



National Unit specification: general information

Unit title: Geographical Information Systems: Handling Data

Unit code: FN4T 12

Superclass: RF

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Version: 02

Summary

The purpose of this Unit is to provide candidates with the knowledge and skills to understand the nature, theory and use of spatial and other data types in the context of Geographical Information Systems (GIS). Candidates will be introduced to data handling and exploration methods, using research, discussion, practical application and teamwork. Practical skills will include the creation, design and use of a database in a GIS context.

This is a mandatory Unit within the National Progression Award in Geographical Information Systems: An Introduction (SCQF level 6), but can also be taken as a free-standing Unit.

This Unit is suitable for candidates who:

- ◆ are undertaking data handling and/or GIS for the first time
- ◆ wish to obtain a basic knowledge of the use of data in the context of GIS
- ◆ are considering further study or employment in a field which requires a basic knowledge of spatial data handling and/or GIS

Outcomes

- 1 Investigate types and sources of data in the context of GIS.
- 2 Investigate a range of data collection methods in the context of GIS.
- 3 Explain the importance of data quality in the context of GIS.
- 4 Apply data handling skills to a given brief in the context of GIS.

National Unit specification: general information (cont)

Unit title: Geographical Information Systems: Handling Data

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:

- ◆ English at Standard Grade (Credit) or equivalent
- ◆ Mathematics at Standard Grade (Credit) or equivalent
- ◆ Basic IT skills, which could be evidenced by attainment of Intermediate 1 ICT Core Skill or equivalent qualification or comparable level of skill obtained through experience

Credit points and level

1 National Unit 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

Achievement of this Course gives automatic certification of the following:

Complete Core Skill Problem Solving at SCQF level 6

Core Skill component None

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of the Unit Specifications for this Course.

National Unit specification: statement of standards

Unit title: Geographical Information Systems: Handling Data

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

Investigate types and sources of data in the context of GIS.

Performance Criteria

- (a) Research a range of data types used in the context of GIS.
- (b) Identify sources of GIS data.
- (c) Evaluate the strengths and weaknesses of types and sources of data.

Outcome 2

Investigate a range of data collection methods in the context of GIS.

Performance Criteria

- (a) Research and describe a range of data collection methods.
- (b) Evaluate the strengths and weaknesses of different data collection methods.

Outcome 3

Explain the importance of data quality in the context of GIS.

Performance Criteria

- (a) Define what is meant by data quality in the context of GIS.
- (b) Evaluate the quality of a given set of GIS data.

Outcome 4

Apply data handling skills to a given brief in the context of GIS.

Performance Criteria

- (a) Produce a data collection plan.
- (b) Collect data relevant to a given brief.
- (c) Create a database appropriate to the data collected.
- (d) Input the data into the database accurately.
- (e) Interrogate the database to produce outputs.
- (f) Describe and evaluate the implementation of the brief.

National Unit specification: statement of standards (cont)

Unit title: Geographical Information Systems: Handling Data

Evidence Requirements for this Unit

Written and/or oral recorded evidence and performance evidence should be produced to demonstrate that the candidate has achieved all of the Outcomes and Performance Criteria. The evidence should be produced under supervised conditions, and may be gathered holistically using a range of methods.

Relating to Outcomes 1–3

Evidence is required to demonstrate that the candidate has achieved Outcomes 1 to 3 to the standard specified in the Performance Criteria. This will be an open-book assessment, produced under supervised conditions.

- ◆ Identify the following types of data in the context of GIS by giving at least **two** examples and at least **two** appropriate sources of each and identifying their strengths and weaknesses:
 - primary and secondary data
 - qualitative and quantitative data
 - spatial, attribute and temporal data
 - metadata
- ◆ Suggest at least **two** qualitative and **two** quantitative collection methods for each of the following, and identify their strengths and weaknesses:
 - primary data collection
 - secondary data collection
- ◆ Explain the nature and importance of data quality in the context of GIS in terms of **each** of the following:
 - definitions of data quality terms
 - identification and resolution of errors
 - data quality assurance and control
 - impacts of poor quality data including data intended for use by a GIS and data generated by a GIS
 - evaluate the quality of **one** set of given data in relation to a given brief

Relating to Outcome 4

Written and/or oral recorded and performance evidence is required to demonstrate that the candidate can:

- ◆ collect data relevant to a given brief ensuring observations are accurately recorded in a given format
- ◆ create a database appropriate to the data collected
- ◆ enter data into the database ensuring data quality control principles are applied
- ◆ interrogate the database to produce results relevant to the given brief

National Unit specification: statement of standards (cont)

Unit title: Geographical Information Systems: Handling Data

Additional written and/or oral recorded evidence is required which will include:

- ◆ a data collection plan which includes primary and/or secondary spatial and attribute data
- ◆ an evaluation which will include an assessment of the effectiveness of the procedures carried out and identification of any areas for improvement in future application of data handling skills

Assessment will be open-book, produced under supervised conditions. The collection of data may involve group work but centres must be satisfied that the evidence submitted is the work of the individual candidate and that the candidate has participated actively in all activities.

National Unit specification: support notes

Unit title: Geographical Information Systems: Handling Data

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 a mandatory Unit within the National Progression Award in Geographical Information Systems: An Introduction (SCQF level 6), but can also be taken as a free-standing Unit.

The purpose of this Unit is to provide candidates with the knowledge and skills to understand the nature, theory and use of spatial and other data types in the context of Geographical Information Systems (GIS). Candidates will be introduced to data handling and exploration methods, using research, discussion, practical application and teamwork. Practical skills will include the creation, design and use of a database in a GIS context.

Outcome 1

In this Outcome, candidates will learn about the types of data which anyone working in a data-centred area should ideally be familiar with, but with specific reference to their usefulness in relation to GIS:

- ◆ primary and secondary data
- ◆ qualitative and quantitative data
- ◆ spatial, thematic and temporal data
- ◆ sources of data

Candidates should be encouraged to build a repository of examples and evaluations. Attention should be given to ensuring that candidates have a good understanding of the nature of spatial data in particular.

Outcome 2

In this Outcome, candidates will learn about the collection of data in the context of GIS, including:

- ◆ primary data collection: survey/questionnaire, interview, observations
- ◆ secondary data collection: existing records, maps, photographs, surveys, diaries, portfolios, logs
- ◆ qualitative and quantitative methods

National Unit specification: support notes (cont)

Unit title: Geographical Information Systems: Handling Data

Outcome 3

In this Outcome, candidates will learn about the importance of data quality. Candidates should be encouraged to question both the quality of data and the ways in which it can be used. The principles and processes of data quality assurance and control should be applied to sample data sets.

- ◆ Definitions of data quality terms: error, precision, accuracy, bias.
- ◆ Identification and correction of errors in: source data; data encoding; editing and conversion; data processing and analysis; data output.
- ◆ Data quality assurance: consistency, completeness, accuracy, precision and potential bias of data; and identification of missing data.
- ◆ Data quality control: acceptance or rejection of data based on the data quality assurance procedure.

Outcome 4

In this Outcome, candidates will be planning and implementing a data collection strategy to a given brief in a GIS context. Activities will include:

- ◆ planning and implementing a primary data collection strategy
- ◆ collecting and editing data
- ◆ recording of data in an agreed format. The tutor should either provide a proforma or assist in preparing one for candidates' use
- ◆ database design and creation
- ◆ data entry, manipulation and interrogation
- ◆ data quality assurance and control

Outcome 4 builds on knowledge developed in Outcomes 1–3 and seeks to draw out the candidate's understanding of the theory through collection and handling of data they have sourced and/or collected. Completion of a range of tasks will produce a folio of evidence which can be collated into the Instrument of Assessment. For candidates undertaking this Unit as part of the National Progression Award in Geographical Information Systems: An Introduction, the data collected may be suitable for use in the Unit: Using Geographical Information Systems.

National Unit specification: support notes (cont)

Unit title: Geographical Information Systems: Handling Data

National Occupational Standards

This Unit is aligned to the following National Occupational Standards for IT Users (NOS)

Using IT Systems: IT User Fundamentals

- ◆ IUF:B2 Manage information storage and retrieval appropriately

Using IT to find and exchange information: Communication fundamentals

- ◆ ICF:B1 Select and use a variety of sources of information to meet needs
- ◆ ICF:B2 Access, search for, select and use internet-based information and assess its fitness for purpose

Using IT productivity tools and applications Database software:

- ◆ DB:B2 Enter, edit and organise structured information in a database
- ◆ DB:C3 Use database software tools to create, edit and run data queries and produce reports

Using IT productivity tools and applications: Spreadsheet software

- ◆ SS:A1 Use a spreadsheet to enter, edit and organize numerical and other data
- ◆ SS:A2 Use appropriate formulas and tools to summarise and display spreadsheet information
- ◆ SS:A3 Select and use appropriate tools and techniques to present spreadsheet information effectively

Using IT productivity tools and applications: Bespoke or specialist software:

- ◆ BS:C3 Exploit the functions of the software effectively to process and present information
- ◆ BS:B3 Use the functions of the software effectively to process and present information

Source <http://www.e-skills.com>

Guidance on learning and teaching approaches for this Unit

A practical and interactive approach to teaching and learning is recommended, with candidates gaining maximum benefit through a range of individual and group-based investigations and classroom discussion of the findings. A candidate-centred and practical approach should be encouraged wherever possible so that knowledge and understanding is developed through personal discovery.

Outcomes 1–3 of this Unit are best taught in sequence to develop the theory of data collection and handling in GIS situations before candidates apply and extend this knowledge through collection and handling of their own data. There is, however, potential for Outcome 4 to be delivered concurrently with Outcomes 1–3, enabling candidates to put theory into practice and to develop a portfolio of evidence throughout the Unit. There is also scope for cross-Unit integration within the National Progression Award in GIS.

National Unit specification: support notes (cont)

Unit title: Geographical Information Systems: Handling Data

In **Outcomes 1–3**, candidates would benefit from:

- ◆ working in small research groups
- ◆ presenting their findings to the class, either individually or as a group
- ◆ class discussions of the findings
- ◆ working individually to evaluate advantages and disadvantages of the topics
- ◆ having visits from people involved in data collection, handling and/or management e.g. from their Centre's data supplier or registry; practitioners from organisations who use GIS in the workplace

In **Outcome 2**, candidates should be encouraged to research a wide range of sources to develop their understanding of how and where data can be obtained and the ways in which data are used. Evaluation skills could be enhanced through use of exemplars and case studies, providing Candidates with an insight into the advantages and disadvantages of collection methods which might influence their strategy for Outcome 4.

In **Outcome 3**, candidates would benefit from working on a range of sample data sets, enabling them to question both the quality of the data and the ways in which the data might be used. This will provide an opportunity to develop analytical and interpretative skills, and help develop confidence in handling data.

Outcome 4 could be taught concurrently with other Outcomes, enabling candidates to individually generate a folio of data-related evidence throughout the Unit. Although group work may be employed for research, planning and data collection, it is suggested that candidates should work independently when creating the database, entering the data and carrying out quality control procedures. Production of the final evidence must be an individual effort.

Using the above approaches, candidates may also develop essential skills for life, learning and work, including:

- ◆ Time Management
- ◆ Creativity and innovation
- ◆ Analytical and Interpretative Skills
- ◆ Presentation Skills
- ◆ Independent Learning
- ◆ Resilience
- ◆ Responsibility
- ◆ Confidence

National Unit specification: support notes (cont)

Unit title: Geographical Information Systems: Handling Data

Guidance on approaches to assessment for this Unit

It is recommended that this Unit be assessed holistically. This could be by building up a folio of evidence throughout the delivery of Outcomes 1 to 3 and applying this to the planning, data collection and recording, creation of a database, accurate entry and interrogation of data, assessment of data quality, and evaluation in Outcome 4.

In Outcome 4, individual centres may design an appropriate Assessment brief to suit. Opportunities may exist for the assessment brief to be tailored to meet individual areas of interest. Alternatively, the candidates may work on a single theme.

Evidence could be gathered by a range of methods, and could involve a mix of individual, small group or class work, but the final evidence submitted should be an individual effort. Evidence for Outcome 4 could be in the form of a copy of the database the candidate has created along with a tutor observation checklist to record the candidate's ability to carry out the tasks required.

Time should be allowed for re-assessment. Where the Unit is assessed holistically candidates need only be re-assessed on those elements that have not met the Performance Criteria.

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 Communication 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)*.

National Unit specification: support notes (cont)

Unit title: Geographical Information Systems: Handling Data

Opportunities for developing Core Skills

In this Unit candidates will learn about the nature, theory and use of spatial and other data and develop practical skills including the creation, design and use of a database in a Geographical Information Systems (GIS context).

Candidates will:

- ◆ identify and categorise data
- ◆ evaluate the relative strengths and weaknesses of data types in given situations
- ◆ plan a strategy for data collection, and execution of that strategy
- ◆ design and create a database and correctly enter, edit and manipulate data
- ◆ apply quality control principles to data sets
- ◆ evaluate the quality of data
- ◆ present findings and evaluate them against a given brief

This Unit has the Core Skill of Problem Solving embedded in it, so when candidates achieve this Unit their Core Skills profile will be updated to show that you have achieved Problem Solving at SCQF Level 6. In addition, candidates will develop aspects of the Core Skills in Communication and ICT.

Further development of all the above Core Skills may be achieved by adopting the learning and teaching approaches suggested in these support notes, eg Communication — through active participation in class discussions and group work; presentation to present findings orally or in written; through taking notes to record investigation findings; Numeracy- through handling of numeric data; preparation of graphical outputs; Problem solving — through preparing information for presentation; ICT — through presentation of findings in electronic format

In addition, candidates could develop aspects of the following Core Skills where particular learning and teaching approaches are adopted:

Working with Others — through working as part of a small group researching a particular topic

Disabled candidates and/or those 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 whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

History of changes to Unit

Version	Description of change	Date
02	Core Skill Problem Solving at SCQF level 6 embedded.	08/08/2011

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