the use of an assessor checklist, which will cover:

- ◆ interpretation of a drawing or specification
- ◆ the appropriate use of tools, materials and equipment
- ◆ successful involvement in the completion of a task, product or assembly
- ◆ quality checking of their work by the learner
- ◆ attention to health and safety aspects of working in a workshop type of environment

The assessment of employability skills is integrated in all of the units and is based on assessor checklists and the completion of a learner review sheet on four different occasions throughout the course. This review allows the learner to record development of employability skills in the context of different skill areas.

Further details about unit assessment for this course can be found in the unit specifications and the ASP materials.

Exemplification of possible assessment approaches for these units will be provided in the ASP.

## Quality assurance

All instruments of assessment used within this course should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* ([www.sqa.org.uk/GuideToAssessment](http://www.sqa.org.uk/GuideToAssessment)).

# Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this course. The skills that learners will be expected to improve on and develop through the course are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the course where there are appropriate opportunities.

## **1 Literacy**

- 1.1 Reading
- 1.2 Writing
- 1.3 Listening and talking

## **3 Health and Wellbeing**

- 3.1 Personal learning
- 3.2 Emotional wellbeing
- 3.4 Planning for, and making, choices and changes

## **4 Employability, enterprise and citizenship**

- 4.1 Employability
- 4.3 Working with others
- 4.4 Enterprise

## **5 Thinking Skills**

- 5.1 Remembering
- 5.2 Understanding
- 5.3 Applying
- 5.4 Analysing and evaluating
- 5.5 Creating

Amplification of these skills is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the course.

# Employability skills profile

Employability skills covered in this course are detailed in the table below. For the purposes of the table, the units are referred to as A, B, C and D as indicated.

<b>Engineering Skills: Mechanical</b>	<b>= A</b>
<b>Engineering Skills: Electrical/Electronic</b>	<b>= B</b>
<b>Engineering Skills: Fabrication</b>	<b>= C</b>
<b>Engineering Skills: Manufacture and Assembly</b>	<b>= D</b>

<b>Employability skill/attitude</b>	<b>Evidence</b>
◆ maintaining good time-keeping	A, B
◆ maintaining good attendance	B, C
◆ maintaining a tidy workplace	A, C
◆ following instructions	A, D
◆ seeking advice	A, D
◆ working co-operatively with others	A, D
◆ sourcing and use of tools in a correct and safe manner	B, C
◆ using tools solely for the purpose for which they are designed	B, C
◆ cleaning and storing tools correctly after use	A, B
◆ recognising common materials	A, C
◆ showing health and safety awareness	A, B, C, D
◆ wearing appropriate personal protective equipment	A, C
◆ preparing appropriately to carry out tasks	C, D
◆ following basic drawings and specifications	B, D
◆ checking own work	A, B, C, D
◆ identifying own strengths and weaknesses	A, B, C, D
◆ identifying learning points from practical experiences	A, B, C, D
◆ positive attitude to learning	A, B, C, D

Assessment evidence in all units:

Performance evidence, supported by learner review sheets and assessor observation checklists.

# Course support notes

Course support notes are not mandatory; they provide advice and guidance on approaches to delivering and assessing the Skills for Work course. They are intended for teachers and lecturers who are delivering the course and its units.

## Guidance on approaches to delivery and assessment for this course

The course has been designed to ensure that learners learn through practical experiences. The main focus in each of the skills specific units is on practical work. General vocational skills, such as selecting and maintaining tools and equipment, are integrated with practical engineering activities within the units.

Health and safety is integral to all practical tasks and should be emphasised at the start of and throughout each lesson.

Brief lessons on workshop protocol should also be included.

Teaching and learning approaches will include demonstrations of practical work by tutors. Short lessons on specific aspects of industrial practice and the correct use of tools will prove invaluable at intervals throughout the learning experience. These may be followed by brief practical sessions in which the learners practise the skill emphasised by the demonstration. Given the practical nature of teaching/learning and assessment, centres should ensure that teaching blocks are of sufficient time to allow a meaningful experience for learners.

Reflecting on practical experiences and learning from them is an approach that is embedded in the course. Throughout the learning experiences, the emphasis should be on helping learners to develop an awareness of the employability skills and attitudes needed for the engineering industry, for example, good time-keeping, co-operating with others, taking instructions, and a positive attitude to learning. Opportunities to develop these skills and attitudes arise naturally in the work of the course. Learners should be aware that these generic skills are just as important as the practical engineering skills they are developing.

For example, it is important for workshop activities to be carried out to effective schedules; learners will have opportunities to demonstrate good time-keeping in the context of these schedules. Learners will have to co-operate with others regarding shared workspace, tools and equipment. They will have to co-operate and communicate regarding the transfer of materials, tools and equipment safely around and across the workshop. Learners will be encouraged to develop a positive attitude to waste minimisation and environmental issues regarding the use of materials.

The work of the course will increase awareness that health and safety issues are important in the world of work generally and in engineering in particular.

In carrying out engineering activities, learners will learn that there are correct and incorrect ways to use tools and equipment. Tutors will have ample opportunity to demonstrate good practice and correct procedures to learners, who will learn the importance to self and others of following instructions. Such positive experiences will foster a positive attitude to learning.

Teaching and learning approaches should impart enthusiasm and help to inform learners of realistic prospects in the engineering sector or in industry generally. They should become aware of steps to employment or further training. Through their experiences of the various practical skills in the course, they should become better equipped to make valid personal choices regarding careers and further study.

## **Sequencing/integration of units**

The course has four mandatory units which offer a broad range of different engineering experiences. It is recommended that the unit *Engineering Skills: Mechanical* (National 4) is attempted and completed initially as some aspects of the content of this unit are incorporated in all of the other course units. The *Engineering Skills: Manufacture and Assembly* (National 4) unit should only be attempted after successful completion of the other three units.

It is important that a well-planned induction to the course is delivered, emphasising its integrated nature and stressing the importance of generic employability skills throughout.

Employability skills should span the course, allowing learners ample opportunity to develop and review employability skills and attitudes over a range of engineering skills and over a reasonable period of time.

## **Guidance on approaches to delivery**

Throughout the course, the need for correct preparation for practical activities should be stressed. However, such preparation should not take excessive time to complete. Teaching correct skills practice, effective use of tools and equipment and a positive view of health and safety should help to ensure that preparation for practical work is comprehensive.

Learners will require supervision during practical work — both on a skills level and for health and safety reasons. The learning environment should be designed to minimise risks and provide a safe context for carrying out tasks. For example, when undertaking the task of Metal Active Gas (MAG) welding learners should be made aware of the risk from fire, fumes and harmful rays to themselves and others.

It is recommended that each practical session be preceded by a ‘tool box’ talk on an aspect of health and safety relevant to the work in hand. It is recommended that learners be given regular but short practice sessions in the correct use of the materials to be used in each session as well as coaching in the correct use of associated tools and equipment.

Centres are encouraged to establish links with local industry. Local engineering companies, trades associations, Sector Skills Councils (SSCs), Institutes and Chambers of Commerce may be prepared to offer support, for example, in the form of visits from representatives of their organisations. Visitors from industry will be able to give learners a realistic view of jobs and conditions in the engineering industry.

It may be possible for centres to arrange visits to engineering works as part of the learners’ learning experience. Visits to local industry are often particularly useful because work in progress will be at different stages and learners can see various different trades working at the same time. Industrial visits should be carefully arranged, organised and authorised. It would be preferable for those responsible for such visits to have prior knowledge of the industry in question.

## Guidance on approaches to assessment

Approaches to assessment that promote the efficient and effective gathering of evidence are to be encouraged.

The development and assessment of generic employability skills is a key feature of this course and is integrated with the skills specific units. Learners can readily gather evidence for assessment during their work in these practical skills units. Reviewing progress with engineering employability skills and attitudes will take place in the practical context of work in the different activities. Learners will complete a minimum of four review sheets in the different trade activities. Assessment of interpreting drawings and specifications and materials should also take place during the work in skills specific practical units. An employability skills profile for the course is included and this gives a clear indication of where assessment evidence is gathered for generic employability skills.

Within the skills specific practical units, the learner will produce evidence as a natural part of the learning and teaching process. Learners will first learn and practise the correct techniques and methods for each of the skills they undertake. Assessment of the various practical tasks will take place at appropriate points throughout the course, allowing time for learners to make quality checks of their finished products against the prescribed tolerances, before being submitted for assessment.

In the *Engineering Skills: Manufacture and Assembly* (National 4) unit learners can if appropriate work in teams of no more than three to manufacture and assemble an artefact. It is expected that the artefact produced by such a team will be of sufficient complexity and scope to allow all members of the team to make a contribution equal to the manufacture and assembly of an artefact by an individual learner. The artefact manufactured by a team can be, for example, a community-based project for the school, college or a youth group. Where this occurs, each learner must identify their contribution to the completion of the task and present evidence to satisfy the assessor that all outcomes and performance criteria have been met.

## Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this course. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at [www.sqa.org.uk/e-assessment](http://www.sqa.org.uk/e-assessment).

## Opportunities for developing Core Skills

Opportunities to develop aspects of Core Skills should be used where they arise naturally. For example, in order to carry out engineering activities in a workshop environment, learners will develop aspects of Numeracy when making engineering calculations and taking measurements. They will also have to communicate simple engineering terms with tutors and fellow learners regarding skills practices, materials and tools, health and safety and working together in the workplace. Aspects of Problem Solving will arise through their participation in practical work.

Teaching and learning approaches should encourage learners to take responsibility for their own learning and development. In the practical units of the course, learners need to carry out quality checks on their own work. This provides a good opportunity to motivate learners to take pride in their work. The integration of employability skills, in particular self-evaluation skills, will allow learners to take responsibility for seeking feedback and identifying action points for improvement in their own performance. This should help to develop confidence in taking advice and in asking for direction and assistance where necessary.

This course gives automatic certification of the Core Skill component Critical Thinking at SCQF level 4.



## General information for learners

The National 4 Skills for Work Engineering Skills course focuses on four broad areas of engineering — mechanical, electrical/electronic, fabrication and manufacture.

You will learn the basic skills across these areas by the:

- ◆ Interpretation of a drawing or specification.
- ◆ Appropriate use of tools, materials and equipment.
- ◆ Successful involvement in the completion of a task, product or assembly.
- ◆ Quality checking of your own work.
- ◆ Attention to health and safety aspects of working in a workshop type of environment.

Integrated throughout the course is the development of generic employability skills valued by employers in an engineering sector. Your assessor will use checklists and you will complete a learner review sheet on four different occasions throughout the course.

The National 4 Skills for Work Engineering Skills course provides a basis for progression into further education or for moving directly into training in employment within an engineering sector.

# Administrative information

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## History of changes to national course specification

Version	Description of change	Date
2.0	2013 — course re-coded as part of CfE development programme but no change to course and unit content.	August 2013
3.0	Course specification moved to a new template. No change to content. Units re-coded to align with corresponding course 2 code.	October 2018

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Note: You are advised to check SQA's website ([www.sqa.org.uk](http://www.sqa.org.uk)) to ensure you are using the most up-to-date version of the course specification.

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