



National 4  
Course  
Specification



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# National 4 Practical Electronics Course Specification (C760 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).

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## Course outline

**Course title:** Practical Electronics (National 4)

**SCQF:** level 4 (24 SCQF credit points)

**Course code:** C760 74

### Mandatory Units

<b>H25K 74</b>	<b>Practical Electronics: Circuit Design (National 4)</b>	<b>6 SCQF credit points</b>
<b>H25L 74</b>	<b>Practical Electronics: Circuit Simulation (National 4)</b>	<b>6 SCQF credit points</b>
<b>H25M 74</b>	<b>Practical Electronics: Circuit Construction (National 4)</b>	<b>6 SCQF credit points</b>

### Added Value Unit

<b>H25N 74</b>	<b>Developing an Electronic Solution (National 4)</b>	<b>6 SCQF credit points</b>
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This Course includes six SCQF credit points for the assessment of added value in the Added Value Unit. Further information on this Unit is provided in the Assessment section.

## Recommended entry

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

- ◆ Numeracy (SCQF level 3)

In terms of prior learning and experience, relevant experiences and outcomes may also provide an appropriate basis for doing this Course. Further information on relevant experiences and outcomes is given in the *Course Support Notes*.

## **Progression**

This Course or its Units may provide progression to:

- ◆ other SQA qualifications in Practical Electronics or related areas
- ◆ further study, employment and/or training

Further details are provided in the *Course Support Notes*.

## **Equality and inclusion**

This Course 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. For further information, please refer to the *Course Support Notes*.

## **Rationale**

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 Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

## **Relationship between the Course and Curriculum for Excellence values, purposes and principles**

Electronics is an area of human endeavour which brings together elements of technology, science and mathematics, and applies these to real world challenges. The Course therefore provides an excellent opportunity for making links across learning in the senior phase.

The Course encourages learners to become successful, responsible and creative in their use of technologies and to continue to acquire and develop the attributes and capabilities of the four capacities, including: creativity, flexibility and adaptability; enthusiasm and a willingness to learn; perseverance, independence and resilience; responsibility and reliability; confidence and enterprise.

The Course provides progression from experiences and outcomes in craft, design, engineering and graphics, and in science.

## **Purpose and aims of the Course**

Electronics is vital to everyday life in our society. This Course provides skills and a basic understanding of electronics and its impact. It provides a solid foundation for those considering further study, or a career, in electrical engineering and related disciplines. The Course also provides a valuable complementary practical experience for those studying Engineering Science, Physics or other pure science Courses.

The electronics industry continues to be a major contributor to the economy. It contributes not only to manufacturing, but to other sectors such as finance, telecommunications, material processing, oil extraction, weather forecasting and renewable energy. Within all of these fields there exists a wide range of job opportunities for people with skills in electronics.

The aims of the Course are to enable learners to develop:

- ◆ knowledge and understanding of key concepts in electronics and apply these in a range of contexts
- ◆ a range of practical skills in electronics, including skills in analysis and problem solving, design skills, skills in the safe use of tools and equipment, and skills in evaluating products and systems
- ◆ awareness of the importance of safe working practices in electronics
- ◆ an understanding of the role and impact of electronics in changing and influencing society and the environment

The Course is mainly practical in nature. The aims of the Course will be developed through practical projects and investigative tasks in a range of contexts.

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

The Course provides a broad practical introduction to electronics. It will be of value in providing an informed view of the impact of electronics to many learners, and particularly beneficial to those considering a career or further study in electronics, electrical engineering, physics, and related disciplines.

The Course provides sufficient breadth, flexibility and choice to meet the needs of all learners.

Learners will develop a broad understanding of the pervasive role of electronics in our society, as well as a range of transferable skills for learning, life and work, opening up a wide range of career and study opportunities, and enabling them to develop as global citizens who can contribute effectively to their communities, society and the world.

On completing the Course, learners will have developed skills in analysis and problem solving, circuit design, safe use of tools and equipment, and evaluation of electronic solutions.

Course activities also provide opportunities to enhance generic skills in planning and organising, working independently and in teams, critical thinking and decision making, research, communication and self- and peer-evaluation, in a technological context.

# Course structure and conditions of award

## Course structure

The Course enables learners to develop a range of technological skills, including skills in analysis and problem solving, design skills, skills in the safe use of tools and equipment, and skills in evaluating products and systems.

The Course also enables learners to develop knowledge and understanding of key concepts in electronics, and the ability to apply these in a variety of contexts; and an awareness of the impact of electronics on society and the environment.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a number of ways.

The Course comprises four mandatory Units including the Added Value Unit. The first three Units listed below are designed to provide progression to the corresponding Units at National 5.

### **Practical Electronics: Circuit Design (National 4)**

This Unit provides a basic understanding of key electrical concepts and electronic components. Learners will analyse straightforward electronic problems, design solutions to these problems and explore issues relating electronics to society and the environment.

### **Practical Electronics: Circuit Simulation (National 4)**

In this Unit, the learner will use simulation software to assist in the design, construction and testing of simple circuits and systems and to investigate their behaviour.

### **Practical Electronics: Circuit Construction (National 4)**

This Unit provides experience in assembling a range of simple electronic circuits, using permanent and non-permanent methods. Skills in practical wiring and assembly techniques will be developed, and basic testing and fault-finding carried out.

### **Added Value Unit: Developing an Electronic Solution (National 4)**

This Unit requires the learner to apply skills and knowledge from the other Units to solve a straightforward electronics problem.

## Conditions of award

To achieve the Practical Electronics (National 4) Course, learners must pass all of the required Units, including the Added Value Unit. The required Units are shown above.

National 4 Courses are not graded.

## Skills, knowledge and understanding

Full skills, knowledge and understanding for the Course is given in the *Added Value Unit Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course includes:

- ◆ awareness of some aspects of the impact of electronic systems on society and the environment
- ◆ awareness of safe working practices in electronics
- ◆ analysing, with guidance, straightforward electronic problems, and designing solutions to these problems
- ◆ simulating, testing and evaluating solutions to electronic problems, with guidance
- ◆ skills in using basic test equipment
- ◆ constructing simple electronic circuits using permanent (soldering) and non-permanent methods, using given layouts
- ◆ basic knowledge and understanding of the systems approach to electronics
- ◆ basic knowledge and understanding of a range of electronic components
- ◆ introductory knowledge and understanding of combinational logic
- ◆ understanding of key electrical concepts — current, voltage, resistance, analogue/digital
- ◆ applying basic electronic knowledge and skills in a range of straightforward contexts

Skills, knowledge and understanding to be included in the Course will be appropriate to the SCQF level of the Course. The SCQF level descriptors give further information on characteristics and expected performance at each SCQF level ([www.sqa.org.uk/scqf](http://www.sqa.org.uk/scqf)).

# Assessment

Further information about assessment for the Course is included in the *Course Support Notes* and the *Added Value Unit Specification*.

## Unit assessment

All Units are internally assessed against the requirements shown in the Unit Specification.

They can be assessed on an individual Unit basis or by using other approaches which combine the assessment for more than one Unit.

They will be assessed on a pass/fail basis within centres. SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgments are consistent and meet national standards.

The assessment of the Units in this Course will be as follows:

### **Practical Electronics: Circuit Design (National 4)**

For this Unit, learners will be required to provide evidence of:

- ◆ skills in designing simple digital electronic circuits
- ◆ skills in designing simple analogue electronic circuits
- ◆ awareness of some aspects of the impact of electronics

### **Practical Electronics: Circuit Simulation (National 4)**

For this Unit, learners will be required to provide evidence of:

- ◆ skills in using simulation software in the design of simple electronic circuits
- ◆ skills in using simulation software in the construction and testing of simple electronic circuits

### **Practical Electronics: Circuit Construction (National 4)**

For this Unit, learners will be required to provide evidence of:

- ◆ skills in constructing simple electronic circuits, applying safe working practices
- ◆ skills in testing simple electronic circuits

## Added Value Unit

Courses from National 4 to Advanced Higher include assessment of [added value](#)<sup>1</sup>. At National 4, added value will be assessed in an Added Value Unit. The Added Value Unit will address the key purposes and aims of the Course as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge or application.

In the Practical Electronics (National 4) Course, the Added Value Unit will focus on challenge and application.

The learner will draw on, extend and apply the skills they have learned during the Course. This will be assessed through a [practical activity](#)<sup>2</sup> which involves applying skills and knowledge from the other Units to solve an appropriately challenging electronics problem.

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<sup>1</sup> Definitions can be found here: <http://www.sqa.org.uk/sqa/58409.html>

<sup>2</sup> Definitions can be found here: <http://www.sqa.org.uk/sqa/58409.html>

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

It is expected that learners will also 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.

## **2 Numeracy**

2.3 Information handling

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

4.2 Information and communication technology (ICT)

## **5 Thinking skills**

5.2 Understanding

5.3 Applying

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. Further information on building in skills for learning, skills for life and skills for work for the Course is given in the *Course Support Notes*.

# Administrative information

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## History of changes to National Course Specification

Course details	Version	Description of change	Authorised by	Date

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