



National Unit Specification: general information

UNIT Illumination and Emergency Lighting (SCQF level 6)

CODE F5FR 12

SUMMARY

This Unit is intended for candidates with little or no prior knowledge of illumination and emergency lighting requirements but who wish to develop such knowledge and apply it to the design of simple illumination and emergency lighting schemes.

The aim of this Unit is to develop the candidate's awareness of discharge luminaries in terms of their construction and operation. Candidates will also be presented with a range of operating environments and be able to select luminaries for these specific requirements.

Candidates will be presented with opportunities to calculate the illumination requirements of a simple lighting scheme and determine the type and quantity of luminaries required for the scheme.

The terminology and requirements of emergency lighting schemes will also be discussed and candidates will gain an appreciation of these.

This Unit may form part of a National Qualification Group Award or may be offered on a free-standing basis.

OUTCOMES

- 1 Describe the operation of a range of discharge luminaries.
- 2 Select suitable luminaries for a range of environments.
- 3 Design a simple interior lighting scheme.
- 4 State the requirements of emergency lighting schemes and select a scheme for a given environment.

Administrative Information

Superclass: XJ

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National Unit Specification: general information (cont)

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RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- ◆ Standard Grade Mathematics — Credit Level
- ◆ Standard Grade Technological Studies — Credit Level
- ◆ Standard Grade Physics — Credit Level

CREDIT VALUE

1 credit at SCQF level 6 (6 SCQF credit points at SCQF level 6*).

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

There is no automatic certification of Core Skills in this Unit.

This Unit provides opportunities for candidates to develop aspects of the following Core Skills:

- ◆ Problem Solving (SCQF level 6)
- ◆ Numeracy (SCQF level 6)

These opportunities are highlighted in the Support Notes of this Unit Specification.

National Unit Specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Describe the operation of a range of discharge luminaries.

Performance Criteria

- (a) Identify correctly the component parts of a range of discharge luminaries.
- (b) Describe clearly the starting and running procedures of a range of discharge luminaries.
- (c) State clearly the fault symptoms of common discharge luminaries.

OUTCOME 2

Select suitable luminaries for a range of environments.

Performance Criteria

- (a) State correctly the operating characteristics of a range of luminaries.
- (b) State correctly the factors which influence the choice of lighting scheme for different environments.
- (c) Select the most appropriate luminaire types to meet the requirements of particular lighting environments.

OUTCOME 3

Design a simple interior lighting scheme.

Performance Criteria

- (a) Apply correctly the 'Inverse Square' and 'Cosine' laws to illumination calculations.
- (b) Apply correctly the 'Lumen method' to simple illumination design calculations.
- (c) Determine correctly the required illumination level of an interior lighting scheme.
- (d) Select the appropriate type and quantity of luminaire to meet the scheme requirements.
- (e) Draw clearly the luminaire layout for the lighting scheme.

National Unit Specification: statement of standards (cont)

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OUTCOME 4

State the requirements of emergency lighting schemes and select a scheme for a given environment.

Performance Criteria

- (a) Define correctly terms used in emergency lighting design.
- (b) State correctly the requirements of BS5266 and BSEN1838 regarding the siting of emergency lighting luminaires.
- (c) State correctly the requirements of BS5266 and BSEN1838 regarding the appropriate illumination levels for emergency lighting schemes in 'escape routes' and 'open areas'.
- (d) Select the most appropriate emergency lighting scheme in terms of 'duration' and 'type', for a given environment, in compliance with the requirements of BS5266 and BSEN1838.

EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Written and/or recorded oral evidence should be produced to demonstrate that the candidate has achieved Outcomes 1 and 2 to the standard specified in the Outcomes and Performance Criteria. The evidence should be produced under supervised, controlled conditions. The assessment will be closed-book and should last no more than 40 minutes.

With regard to Outcomes 1 and 2:

- ◆ the component parts of two types of discharge luminaire should be identified and operating characteristics of the luminaires stated
- ◆ the starting and running procedures of two luminaire types should be described
- ◆ two typical fault symptoms of two discharge luminaires should be stated
- ◆ two indoor and two outdoor lighting scheme requirements should be described
- ◆ selection of luminaires to consider factors of illumination, glare, colour rendering, efficacy

Written and/or recorded oral evidence should be produced to demonstrate that the candidate has achieved Outcome 3 to the standard specified in the Outcome and Performance Criteria. The evidence should be produced under supervised, controlled conditions. The assessment will be closed-book and should last no more than 50 minutes.

With regard to Outcome 3:

- ◆ the interior lighting scheme to be restricted to one room
- ◆ appropriate lighting codes should be provided

National Unit Specification: statement of standards (cont)

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Written and/or recorded oral evidence should be produced to demonstrate that the candidate has achieved Outcome 4 to the standard specified in the Outcomes and Performance Criteria. The evidence should be produced under supervised, controlled conditions. The assessment will be closed-book and should last no more than 40 minutes.

With regard to Outcome 4:

- ◆ six emergency lighting design terms to be defined
- ◆ two requirements of BS5266 and two requirements of BSEN1838 regarding the siting of emergency luminaires to be stated
- ◆ the minimum levels of illumination for escape routes and open areas to be stated

Candidates should be permitted to use appropriate 'British Standards' as reference materials during the assessment.

Assessors should use a checklist to record candidate's achievement as they demonstrate the knowledge and skills set out in the Performance Criteria of each Outcome.

National Unit Specification: support notes

UNIT Illumination and Emergency Lighting (SCQF level 6)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This is an optional Unit within the National Qualification Group Award in Electrical Engineering at SCQF level 6 but may also be offered on a free-standing basis.

The aim of this Unit is to develop the candidate's awareness of discharge luminaries in terms of their construction and operation. Candidates will also be presented with a range of operating environments and be able to select luminaries for these specific requirements.

Candidates will be presented with opportunities to calculate the illumination requirements of a simple lighting scheme using the 'lumen method'. Candidates should also be given the opportunity to use the 'cosine', the 'inverse square' laws in relation to lighting calculations. The illumination requirements of a simple lighting scheme should be calculated and the type and quantity of luminaries required for the scheme should be determined.

Candidates should be provided with opportunities to gain knowledge of the terminology of emergency lighting, including the terms: luminaire, maintained, non-maintained, central battery, illuminance, rated duration, rated load, self-contained (single point), slave luminaire. Candidates should also be made aware of the requirements of emergency lighting schemes as set out in BS5266 and BSEN1838.

The content and context of this Unit should provide candidates with an overview of the lighting design and the requirements of emergency lighting schemes, and the topic should be set in a practical context for given environmental and operating conditions.

Candidates should be made aware of the need to comply with the requirements of the appropriate 'British Standards' and 'lighting codes' in terms of general and emergency lighting design.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Although much of the content of this Unit is of a descriptive nature, it should be delivered in an environment which places an emphasis of lighting design. This could be in a classroom, laboratory or workshop.

Delivery of the Unit content could utilize relevant industrial case studies, and drawings/layouts and specifications of lighting schemes. The use of relevant videos or DVD recordings illustrating the construction and operation of luminaries and the requirements of general and emergency lighting schemes should be encouraged. Suitable Design Software packages may be used to confirm design solutions.

The use of relevant 'British Standards' and lighting codes as working documents should be encouraged and candidates should be given exercises which provide opportunities for them to use the relevant sections of these publications.

National Unit Specification: support notes (cont)

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Candidates should be encouraged to discuss and debate the various issues raised by the subject content in order that this interaction might stimulate their thought processes and reinforce the learning.

The Outcomes should be delivered in the sequence given in the ‘statement of standards’.

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Elements of the Core Skill of *Problem Solving*, that is, critical thinking, planning, organising, reviewing and evaluating, will be naturally developed as candidates apply knowledge to design simple illumination and emergency lighting schemes. They investigate lighting requirements and consider all relevant factors including room dimensions, working surface needs and maintenance before determining the type and quantity of luminaries required to take account of the environment. Group discussion of issues during formative work could be particularly useful in developing an evaluative approach to potential design solutions.

Candidates calculate the illumination requirements of a simple lighting scheme and determine the type and quantity of luminaries required. Numeracy skills will be naturally enhanced, with a focus on the practical application of numerical and graphic information. Formative activities should be designed to develop accuracy and confidence in handling concepts in an electrical engineering context. Examples of drawings, layouts, and specifications will provide useful support.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

This Unit should be assessed on an Outcome by Outcome basis with Outcomes 1 and 2 being integrated. Further opportunities to integrate assessments may also be possible however the total assessment time for this Unit should be no more than 2 hours 10 minutes.

The assessment of Outcomes 1 and 2 should take the form of an exercise of short-answer or structured questions which allow the candidate to demonstrate achievement of all the Performance Criteria of these Outcomes.

The assessment of Outcome 3 should take the form of a simple lighting design exercise in which the candidate is provided with sufficient information regarding the type of activity to be carried out in the room, the room dimensions, the height of the luminaries above the working surface, the maintenance factor and all other relevant information to allow the design exercise to be completed. The lighting scheme produced should demonstrate achievement of all the Performance Criteria of this Outcome.

National Unit Specification: support notes (cont)

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The assessment of Outcome 4 should take the form of an exercise of short-answer or structured questions which allow the candidate to demonstrate achievement of all the Performance Criteria of these Outcome.

Candidates should be allowed access to appropriate 'British Standards' for reference purposes.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

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