Arrangements for:

National Progression Award in Geographical Information Systems: An Introduction at SCQF level 6

Group Award Code: GC80 46

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Version: 1

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of National Qualification Group Awards.

History of changes

It is anticipated that changes will take place during the life of the qualification, and this section will record these changes. This document is the latest version and incorporates the changes summarised below.

Version number	Description	Date	Authorised by

Contents

1 Introduction

This is the Arrangements Document for the ***National Progression Award in Geographical Information Systems: An Introduction, at SCQF level 6*****,** ***which was validated in June 2011***. This document includes: background information on the development of the Group Award, its aims, guidance on access, details of the Group Award structure, and guidance on delivery.

2 Rationale for the development of the Group Award

This National Progression Award (NPA) has been designed as an introductory programme which will enable candidates to explore and handle spatial data, to use Geographical Information Systems (GIS) software and to develop a broad understanding of the GIS sector. The focus is on practical application and experiential learning, and is intended to provide candidates with a basic level of GIS competence which could act as a foundation for further study or employment.

One definition of a GIS is "an automated system for the capture, storage, retrieval, analysis and display of spatial data" (Keith C Clarke, 1995). These concepts are mirrored in the outcomes of several areas of the Curriculum for Excellence, specifically the outcomes for Mathematics, Technologies and Social Studies.

Geographic information locates and describes the distribution and patterns of physical and human features existing on the Earth's surface. A GIS is a tool which takes this information and uses geography as the common denominator between different themes to highlight issues and suggest possible solutions. It is estimated that approximately 70% of data collected by any business will have a spatial nature and GIS technology is used by many agencies in ways which affect our everyday lives e.g. by the military, police, government, retail and marketing, utilities, health services, agriculture, relief agencies, insurance companies and many more. Employer research carried out during the development of the NPA indicated significant support for the award and highlighted that GIS experience is a skill that is much in demand but that at present is in short supply amongst the workforce in Scotland.

The NPA is targeted at post-16 candidates, aiming to provide them with skills which can be applied across a range of academic and vocational areas, and ultimately to enable them to be able to offer these skills to the many employers who are increasingly seeking GIS experience. The award is suitable for candidates who have basic IT, communication and numeracy skills.

The NPA is relevant at several levels:

- it fulfils a number of Curriculum for Excellence outcomes in Mathematics, Technologies, and Social Studies
- it will provide candidates with data handling skills in addition to GIS knowledge and practical skills which they can take forward into employment

- it provides a foundation which could be developed further in Higher Education-level study.

Possible progression routes can be seen in figure 1. The Units in the award have been mapped against relevant elements of the National Occupational Standards produced by e-skills UK, the Sector Skills Council for Business and Information Technology.

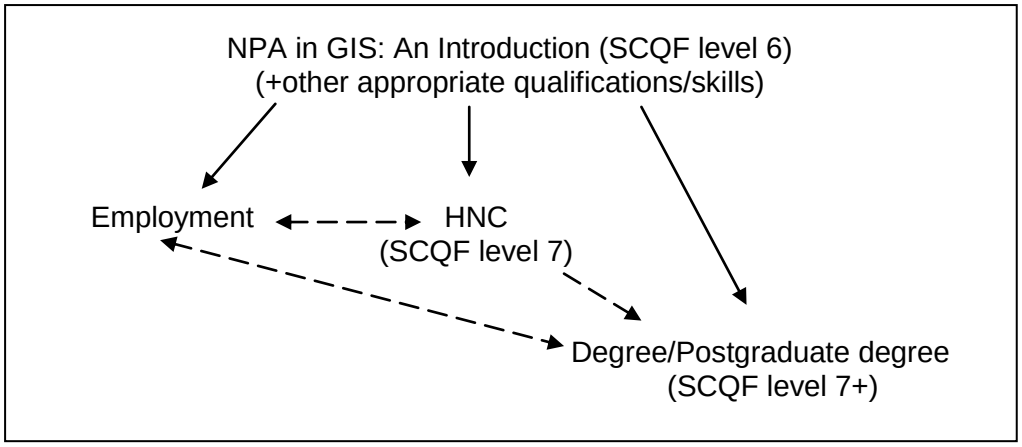

Fig 1: possible progression routes into employment and/or further study

All Units in the Group Award are at SCQF level 6. The Level Descriptor for SCQF level 6 has been mapped against the Units making up this award to demonstrate that the level is commensurate with the identified level of the SCQF.

3 Aims of the Group Award

3.1 Principal aims of the Group Award

The principle aims of the award are to provide candidates with:

- A background in GIS which can be applied to a range of contexts;
- The practical skills and basic working knowledge of GIS sought by employers;
- Opportunities to develop awareness of how widely GIS is applied
- Skills and knowledge to facilitate progression to employment in sectors where GIS is used and/or to further training in GIS

3.2 General aims of the Group Award

The general aims of the award are to:

- Provide opportunities to develop Core Skills, including Communication, Numeracy, IT, Problem Solving and Working with Others;
- Develop knowledge, understanding and problem solving skills which underpin all academic study.
- Encourage candidates to develop a positive attitude towards their own learning;
- Allow candidates to develop skills and attitudes required for employability in a GIS-related field;
- Provide opportunities for candidates to develop organisational, analytical and evaluative skills;
- Provide candidates with a range of learning, teaching and assessment styles which will motivate them to achieve their full potential.

3.3 Target groups

This award has been developed to provide an understanding of the principles of Geographical Information Systems, their structure and their use. The qualification is designed to be cross-curricular and to appeal to candidates both within and outside the traditional geography base, including candidates from computing and information systems and other subject areas where data is handled and/or there is potential for GIS analysis.

It is anticipated that there will be a wide range of participants, from post-16 school or further education in addition to learners currently in employment or seeking employment and who wish to up-skill. This will attract candidates with varying levels of ability, all of whom will have opportunities to further their own knowledge, understanding, experience and social interactions. The programme is designed to offer flexibility in its delivery, making it accessible to many.

3.4 Employment opportunities

The GIS sector is very broad and applications of GIS within it are very diverse. An introductory level of knowledge, skills and experience required to facilitate the planning, implementation and management of GIS projects is reflected in the content of this award and the aims outlined above, supporting the identified need for these skills in the GIS sector.

Specific employer research indicates that the level of GIS knowledge and skills provided by the NPA is sufficient to meet the needs of organisations where GIS is just one component of a job and where there is a requirement for an employee to have basic but adaptable practical skills rather than being a GIS expert.

Success in this NPA will represent a significant achievement for candidates as it will provide them with an introduction to a range of skills which can be used as a foundation for employment in the GIS sector or for further learning of its uses. The opportunities provided through this NPA will help to develop a range of positive personal skills and self-confidence, complementing the knowledge gained.

4 Access to Group Award

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

- Standard Grade (Credit) in English and Mathematics, or
- Similar capability through work/life experience

Core skills profile:

- As this award entails significant IT application, it is recommended that candidates have basic IT skill equivalent to SCQF level 4 ICT core skills.
- It is also recommended that candidates have communication and numeracy skills equivalent to attainment at SCQF level 5.

5 Group Award structure

5.1 Framework

The combination of Units within this NPA is designed to provide a broad overview of the GIS sector and to allow candidates to develop specific knowledge and skills that are required for employment or further study in the sector.

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Geographical Information Systems: Handling Data	FN4T 12	6	6	1
Using a Geographical Information System (GIS)	FN4W 12	6	6	1
Geographical Information Systems: Project	FN4V 12	6	6	1

Fig 2. Framework for the National Progression Award in Geographical Information Systems: An Introduction (SCQF level 6)

All Units are mandatory. Candidates will be awarded the National Progression Award in Geographical Information Systems: an Introduction at SCQF level 6 on successful achievement of all three Units (18 SCQF credit points at level 6).

5.2 Mapping information: Core Skills and National Occupational Standards

Mapping of Core Skills against Unit activities and mapping of National Occupational Standards against Units are shown in figures 3 and 4.

The NPA and the Units within it are designed to promote the development of Core Skills and other transferable skills through the delivery and assessment of the Units. This provides a wide range of opportunities for candidates to continually work towards the development of all five Core Skills.

Achievement of this Award gives automatic certification of the following:

Complete Core Skill Problem Solving at SCQF level 6

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

Fig 3: Mapping of Core Skills against Unit activities

Core Skill	Geographical Information Systems: Handling Data	Using a Geographical Information System	Geographical Information Systems: Project
Communication	♦ Active participation in class discussions ♦ Discussion and presentation of findings	♦ Active participation in class discussions ♦ Discussion and presentation of findings	♦ Active participation in class discussions ♦ Discussion and presentation of findings
Numeracy	♦ Handling numerical data ♦ Data quality evaluation ♦ Creation of graphical outputs	♦ Handling numerical data, including grid coordinates ♦ Coordinate conversions ♦ Use of graduated symbols and classes ♦ Creation of graphical outputs	♦ Handling numerical data, including grid coordinates ♦ Coordinate conversions ♦ Use of graduated symbols and classes ♦ Creation of graphical outputs
ICT	♦ Internet exploration and research ♦ Spreadsheet creation ♦ Creation, design and use of a database	♦ Internet exploration and research ♦ Creation and use of spreadsheets ♦ Use of GIS software ♦ Creation of visual outputs	♦ Internet exploration and research ♦ spreadsheet creation ♦ Creation, design and use of a database ♦ Use of GIS software ♦ Creation of visual outputs
Problem Solving	♦ Practical applications ♦ Planning and implementing data collection	♦ Use GIS software to edit and manipulate data ♦ Interpret findings and evaluate outputs	♦ Identify a research question ♦ Planning and implementing data collection ♦ Use GIS software to edit and manipulate data ♦ Data quality assurance ♦ Interpret findings and evaluate outputs
Working with Others	♦ Small group tasks, discussion and presentations	♦ Small group tasks, discussion and presentations	♦ Small group tasks, discussion and presentations

Fig 4: Mapping of National Occupation Standards against Units

e-skills UK – National Occupation Standards for IT users relevant to the award

http://www.e-skills.com/standards-and-qualifications/national-occupational-standards-nos

Group Award title: National Progression Award in Geographical Information Systems: An Introduction (SCQF level 6)

Unit title	NOS title												
	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	IUF:B2 Manage information storage and retrieval appropriately	ISF:B1 Select and use appropriate software applications to meet needs and solve problems	ISF:B2 Enter, develop. combine and format different types of information to suit its meaning and purpose	ISF:B3 Present information in ways that are fit for purpose and audience	BS:C3 Exploit the functions of software effectively to process and present information	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 results	SS:A1 Use a spreadsheet to enter, edit, organise 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	UCT:B3 Prepare collaborative technologies for use
Geographical Information Systems: Handling Data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Using a Geographical Information System	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographical Information Systems: Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

6 Approaches to delivery and assessment

6.1 Content and Context

The NPA has been designed with a cross-curricular approach in mind, aiming to appeal to candidates both within and outside the traditional geography-GIS base, for example Information Systems and IT. It will provide candidates with basic GIS knowledge and practical skills beneficial for employment in the GIS sector. By providing candidates with basic skills common to all GIS applications, the NPA lays a foundation which employers can develop to suit their own applications. For those wishing to take their studies further, the award and associated Core Skills will provide a foundation for HE-level study.

Candidates who undertake this Group Award will not only gain understanding, knowledge and skills specific to the GIS sector, but will also develop confidence and personal awareness. Collectively, these will stand them in good stead in further study or in employment. The content of the Units contained within this NPA have been assessed against relevant National Occupation Standards (NOS) produced by the Sector Skills Council for Business and Information Technology (e-skills).

- **Geographical Information Systems: Handling Data**

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 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 Unit will inform other Units studied as part of the award.

- **Using a Geographical Information System**

The purpose of this Unit is to enable candidates to understand the origins and fundamentals of a GIS, how these are applied and by whom. Candidates will develop practical skills in using a GIS to import, edit, manipulate and analyse data and in the display and presentation of their findings. This Unit will inform other Units studied as part of the award.

- **Geographical Information Systems: Project**

The purpose of this Unit is to enable candidates to apply GIS theory and knowledge of its applications by designing a basic GIS project to solve or address a real world issue. Candidates will develop critical evaluation skills in completing a GIS project. This Unit is the culmination of the NPA in Geographical Information Systems: An Introduction and candidates completing the Unit should exit with a working knowledge of how a GIS operates and the basic skills to be able to use one.

6.2 Delivery and assessment

The Units in this NPA are designed to encourage a practical and interactive approach to learning, reflecting the practical nature of GIS use, with candidates gaining maximum benefit through a range of individual and group-based investigations and classroom discussion of the findings.

Delivery models will differ depending on the centre and candidate group: there is flexibility in the NPA for centres to use delivery and assessment approaches which are best suited to their own situation and that of their learners, but a candidate-centred and practical approach is encouraged wherever possible so that knowledge and understanding are developed through personal discovery. The range of methods used in delivering this award should ensure that exploratory, enquiry-based, experiential learning opportunities are available to candidates. Experiential learning complemented with group discussions and evaluation of activities will help develop the Core Skills outlined in figure 3. The majority of learning for all three Units should occur through interaction with others, undertaking activities and through the building of a folio of outputs and evaluations.

Candidates would benefit from:

- Working in small research groups
- Presenting their findings to the class, either individually or as a group
- Class discussion of the findings
- Working individually to evaluate advantages and disadvantages of the topics
- Having visits from people involved in the collection, handling and/or management of data; from GIS practitioners; or by visiting centres where GIS is used on a regular basis (e.g. local planning, police, health agencies, businesses, marketing, or environmental agencies)

All the activities should encourage the development of self-confidence and understanding of others. It is anticipated that discussions of candidates' own experiences of GIS and their findings will be carried out throughout the award and that these will be used as a basis on which to build personal knowledge and experience, as well as to enable candidates to draw comparisons with others.

It is recommended that the Units in this award are taught in sequence as although Units 1 and 2 are discrete, the knowledge, understanding and practical skills developed during them will then be applied in Unit 3. Where more than one person is involved in delivering the NPA, it would be beneficial for all those involved in the delivery to communicate with each other about intended delivery, timings and Unit content. This approach will enable a coherent experience for candidates and this should be reinforced by all staff involved in delivering this programme.

There are opportunities for integrating learning and assessment across the Units, for example the data collected in the Handling Data Unit could be used in subsequent Units. Where possible a holistic approach should be adopted in the delivery and assessment of this award. It is recommended that assessment for each Unit should be through the creation of individual folios which will include evidence of practical skills and tasks produced

under open-book conditions. These may include outputs from group work but the presentation of final evidence should be produced by the individual candidate.

Although not specifically designed as an online or open learning programme, the IT nature of this award lends itself to an e-assessment approach, such as the use of e-portfolios or e-checklists. The design of the NPA lends itself to part time and open learning opportunities.

6.3 Core Skills

Progress in development of Core Skills will be dependent on delivery centre resources and the approaches taken to learning and teaching. Development of Core Skills should take place through learning and teaching activities, and through individual and group-based formative and summative assessment of practical activities which candidates have been involved in planning, delivering and evaluating.

In situations where individual candidates are engaged in open learning; the use of e-portfolios would enable candidates to participate in group activities and to share findings and outputs and thus to develop the Core Skill of Working with Others.

Essential skills which may be developed during the course of the award include:

- Time management
- Creativity and innovation
- Analytical and interpretive skills
- Presentation skills
- Independent learning
- Responsibility
- Confidence

7 General information for centres

Some centres may have access to industry standard GIS software packages but it is recognised that such software may be too expensive for all centres to consider purchasing. However, there are a number of free packages which can be freely downloaded from the internet, including those listed below. Please note that these are suggestions rather than recommendations and that the format of and access to individual packages may change over time.

- Mapmaker http://www.mapmaker.com
- MapWindow http://www.mapwindow.org
- DIVA-GIS http://www.diva-gis.org
- Quantum GIS http://www.qgis.org
- Arc Explorer http://www.esri.com/software/arcgis/explorer/index.html
- ILWIS http://www.ilwis.org
- IDRISI http://www.clarklabs.org

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**.

Internal and external verification

All instruments of assessment used within this/these Group Award(s) should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* **(www.sqa.org.uk)**.

8 General information for candidates

Geographic information locates and describes the distribution and patterns of physical and human features existing on the Earth's surface. A GIS is a tool which takes this information and uses geography as the common denominator between different themes to highlight issues and suggest possible solutions. It is estimated that approximately 70% of data collected by any business will have a spatial nature and GIS technology is used by many agencies in ways which affect our everyday lives e.g. by the military, police, government, retail and marketing, utilities, health services, agriculture, relief agencies, insurance companies and many more.

The National Progression Award (NPA) in Geographical Information Systems: An Introduction has been designed to provide you with an understanding of the range of information you might be exposed to on a daily basis and the variety of ways it is used and applied, some of which you may never have thought of before.

You will learn how to use GIS software and will explore how others use it. Through this you will gain the different skills and experiences necessary for employment in a variety of organisations which use GIS and/or to progress into more advanced study.

To achieve this NPA, you must pass all three of the Units outlined below.

- **Geographical Information Systems: Handling Data**

  In this Unit you will explore types of information used in GIS and how to apply it. You 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

- **Using a Geographical Information System (GIS)**

  This Unit will help you to understand why organisations use GIS, how it is applied and by whom. You will develop practical skills in using a GIS to import, edit, manipulate and analyse data and to display and presentation your findings.

- **Geographical Information Systems: Project**

  In this Unit you will design your own GIS project to solve or address a real world issue using what you have learned in the previous Units.

Throughout all the Units you will be learning via a variety of approaches, including individual and group work, with an emphasis on practical skills and hands-on GIS experience. You will be assessed throughout the Unit, with assessment based on outputs from practical activities.

9 Glossary of terms

SCQF: This stands for the Scottish Credit and Qualification Framework, which is a new way of speaking about qualifications and how they inter-relate. We use SCQF terminology throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at **www.scqf.org.uk**

SCQF credit points: One SCQF credit point equates to 10 hours of learning. NQ Units at SCQF levels 2–6 are worth 6 SCQF credit points, NQ Units at level 7 are worth 8 SCQF points.

SCQF levels: The SCQF covers 12 levels of learning. National Qualification Group Awards are available at SCQF levels 2-6 and will normally be made up of National Units which are available from SCQF levels 2–7.

Dedicated Unit to cover Core Skills: This is a non-subject Unit that is written to cover one or more particular Core Skills.

Embedded Core Skills: This is where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level.

Signposted Core Skills: This refers to the opportunities to develop a particular Core Skill at a specified level that lie outwith automatic certification.

Qualification Design Team: The QDT works in conjunction with a Qualification Manager/Development Manager to steer the development of the National Certificate/National Progression Award from its inception/revision through to validation. The group is made up of key stakeholders representing the interests of centres, employers, universities and other relevant organisations.

Consortium-devised National Certificates/National Progression Awards are those developments or revisions undertaken by a group of centres in partnership with SQA.