



## Higher National Unit Specification

### General information for centres

**Unit title:** Geographic Information Systems

**Unit code:** F502 34

**Unit purpose:** The Unit is designed to give candidates an introduction to the utilisation of computer information systems which are based on locations from digital maps and plans.

On completion of the Unit the candidate should be able to:

- 1 Survey and process digital map data for inclusion in a Geographic Information System (GIS).
- 2 Geocode data tables to digital map data.
- 3 Use GIS software to display data.

**Credit points and level:** 1 HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7\*)

*\*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.*

**Recommended prior knowledge and skills:** It is recommended that candidates undertaking this Unit should have prior Knowledge and/or Skills as evidenced by the completion of the Unit Digital Mapping: An Introduction

**Core Skills:** There are opportunities to develop the Core Skills components of *Numeracy Using Graphical Information*, *Information Technology*, *Problem Solving with Critical Thinking* Reviewing and Evaluation and *Working with Others* at SCQF level 5, although there is no automatic certification of Core Skills or Core Skill components.

**Context for delivery:** If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

**Assessment:** Outcome 1 is best suited to a group field data collection exercise. Outcomes 2 and 3 can be assessed on an individual Outcome basis, using an IT based exercise.

## **Higher National Unit specification: statement of standards**

**Unit title:** Geographic Information Systems

**Unit code:** F502 34

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### **Outcome 1**

Survey and process digital map data for inclusion in a Geographic Information System

#### **Knowledge and/or Skills**

- ◆ Methods of field survey
- ◆ Data processing techniques
- ◆ Data format

#### **Evidence Requirements**

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ carry out a digital field survey using total station or Global Positioning instruments to accurately fix the positions of buildings, kerbs, ground areas, services and street furniture
- ◆ process the field data to produce an accurate base map containing all detail necessary for inclusion into a Geographic Information System
- ◆ save the base map in a format suitable for entry into a Geographic Information System

The base map completed in this Outcome should be used for Outcomes 2 and 3.

#### **Assessment Guidelines**

In the production of the base map it could be possible to use existing Ordnance Survey Landline or Mastermap data to which the field survey data would be added.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** Geographic Information Systems

### Outcome 2

Geocode data tables to digital map data

#### Knowledge and/or Skills

- ◆ Methods of map data import
- ◆ Data table creation techniques
- ◆ Methods of importing data tables
- ◆ Identification of map image elements
- ◆ Geocoding techniques

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can use GIS software. Candidates must:

- ◆ import map data for viewing in the GIS software
- ◆ create field headers for data tables
- ◆ add rows of information to data tables
- ◆ import data tables from a spreadsheet
- ◆ allocate image identifiers to the map data
- ◆ check and create polygons in the map data
- ◆ create index fields to link data tables and the map
- ◆ Geocode data tables to the map

#### Assessment Guidelines

The assessment for this Outcome should follow on from Outcome 1 and form the basis for Outcome 3. The base map could be linked with data tables containing information about buildings, plots of ground, services and street furniture.

In any assessment of this Outcome **all** Knowledge and/or Skill items should be included.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** Geographic Information Systems

### Outcome 3

Use GIS software to display data

#### Knowledge and/or Skills

- ◆ Data selection methods
- ◆ Structured Query Language (SQL) selection techniques
- ◆ Thematic mapping techniques.
- ◆ Raster image processing
- ◆ Georeferencing techniques

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can use GIS software to analyse, select and display data. Candidates must

- ◆ use simple queries to select information from data tables matching specific criteria.
- ◆ select from data tables for complex queries using Structured Query Language (SQL) to match specific criteria.
- ◆ analyse data on a specific theme and display as a thematic map.
- ◆ import a raster image.
- ◆ register the raster image with a vector map by matching control points.
- ◆ create page layouts of the maps and related queries. The maps should be fully annotated with title, scale and heading information with the query results labelled.
- ◆ print the page layouts at the specified paper size.

Evidence for the Knowledge and/or Skills for this Outcome will be provided from the data compiled in a GIS from Outcome 2.

#### Assessment Guidelines

In any assessment of this Outcome **all** Knowledge and/or Skill items should be included.

The page layouts could include the base map with data tables inserted into the map frame or outside the map frame. An aerial photograph registered to the base map could be used as a frontispiece.

## Administrative Information

**Unit code:** F502 34  
**Unit title:** Geographic Information Systems  
**Superclass category:** CD  
**Original date of publication:** August 2008  
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### History of changes:

Version	Description of change	Date

**Source:** SQA

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## Higher National Unit specification: support notes

### Unit title: Geographic Information Systems

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 provides the candidate with the Knowledge and/or Skills to compile data in a geographic information system and to select, analyse and display parts of the data.

#### Outcome 1

This Outcome introduces the candidate to digital field survey methods to produce a site plan. Total Station survey instruments and if possible some form of GPS instrument could be used. The candidate will learn about the field coding of detail points and the collection of date strings.

The completed field survey file could be downloaded into a suitable software package where detail point coordinates will be calculated and field codes read to produce a site map. The site map could be used as an update for an Ordnance Survey map. The map could then be saved in a form suitable for exporting to a GIS.

#### Outcome 2

This Outcome introduces the candidate to the use of GIS software to create and geocode data tables to a digital map. Topics covered could include the following:

**Map data import:** map file translator; dxf; dwg.

**Data table creation:** file format; map projection; map grid system; indexing of graphic image elements; creation of polygons and districts; creation of field headers; addition of information rows.

**Data table import:** spreadsheet creation; file format; import techniques.

**Identification of map image elements:** checking and creation of polygons; use of object identifiers; use of Mastermap TOIDS.

**Geocoding:** index fields; automatic geocoding; interactive geocoding.

#### Outcome 3

This Outcome introduces the candidate to the use of a GIS to analyse, select and display data from a Geographic Information System. Topics covered could include the following:

**Data selection:** simple queries using numerical values, names, postcodes and dates.

**SQL:** complex queries linking two or more data tables.

**Thematic maps:** creation of choropleth (ranged) maps; dot density maps; bar charts; pie charts; graduated circles.

## Higher National Unit specification: support notes (cont)

**Unit title:** Geographic Information Systems

**Raster images:** scanned maps; aerial photographs; file format.

**Georeferencing:** registration of a raster image with a map; control point selection; minimising errors.

**Map and query layout:** paper size; page layout; insertion of tables; arrangement of map and tables; headings; title, scale and marginal information.

**Map printing:** paper size; map scale.

### Guidance on the delivery and assessment of this Unit

This Unit provides the candidate with the knowledge and understanding of the basic processes in the use of a Geographic Information System. The Unit is likely to form part of a Group Award in the field of land management. If the Unit is taught as part of a Group Award, the delivery of the Unit could be related to other Units which have a mapping content, in particular Digital Mapping.

The assessment for the Unit lends itself to a project which would cover all Outcomes.

#### *Opportunities for developing Core Skills*

Core Skill	Outcome 1	Outcome 2	Outcome 3
<b>1 Communication</b>			
Written Communication			
(Reading)			
(Writing)			
Oral Communication			
<b>2 Numeracy</b>			
Using Number			
Using Graphical Information	SCQF level 5	SCQF level 5	SCQF level 5
<b>3 Information Technology</b>			
Using Information Technology	SCQF level 5	SCQF level 5	SCQF level 5
<b>4 Problem Solving</b>			
Critical Thinking	SCQF level 5		
Planning and Organising	SCQF level 5		
Reviewing and Evaluating		SCQF level 5	SCQF level 5
<b>5 Working with Others</b>			
Working with Others	SCQF level 5		

## **Higher National Unit specification: support notes (cont)**

### **Unit title:** Geographic Information Systems

Opportunities for the development of Core Skills at SCQF level 5 are as follows:

*Numeracy* skills of Using Graphical Information are developed in Learning Outcomes 1, 2 and 3; *IT* skills are required in all Outcomes; *Problem Solving* skills are developed in planning the survey and the data collection process of Outcome 1, followed by reviewing and evaluating how the data is best arranged in the GIS for Outcomes 2 and 3; *Working with Others* is required in the group work for Outcome 1.

### **Open learning**

Where appropriate materials and equipment exists, this Unit could be delivered by distance or open learning. Some degree of online support would be necessary with learning material being available electronically or by post.

### **Candidates with 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)).



## General information for candidates

### Unit title: Geographic Information Systems

This Unit is designed to introduce you to the use of a Geographic Information System.

The Unit will introduce you to:

- 1 The surveying of digital map data for inclusion in a Geographic Information System.
- 2 The creation of data tables and their geocoding to digital map data.
- 3 Methods of analysing, selecting and displaying data.

The assessment for this Unit could take the form of a practical project involving the following:

- ◆ a digital field survey to produce a base map or to update an existing base map followed by the processing of the field data to create the updated base map
- ◆ the importation of the base map into a GIS software package and the creation and geocoding of data tables to the map
- ◆ the use of the GIS software to select data by simple queries and by complex queries using Structured Query Language (SQL)
- ◆ the analysis of data on a specific theme to create thematic maps
- ◆ the registration of a raster image with a vector map by matching control points
- ◆ the creation of page layouts with maps and data tables
- ◆ the printing of the layouts

You will have the opportunity to develop Core Skills at SCQF level 5 in the following areas:

*Numeracy* skills of Using Graphical Information are developed in Learning Outcomes 1, 2 and 3; *IT* skills are required in all Learning Outcomes; *Problem Solving* skills are developed in planning the survey and the data collection process of Learning Outcome 1, followed by reviewing and evaluating how the data is best arranged in the GIS for Learning Outcomes 2 and 3; *Working with Others* is required in the group work for Learning Outcome 1.