



## National Unit Specification: general information

**UNIT** Mathematics: Craft 2 (SCQF level 5)

**CODE** F3HW 11

### SUMMARY

This Unit is intended primarily for those candidates who wish to develop further their knowledge and understanding of Mathematics at SCQF level 5 with a view to supporting and underpinning their studies in an engineering discipline. In such cases, delivery of the Unit should be set within the context of the award to which it contributes. The Unit is designed to develop aspects of the candidate's skills in numeracy, graphical communication, statistics, trigonometry and algebra, and to apply these skills in the appropriate engineering context. It is envisaged that the content of each Outcome is delivered and assessed with specific reference to the candidate's engineering specialism, where appropriate.

### OUTCOMES

- 1 Use tolerance notation, and direct and inverse proportion in engineering contexts.
- 2 Construct charts and graphs from given engineering data.
- 3 Calculate and interpret simple statistical measures in engineering contexts.
- 4 Use the sine and cosine rules in engineering contexts.
- 5 Transpose simple engineering formulae.

### 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:

- ◆ Mathematics: Craft 1 (SCQF level 5)
- ◆ Standard Grade Mathematics at General level
- ◆ Mathematics Intermediate 1 Course

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#### Administrative Information

**Superclass:** RB

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## **National Unit Specification: general information (cont)**

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### **CREDIT VALUE**

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5\*).

\*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**

Achievement of this Unit gives automatic certification of the following Core Skills Component: *Using Number* at SCQF level 5.

## **National Unit Specification: statement of standards**

### **UNIT Mathematics: Craft 2 (SCQF level 5)**

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**

Use tolerance notation, and direct and inverse proportion.

##### **Performance Criteria**

- (a) Calculate correctly the result when quantities expressed in tolerance notation are added or subtracted or multiplied.
- (b) Calculate correctly quantities which are in direct or inverse proportion.

#### **OUTCOME 2**

Construct charts and graphs from given engineering data.

##### **Performance Criteria**

- (a) Present given data appropriately and accurately in a bar chart or pie chart or line graph or histogram.
- (b) Construct, from appropriate given data, a graph with correctly labelled axes, sensibly chosen scales, correctly plotted points, and depending on the data either a reasonable line of best fit or a reasonable curve through the points.

#### **OUTCOME 3**

Calculate and interpret simple statistical measures in engineering contexts.

##### **Performance Criteria**

- (a) Calculate correctly the mean or mode or median for given data.
- (b) Interpret results for mean or mode or median in relation to the data and its context.
- (c) Calculate correctly the range and standard deviation for given data.
- (d) Interpret results for range and standard deviation in relation to the data and its context.

#### **OUTCOME 4**

Use the sine and cosine rules in engineering contexts.

##### **Performance Criteria**

- (a) Calculate correctly an unknown side and angle in a triangle using the sine rule.
- (b) Calculate correctly an unknown side and angle in a triangle using the cosine rule.

## **National Unit Specification: statement of standards (cont)**

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### **OUTCOME 5**

Transpose simple engineering formulae.

#### **Performance Criteria**

- (a) Transpose correctly engineering formulae involving addition or subtraction or multiplication or division of terms, and combinations of these operations.
- (b) Transpose correctly engineering formulae involving simple powers: squares or square roots or cubes or cube roots.

#### **EVIDENCE REQUIREMENTS FOR THIS UNIT**

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

Evidence should be produced under closed-book, supervised conditions in response to an appropriate set of questions. The evidence may be gathered:

- ◆ in a single, end-of–Unit assessment
- or**
- ◆ on an Outcome by Outcome basis
- or**
- ◆ by a combination of Outcomes

The total time allowed for the assessment(s) should not exceed two hours

Candidates should be given access to calculators and an appropriate formula sheet. Sufficient working must be shown to demonstrate the method of solution.

Sampling of content may be appropriate, but assessment questions must be constructed to enable evidence to be produced which demonstrates achievement of all Outcomes and Performance Criteria.

Where reassessment is needed, a different set of questions must be used on each assessment occasion.

The Assessment Support Pack for this Unit provides sample assessment material and marking information. Centres wishing to develop their own assessments must refer to the Assessment Support Pack to ensure a comparable standard.

## National Unit Specification: support notes

### UNIT Mathematics: Craft 2 (SCQF level 5)

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

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

#### GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This Unit is an optional Unit of the National Certificate Group Awards in Engineering, but can also be taken as a free-standing Unit. This Unit aims to build on and extend further the candidate's mathematical knowledge and skills.

It is envisaged that the content of this Unit is delivered in the engineering context appropriate to the candidate, whether as an optional Unit of the Group Award or as a free-standing Unit.

Applying the mathematical skills of the Unit in meaningful engineering scenarios will enable the candidate to appreciate that those skills are valuable tools for engineering.

#### GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Due to the essentially progressive nature of mathematics learning and teaching, every opportunity should be taken to revise and consolidate prior knowledge. For example: in Outcome 4, preliminaries referring to Pythagoras' Theorem and sin/cos/tan could be appropriate; in Outcome 5, revision of substitution into formulae could precede transposition.

Delivery of the Unit can be an appropriate mixture of lecturer-led/student-centred activities; individual/group work; classroom/workshop assignments. Use of online resources could be included to support and underpin learning.

The sensible and correct use of calculators should be demonstrated and encouraged where appropriate. At the same time, candidates should be guided and encouraged to identify when working without a calculator is more appropriate.

#### OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

The Unit will further develop skills in *Using Number* and *Graphical Information* at SCQF level 5. The emphasis of formative work should be on *Numeracy* as a practical tool. Candidates need to work confidently with numerical concepts, applying a wide range of numerical and graphical information in engineering contexts. They should be proficient in selecting the number and order of operations which require to be carried out to solve practical problems efficiently. Candidates should be provided with formative opportunities to undertake sustained complex calculations and apply skills to numerical, statistical and graphic engineering data. Accuracy in interpreting and presenting information could be developed and supported by appropriate technology and resources.

## **National Unit Specification: support notes (cont)**

### **UNIT Mathematics: Craft 2 (SCQF level 5)**

#### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

Candidates will benefit from the incorporation of formative assessments into the learning and teaching process

Achievement of this Unit requires the Evidence Requirements for each Outcome to be met. A candidate who does not initially achieve the specified standard can have a further opportunity, attempting only the Outcome(s) not previously achieved.

#### **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)*.

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#### **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](http://www.sqa.org.uk)).