



Group Award Specification for:

**National Progression Award Data Science
SCQF level 4, 5 and 6**

Group award code: GP8N 44, GP8P 45, GP8R 46

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1 Introduction

This document was previously known as the arrangements document. The purpose of this document is to:

- ◆ assist centres to implement, deliver and manage the qualification
- ◆ provide a guide for new staff involved in offering the qualification
- ◆ inform course managers teaching staff, assessors, learners, employers and HEIs of the aims and purpose of the qualification
- ◆ provide details of the range of learners the qualification is suitable for and progression opportunities.

Data science is one of a number of emerging technologies, which include artificial intelligence and machine learning, that are becoming vital for contemporary societies. ‘Big Data analytics’ was one of four technologies (along with cyber security, mobile computing and cloud computing) identified by *The Tech Partnership* as an area of future skills shortage (Employer Insights, 2017). The skills shortage in data science has been widely reported.

Data science is a multi-disciplinary field and data scientists are required to possess a range of skills including data skills, statistical skills and problem solving skills.

‘Effective data scientists are able to identify relevant questions, collect data from a multitude of different data sources, organize the information, translate results into solutions, and communicate their findings in a way that positively affects business decisions. These skills are required in almost all industries, causing skilled data scientists to be increasingly valuable to companies.’

‘What is Data Science?’, Berkeley University, <https://datascience.berkeley.edu/about/what-is-data-science/>

Skills in analysing large datasets and presenting the findings are particularly important.

‘The ability to take data — to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it — that’s going to be a hugely important skill in the next decades.’

Hal Varian, chief economist at Google

Education has responded to the growing demand for data scientists by providing qualifications in data science/data analytics at graduate and post-graduate levels (SCQF levels 9–12) including a graduate apprenticeship. More recently, intermediate qualifications have been developed such as *HNC Data Analytics* (SCQF level 7). Recent reports have highlighted the need for improved provision at school and college, including *Analytic Britain* (Nesta, 2015) and *Dynamics of Data Science* (Royal Society, 2019).

The creation of a *National Progression Award in Data Science* provides an **entry-level** qualification for learners who wish to study this topic at lower levels (SCQF levels 4, 5 and 6). It is anticipated that the qualification will be attractive to young learners at school and college.

The qualification aims to attract three types of learner.

- 1 Learners who wish to improve their data literacy skills but whose vocational interests are not directly related to data science.
- 2 Learners with a vocational interest in data science or computer science.
- 3 Learners who want to gain skills in data analysis prior to entering university.

Data skills are important for everyone, irrespective of their vocational or academic ambitions. Data citizenship relates to the need for everyone to possess a basic understanding of data to permit them to participate in contemporary society and engage in the political process. More focus is being placed on data literacy among the general workforce, as more organisations become data driven and opportunities to apply data analytics to an ever increasing range of tasks becomes apparent.

Employment trends indicate that the current shortage of specialists in data science will become more acute in the future, resulting in a significant shortage of data and computer scientists in the coming decades. A key objective of this qualification is to stimulate interest in data science to improve the 'skills pipeline'.

The qualification is also relevant to learners with no particular vocational interest in data science but who wish to improve their data skills prior to pursuing a career in other fields.

The qualification will be of interest to learners at school and college. In the school environment, it may be undertaken alongside, or in place of, National Qualifications. National Progression Awards in this field (Computing) are popular in the final years of secondary education, often used to compliment a traditional programme of National Qualifications in preparation for progression to university. In the college context, the qualification may be taken as part of a National Certificate programme to prepare learners for a wide range of Higher National qualifications in areas such as Business, Computing and Engineering.

The qualification does not seek to prepare learners for employment. The aim of the qualification is to provide a foundation in data science that will prepare learners for further studies at college or university or eventual employment via an apprenticeship or degree course. Potential progression paths include:

- ◆ National Certificate in Computing with Digital Media
- ◆ HNC Data Analytics
- ◆ HND Computer Science
- ◆ Technical Apprenticeship in Data Analytics
- ◆ Graduate Apprenticeship in Data Analytics
- ◆ BSc Computer Science
- ◆ BSc Data Science
- ◆ Degree in a range of other disciplines

If a learner wishes to specialise in the field of data science, a variety of future career opportunities will be available to learners including:

- ◆ Business intelligence analyst
- ◆ Data analyst
- ◆ Data engineer
- ◆ Data scientist
- ◆ Statistician
- ◆ Systems analyst

Although there is no formal professional recognition for this qualification, nor formal articulation arrangements with colleges or universities, the qualification was designed in consultation with employers and representatives from colleges and universities to ensure that it meets their requirements.

SQA would like to thank the following organisations for their contributions to this qualification:

- ◆ City Region Deal (Edinburgh)
- ◆ DataLab
- ◆ Effini Data Company
- ◆ Midlothian Council
- ◆ Perth and Kinross Council
- ◆ QA
- ◆ Sky UK
- ◆ University of Derby
- ◆ University of Edinburgh
- ◆ University of Glasgow
- ◆ University of St Andrew's

2 Qualifications structure

This group award is available at **three levels**: SCQF level 4, 5 and 6.

It comprises two SQA credits (12 SCQF points) at SCQF level 4 and three SQA credits (18 SCQF points) at SCQF levels 5 and 6.

A mapping of Core Skills development opportunities is available in Section 5.3.

2.1 Structure

Two units are mandatory at each level. The mandatory units at each level are:

- ◆ *Data Citizenship*
- ◆ *Data Science*

An additional optional unit must be selected at SCQF levels 5 and 6.

SCQF level 4: Both mandatory units must be selected

4 code	2 code	Unit title	SQA credit	SCQF credit points	SCQF level
J2HN	44	Data Citizenship	1	6	4
J2G2	44	Data Science	1	6	4

SCQF level 5: Both mandatory units and one optional unit must be selected

4 code	2 code	Unit title	SQA credit	SCQF credit points	SCQF level
Mandatory units					
J2HN	45	Data Citizenship	1	6	5
J2G2	45	Data Science	1	6	5
Optional units (select one)					
HY2C	45	Computer Programming	1	6	5
H9E2	45	Data Security	1	6	5
J2GT	45	Data Science Project	1	6	5
J2G8	45	Data Science: Statistics	1	6	5
J2G6	45	Machine Learning	1	6	5

SCQF level 6: Both mandatory units and one optional unit must be selected

4 code	2 code	Unit title	SQA credit	SCQF credit points	SCQF level
Mandatory units					
J2HN	46	Data Citizenship	1	6	6
J2G2	46	Data Science	1	6	6
Optional units (select one)					
HY2C	46	Computer Programming	1	6	6
J2GT	46	Data Science Project	1	6	6
J2G8	46	Data Science: Statistics	1	6	6
H9E2	46	Data Security	1	6	6
J2G6	46	Machine Learning	1	6	6
H95Y	46	Statistics	1	6	6

2.2 Hierarchies

Some of the component units have been placed in hierarchies. The following table shows the hierarchies in this award.

Unit title	SCQF level 4	SCQF level 5	SCQF level 6
Computer Programming		X	X
Data Citizenship	X	X	X
Data Science	X	X	X
Data Science Project		X	X
Data Science: Statistics		X	X
Data Security		X	X
Machine Learning		X	X

For example, a learner who completes *Data Science* at level 6, *Data Citizenship* at level 6 and *Machine Learning* at level 5 will be awarded the qualification at level 5.¹

2.3 Selection of optional unit

The choice of optional unit (at levels 5 and 6) can customise the award for different audiences. The following table illustrates different combinations of units.

Focus	Unit 1	Unit 2	Unit 3
Data science	Data Citizenship	Data Science	Machine Learning
Data analysis	Data Citizenship	Data Science	Data Science: Project
Vocational	Computer Programming	Data Citizenship	Data Science
Progression	Data Citizenship	Data Science	Data Science: Statistics

For example, selecting *Machine Learning* as the optional unit would focus the award on data science; selecting the *Data Science: Project* unit would maximise the time learners spend on data analysis; and selecting *Computer Programming* (delivered either before or after the mandatory units) would maximise the employment focus.

Further advice about optional units (and the sequence of delivery) is given in guidance on approaches to delivery and assessment.

¹ Centres must enter candidates for the appropriate level.

3 Aims of the qualifications

Although the qualification exists at three levels (SCQF level 4, 5 and 6), it should be considered a single **suite** of awards, sharing the same aims and, essentially, the same structure from level to level.

The qualification aims to provide **foundation knowledge and skills** in data science to increase awareness of the discipline among learners and provide practical skills in data analysis. The qualification will also raise awareness of the societal aspects of this emerging technology.

The over-arching aim of the qualification is to introduce data science to school and college learners to encourage interest in this emerging discipline as a potential future career and also to improve data analysis skills for all learners irrespective of their vocational goals.

The aims of the qualification are categorised as general aims and specific aims. General aims relate to broad educational objectives; specific aims relate to the particular vocational area. Please note that the general aims may be repeated in the specific aims but contextualised in the subject area.

The aims have been ordered to reflect their broad, relative importance (within each category).

3.1 General aims of the qualifications

- 1 Develop academic abilities consistent with the SCQF level of the qualification.
- 2 Develop vocational competencies relevant to employment.
- 3 Develop a range of transferable and soft skills relevant to employment and citizenship including data literacy.
- 4 Stimulate interest in data science.
- 5 Develop computational and statistical thinking skills.
- 6 Develop Core Skills, particularly *Information and Communication Technology, Numeracy and Problem Solving*.

3.2 Specific aims of the qualifications

The following specific skills contextualise (some of) the general aims.

- 7 Improve the data skills of learners to prepare them for further studies in a range of subject areas.
- 8 Increase the number of learners with a vocational interest in data science as a career.
- 9 Improve data analysis skills for all learners to prepare them for employment in a wide range of fields.
- 10 Improve data literacy to produce future citizens who appreciate the applications and implications of data science.
- 11 Raise awareness of the societal issues relating to data science including data ethics.
- 12 Identify opportunities to apply data science in vocational and personal contexts.

3.3 Aims and levels

These aims apply to all levels. The following guidance relates the aims to specific levels.

The **level 4** qualification aims to provide a basic, introductory qualification in data science, suitable for all learners who wish to develop their **data literacy** skills in preparation for (eventual) employment in a wide range of potential future job roles. At this level, developing vocational competencies and Core Skills, improving data literacy, and appreciating data science in a personal context are particularly significant.

The **level 5** qualification is also introductory but provides a broader introduction to the discipline, focusing on **data analysis** knowledge and skills, in preparation for employment or, more likely, further studies. At this level, developing academic abilities, stimulating interest in data science, developing Core Skills, improving data skills (for use in a wide range of subject areas), and raising awareness of societal issues are particularly significant.

The **level 6** qualification takes a more academic view of **data science**, situating it in the wider context of AI and big data, in preparation for progression to university. At this level, developing academic abilities, stimulating interest in data science as a potential career, improving computational and statistical thinking, providing relatively sophisticated data analysis skills, and raising awareness of data ethics are particularly significant.

4 Recommended entry to the qualifications

Entry to this qualification is at the discretion of the centre. The following information on prior knowledge, skills, experience or qualifications that provide suitable preparation for this qualification has been provided by the Qualification Design Team as guidance only.

No previous experience of data science or statistics is required (at any level). However, direct entry to higher levels (particularly level 6) will require appropriate computational and numeracy skills. Level 4 and level 5 may be entered directly without previous experience of the subject area; it is recommended that learners undertake the level 5 before attempting level 6, however direct entry to level 6 is possible for suitably qualified learners.

It is desirable for learners to possess computational and numerical skills before attempting this award (at any level). This may be evidenced by possession of **one or more** of the following qualifications:

- ◆ Core Skills in *Information and Communication Technology* and *Numeracy* at an appropriate level
- ◆ National Units in Computing or Mathematics or a related subject area
- ◆ National Progression Award in a range of subjects at SCQF level 4, 5 or 6
- ◆ National 4/5 in Computing Science
- ◆ National 4/5 in Mathematics

Given the multi-disciplinary nature of data science, a wide range of subjects may provide the necessary foundation for attempting this award.

This qualification is suitable for a wide range of learners including adults who wish to retrain in this field and people in employment who wish to acquire data skills. The entry requirements for these learners will vary from learner to learner, depending on their individual experiences and motivations.

The recommended entry for each unit defines the knowledge and skills that learners should possess before attempting specific units within this award.

4.1 Core Skills entry profile

Core Skills exist, in five areas, at SCQF levels 2–6. The following table illustrates the level of core skill, in each of the areas, which learners should possess to have a realistic prospect of gaining the qualification.

Core Skill	Recommended SCQF entry profile		
	Data Science level 4	Data Science level 5	Data Science level 6
Communication	SCQF level 3	SCQF level 4	SCQF level 4
Numeracy	SCQF level 4	SCQF level 5	SCQF level 6
Information and Communication Technology	SCQF level 4	SCQF level 5	SCQF level 6
Problem Solving	SCQF level 3	SCQF level 4	SCQF level 5
Working with Others	SCQF level 3	SCQF level 4	SCQF level 4

The table permits centres to identify additional learning support that will need to be put in place for learners whose Core Skills profile is below the recommended entry level or whether learners should be encouraged to do an alternative level or learning programme.

4.2 Core Skills exit profile

Some component units embed Core Skills. The following table summarises the exit profile of learners who gain the qualification (assuming that they satisfy the corresponding entry profile). Levels **in bold** highlight where Core Skills have been raised.

Core Skill	SCQF exit profile		
	Data Science level 4	Data Science level 5	Data Science level 6
Communication	SCQF level 3	SCQF level 4	SCQF level 4
Numeracy	SCQF level 4	SCQF level 5	SCQF level 6
Information and Communication Technology	SCQF level 4	SCQF level 5	SCQF level 6
Problem Solving	SCQF level 4	SCQF level 5	SCQF level 6
Working with Others	SCQF level 3	SCQF level 4	SCQF level 4

5 Additional benefits of the qualification in meeting employer needs

This qualification was designed to meet a specific purpose and what follows are details on how that purpose has been met through mapping of the units to the aims of the qualification. Through meeting the aims, additional value has been achieved by linking the unit standards with those defined in National Occupational Standards and/or trade/professional body requirements. In addition, significant opportunities exist for learners to develop the more generic skill, known as Core Skills through doing this qualification.

5.1 Mapping of qualification aims to units

The following table illustrates how the component units contribute to the aims of the qualification.

Code	Unit title	Aims											
		General						Specific					
		1	2	3	4	5	6	7	8	9	10	11	12
HY2C 45	Computer Programming (SCQF level 5)	X	X		X	X	X						
HY2C 46	Computer Programming (SCQF level 6)	X	X		X	X	X						
J2HN 44	Data Citizenship (SCQF level 4)			X	X			X			X	X	X
J2HN 45	Data Citizenship (SCQF level 5)			X	X			X			X	X	X
J2HN 46	Data Citizenship (SCQF level 6)			X	X			X			X	X	X
J2G2 44	Data Science (SCQF level 4)	X	X		X	X		X	X	X	X		X
J2G2 45	Data Science (SCQF level 5)	X	X		X	X		X	X	X	X		X
J2G2 46	Data Science (SCQF level 6)	X	X		X	X		X	X	X	X		X
J2GT 45	Data Science Project (SCQF level 5)		X		X			X		X			X
J2GT 46	Data Science Project (SCQF level 6)		X		X			X		X			X
J2G8 45	Data Science Statistics (SCQF level 5)	X		X	X	X	X		X				
J2G8 46	Data Science Statistics (SCQF level 6)	X		X	X	X	X		X				
J2G6 45	Machine Learning (SCQF level 5)	X	X		X				X				
J2G6 46	Machine Learning (SCQF level 6)	X	X		X				X				
H9E2 45	Data Security (SCQF level 5)	X	X		X								
H9E2 46	Data Security (SCQF level 6)	X	X		X								
H95Y 46	Statistics (SCQF level 6)	X		X	X	X	X						

This table illustrates the component units that make the **most** contribution to each aim; the absence of an 'X' does not mean that the unit makes no contribution.

5.2 Mapping of National Occupational Standards (NOS)

This qualification is most closely linked to the National Occupational Standards for Data Analytics, which exist at SCQF level 8. However, there are specific standards at lower levels that cover some of the contents of this suite of awards. These are:

ESKITP801301 Assist in Delivering the Data Management Infrastructure to Support Data Analysis and Reporting (RQF level 3/SCQF level 6)

ESKITP802301 Assist in Delivering Routine Data Analysis Studies (RQF level 3/SCQF level 6)

ESKITP803301 Assist in Delivering Data Driven Business Insights (RQF level 3/SCQF level 6)

Code	Unit title	ESKITP801301	ESKITP802301	ESKITP803301
HY2C 45	Computer Programming (SCQF level 5)			
HY2C 46	Computer Programming (SCQF level 6)			
J2HN 44	Data Citizenship (SCQF level 4)			
J2HN 45	Data Citizenship (SCQF level 5)		X	
J2HN 46	Data Citizenship (SCQF level 6)	X	X	
J2G2 44	Data Science (SCQF level 4)			
J2G2 45	Data Science (SCQF level 5)		X	X
J2G2 46	Data Science (SCQF level 6)	X	X	X
J2GT 45	Data Science Project (SCQF level 5)			
J2GT 46	Data Science Project (SCQF level 6)			
J2G8 45	Data Science Statistics (SCQF level 5)			X
J2G8 46	Data Science Statistics (SCQF level 6)			X
J2G6 45	Machine Learning (SCQF level 5)			X
J2G6 46	Machine Learning (SCQF level 6)			X
H9E2 45	Data Security (SCQF level 5)			
H9E2 46	Data Security (SCQF level 6)			
H95Y 46	Statistics (SCQF level 6)			

5.3 Mapping of Core Skills development opportunities across the qualifications

The new units have not yet been checked for Core Skills. The following table is provisional until the units have been audited for Core Skills.

The following abbreviations have been used: E — Embedded; S — Signposted; () — the number in brackets indicates the level of the core skill embedded.

Unit code	Unit title	Communication			Numeracy		ICT		Problem Solving			Working with Others	
		Written (Reading)	Written (Writing)	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
HY2C 45	Computer Programming (SCQF level 5)							S	E(5)	E(5)	S		
HY2C 46	Computer Programming (SCQF level 6)							S	E(6)	E(6)			
J2HN 44	Data Citizenship (SCQF level 4)		S						E(4)				
J2HN 45	Data Citizenship (SCQF level 5)		S						E(5)				
J2HN 46	Data Citizenship (SCQF level 6)		S						E(6)				
J2G2 44	Data Science (SCQF level 4)					E(4)	E(4)		E(3)				
J2G2 45	Data Science (SCQF level 5)				E(5)	E(5)	E(4)	E(4)	E(4)				
J2G2 46	Data Science (SCQF level 6)				E(6)	E(6)	E(5)	E(5)	E(5)		S		
J2GT 45	Data Science Project (SCQF level 5)								E(4)	E(4)	E(4)		
J2GT 46	Data Science Project (SCQF level 6)								E(5)	E(5)	E(5)		
J2G8 45	Data Science Statistics (SCQF level 5)				E(5)	E(5)		E(4)	E(4)				
J2G8 46	Data Science Statistics (SCQF level 6)				E(6)	E(6)		E(5)	E(5)				
J2G6 45	Machine Learning (SCQF level 5)				S	S			E(4)				
J2G6 46	Machine Learning (SCQF level 6)				S	S		E(4)	E(5)				
H9E2 45	Data Security (SCQF level 5)												
H9E2 46	Data Security (SCQF level 6)		S						E(6)	E(6)		S	
H95Y 46	Statistics (SCQF level 6)			S	S	S		S	S				

5.4 Assessment strategy for the qualifications

The qualification, at each level, comprises two or more units, each of which have their own evidence requirements. The evidence requirements define the types, quantity and quality of evidence that learners must produce to satisfy the requirements of each unit. The support notes exemplify approaches to evidence generation by suggesting potential instruments of assessment that could be used to assess learners.

The following table summarises evidence requirements for each unit.

Unit	Evidence requirements		
	Knowledge	Product	Performance
Computer Programming (SCQF level 5)	X	X	
Computer Programming (SCQF level 6)	X	X	
Data Citizenship (SCQF level 4)	X	X	
Data Citizenship (SCQF level 5)	X	X	
Data Citizenship (SCQF level 6)	X	X	
Data Science (SCQF level 4)	X	X	
Data Science (SCQF level 5)	X	X	
Data Science (SCQF level 6)	X	X	
Data Science Project (SCQF level 5)		X	
Data Science Project (SCQF level 6)		X	
Data Science Statistics (SCQF level 5)	X	X	
Data Science Statistics (SCQF level 6)	X	X	
Data Security (SCQF level 5)	X	X	
Data Security (SCQF level 6)	X	X	
Machine Learning (SCQF level 5)	X		
Machine Learning (SCQF level 6)	X		
Statistics (SCQF level 6)	X		

Most units require two types of evidence: knowledge evidence and product evidence. Normally, evidence is required for all outcomes and performance criteria. However, some units permit knowledge evidence to be sampled when testing is used. Typically, knowledge evidence is produced by a selected response test, and product evidence is produced by a practical assignment. For example, *Data Science* at SCQF level 5 requires knowledge and product evidence. The guidelines on assessment, within the support notes, suggests that this could take the form of a multiple choice test, for knowledge, and a practical analysis of a small dataset, for product evidence.

There are opportunities to integrate the assessment of two or more units (at the same level). For example, the assessments for *Data Science* (SCQF level 5) and *Data Science: Statistics* (SCQF level 5) provide considerable scope for a combined assessment activity that generates evidence for both units.

There are also opportunities to integrate assessment across levels. For example, a distinguishing feature of the assessment for Data Science, at all levels, is the complexity of analysis and the size of datasets on which the analysis is carried out. Carefully designed assessment activities could be produced that would permit learners to undertake activities that would permit them to satisfy the criteria for level 4 or level 5 or level 6 depending on the complexity and size of the analysis carried out.

6 Guidance on approaches to delivery and assessment

The qualification aims to deliver a broad, but relatively shallow, range of knowledge and skills in data science and data analytics. Levels 4 and 5 represent a simple introduction to the subject area, particularly level 4, which should be achievable by most learners, irrespective of their previous knowledge and skills. Level 6 presents a more challenging curriculum.

It is recommended that a practical approach to learning is adopted, whereby learners are given the opportunity to apply their knowledge to problems using appropriate software (see resources).

A distinguishing feature of data science is the size of dataset that is analysed, and it is recommended that teaching and learning involves datasets commensurate with the level of unit. For example, the evidence requirements for *Data Science* at level 4 requires learners to analyse datasets with 1,000 records; level 6 requires 10,000 items. It is also recommended that learners are exposed to real data whenever possible. There are various public sources of open data that can be used for teaching and learning. For example, Kaggle (<https://www.kaggle.com/datasets>) and Data World (<https://data.world/>) provide real datasets; Mockaroo (<https://mockaroo.com/>) provides artificially generated datasets.

A wide range of online resources exist to aid teaching and learning, ranging from YouTube (<http://www.youtube.com>) for instructional videos on data science to Our World in Data (<https://ourworldindata.org/>) for examples of visualisations.

6.1 Sequencing/integration of units

If the units are delivered sequentially, the following sequence is recommended.

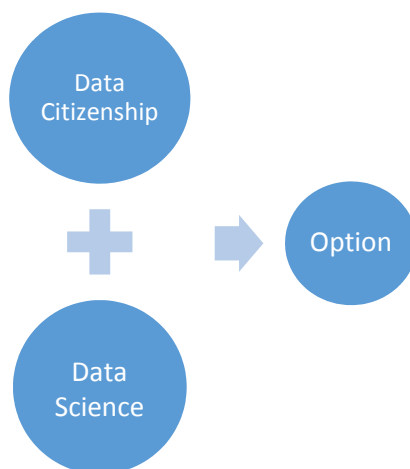


For example, if *Machine Learning* is selected as the optional unit then the following sequence is recommended.



When the award is delivered holistically, it is recommended that Data Citizenship and Data Science are delivered as one, 80-hour, curriculum.

There is some overlap between the units, so combined delivery will ensure that common knowledge and skills are taught once. Combined delivery will also facilitate contextualised learning.



A completely integrated approach to delivery could be adopted. For example, *Data Citizenship*, *Data Science* and *Data Science: Statistics* could be delivered as a single combined curriculum, over 120 hours, with no specific unit boundaries.

It is also possible for the units to be delivered separately, where different teachers are timetabled for different units. For example, in a school setting, a Geography teacher might deliver the *Data Citizenship* unit, a Computing Science teacher might deliver the *Data Science* unit, and a Maths teacher could deliver the optional unit in *Data Science: Statistics*. It is recommended the teachers coordinate closely about the content of the units so that the relevant concepts are delivered before knowledge is applied.

This suite of awards facilitates bi- or tri-level teaching. Centres may wish to delay entering learners for a specific level until their capabilities are known, when learners may be entered for level 4 or level 5 or level 6, depending on their knowledge and skills.

6.2 Selection of optional unit and additional units

The structure of the award, at level 5 and level 6, requires centres to select an optional unit. Advice on the selection of the optional unit is provided in Section 2.3.

Centres may also consider providing additional units to the framework. For example, learners could work towards achieving an additional unit at level 4. This would better match the award structures at higher levels.

SCQF level 4: Units not required for the award but can be delivered with bi-level or tri-level teaching.

4 code	2 code	Unit title	SQA credit	SCQF credit points	SCQF level
HY2C	44	Computer Programming	1	6	4
H9E2	44	Data Security	1	6	4

6.3 Recognition of prior learning

SQA recognises that learners gain knowledge and skills acquired through formal, non-formal and informal learning contexts.

In some instances, a full group award may be achieved through the recognition of prior learning. However, it is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full group award.

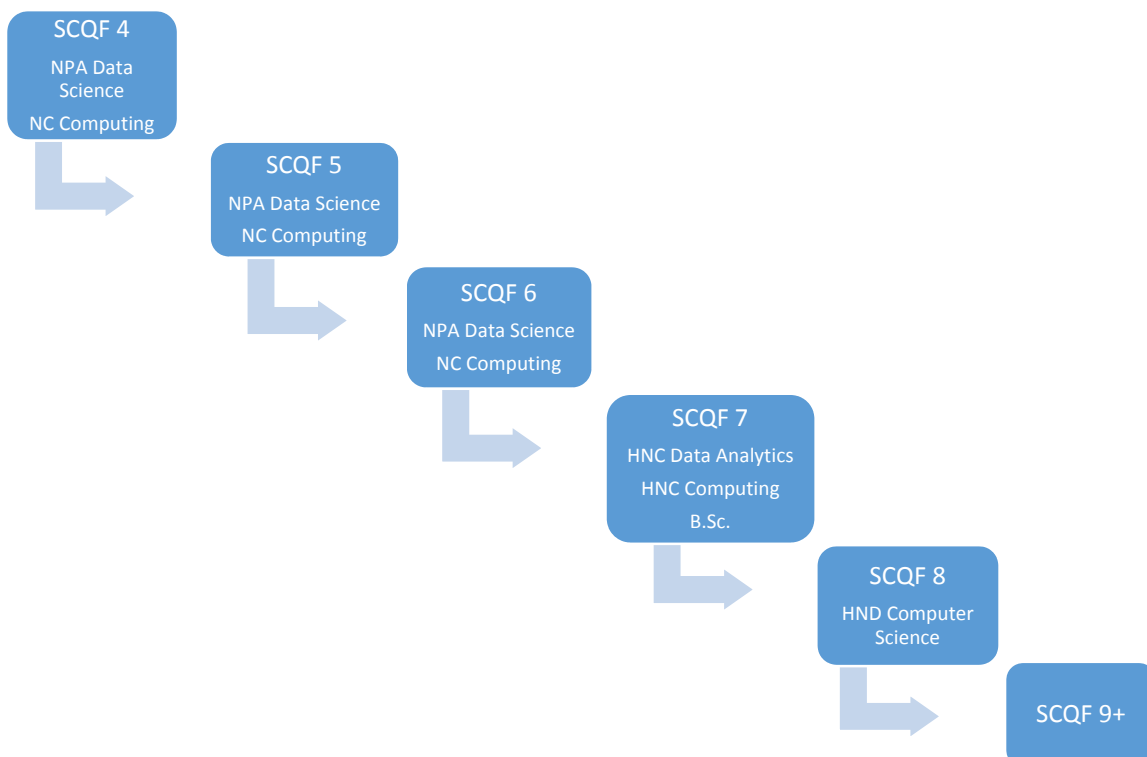
More information and guidance on the *Recognition of Prior Learning* (RPL) may be found on our website www.sqa.org.uk.

The following sub-sections outline how existing SQA unit(s) may contribute to this group award. Additionally, they also outline how this group award may be recognised for professional and articulation purposes.

6.3.1 Articulation and/or progression

There are no formal articulation routes for this award. However, the qualification could lead to a number of potential destinations including Modern Apprenticeships and degree courses in data science or related disciplines.

The main progression for this award is from level to level. For example, progressing from level 4 to level 5 to level 6. Learners could exit the award and progress to other National Certificates, HNCs or degree courses as illustrated below.



6.3.2 Professional recognition

There is no professional recognition for this award.

6.3.3 Transitional arrangements

This is a new qualification. There are no transitional arrangements.

6.3.4 Credit transfer

There are no credit transfer arrangements in place.

6.4 Opportunities for e-assessment

Some of the assessments for this qualification will be available via SOLAR www.sqasolar.org.uk. If your centre is not already on SOLAR you can complete the form on the SOLAR website and get immediate access. The SOLAR website contains training materials and answers many of the common questions you may have. If you would like to know more contact the SOLAR team on solar@sqa.org.uk.

6.5 Support materials

A list of **existing ASPs** is available to view on SQA's website.

6.6 Resource requirements

Learners will require access to computing resources capable of carrying out data analysis. Internet access will be required to use some online resources.

Appropriate hardware will be required. While general purpose Personal Computers (PCs) are adequate to deliver the lower levels (level 4 in particular), it is recommended that learners have access to PCs properly configured for data analysis. Recommended hardware (at the time of writing) includes:

- ◆ Core i5 CPU
- ◆ 8Gb RAM (16Gb preferred)
- ◆ 27' FHD/QHD monitors (widescreen (21:9) preferred)
- ◆ Keyboard with numeric keypad

The qualification may be delivered using general purpose software (such as spreadsheet software), programming languages (such as Python and R), and specialist software (such as Tableau™ and Power BI™). When general purpose software is used, centres must ensure that it has the analytical capabilities required to permit learners to achieve all of the outcomes. At the time of writing, current versions of Microsoft Excel™ (Excel 2016/2019™ and Office 365™) satisfy the necessary requirements. Earlier versions may require the analysis tool pack add-on. It is recommended that, particularly at higher levels, learners are exposed to more than one software tool to permit them to compare and contrast their respective data analysis features. For example, general purpose analytical software, such as Excel™, could be used alongside specialist analytical software, such as RapidMiner™.

Learners will require Internet access to use a variety of online resources. Youtube is a rich source of videos that explain various aspects of data science, particularly software features. Educators may want to use online forums, such as Reddit, for support. The Excel™ Subreddit [r/excel](https://www.reddit.com/r/excel/) (<https://www.reddit.com/r/excel/>) is particularly useful.

Educators will also receive support directly from SQA (computing@sqa.org.uk).

7 General information for centres

Equality and inclusion

The unit specifications making up this group award have been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners will be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Internal and external verification

All instruments of assessment used within these qualifications 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/GuideToAssessment).

8 Glossary of terms

Embedded Core Skills: Is where the assessment evidence for the unit also includes full evidence for complete Core Skill or Core Skill components. A learner successfully completing the unit will be automatically certificated for the Core Skill. (This depends on the unit having been successfully audited and validated for Core Skills certification.)

Finish date: The end of a group award's lapsing period is known as the finish date. After the finish date, the group award will no longer be live and the following applies:

- ◆ learners may not be entered for the group award
- ◆ the group award will continue to exist only as an archive record on the Awards Processing System (APS)

Lapsing date: When a group award is entered into its lapsing period, the following will apply:

- ◆ the group award will be deleted from the relevant catalogue
- ◆ the group award specification will remain until the qualification reaches its finish date at which point it will be removed from SQA's website and archived
- ◆ no new centres may be approved to offer the group award
- ◆ centres should only enter learners whom they expect to complete the group award during the defined lapsing period

SQA credit value: The credit value allocated to a unit gives an indication of the contribution the unit makes to an SQA group award. An SQA credit value of 1 given to an SQA unit represents approximately 40 hours of programmed learning, teaching and assessment.

SCQF: The Scottish Credit and Qualification Framework (SCQF) provides the national common framework for describing all relevant programmes of learning and qualifications in Scotland. SCQF terminology is used 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: SCQF credit points provide a means of describing and comparing the amount of learning that is required to complete a qualification at a given level of the Framework. One National Unit credit is equivalent to 6 SCQF credit points. One National Unit credit at Advanced Higher and one Higher National Unit credit (irrespective of level) is equivalent to 8 SCQF credit points.

SCQF levels: The level a qualification is assigned within the framework is an indication of how hard it is to achieve. The SCQF covers 12 levels of learning. HNCs and HNDs are available at SCQF levels 7 and 8 respectively. Higher National Units will normally be at levels 6–9 and graded units will be at level 7 and 8. 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.

Subject unit: Subject units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Signposted Core Skills: refers to opportunities to develop Core Skills arise in learning and teaching but are not automatically certificated.

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. Centres are advised to check SQA's APS Navigator to confirm they are using the up to date qualification structure.

NOTE: Where a unit is revised by another unit:

- ◆ No new centres may be approved to offer the unit which has been revised.
- ◆ Centres should only enter learners for the unit which has been revised where they are expected to complete the unit before its finish date.

Version number	Description	Date
03	Core Skills table updated.	21/10/2019
02	Unit codes changed due to hierarchy	23/08/19

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of this qualification.

9 General information for learners

This section will help you decide whether this is the qualification for you by explaining what the qualification is about, what you should know or be able to do before you start, what you will need to do during the qualification and opportunities for further learning and employment.

The National Progression Award in Data Science is available at three levels: SCQF level 4 (National 4), SCQF level 5 (National 5) and SCQF level 6 (Higher). The qualification lasts for 80 hours (level 4) or 120 hours (level 5 and level 6).

The qualification aims to develop your knowledge and skills in data science. Data science is an increasingly important field in computer science. It is predicted that there will be a shortage of qualified data scientists in the future. Jobs in data science include: data analyst, data engineer and statistician. Data science is used in lots of areas. For example, doctors, engineers and astronomers all use data science to help them make decisions and predictions. The qualification is also good preparation for university when you will be required to analyse large datasets.

The qualification is introductory. You are not expected to know anything about data science before you commence this qualification. However, at the higher levels (National 5 and Higher) you will need to possess numeracy, digital literacy and computing skills.

What skills will you learn?

You will learn how to use data that you have found or gathered to answer questions and to suggest changes. You will analyse data to find patterns and you will find out how to interpret graphs, charts and tables to spot important points, trends or errors.

In the *Data Science* unit you will gather data from different sources then analyse it by exploring, modelling and validating it. You will then visualise the results and present on your findings, reporting on what you have found.

In the *Data Citizenship* unit you will learn data literacy and basic statistics. You will learn how to interpret data in different formats to find out interesting things from the data, to investigate why unusual results or trends have happened, and think about the impact or behaviour change resulting from the analysis. You will investigate how data can have both a positive and negative effect on society, such as when biased data is used in decision making or when data is misrepresented to influence people.

There are a selection of optional units to choose from which will allow you to specialise in an area of Data Science. These include: *Machine Learning*, *Data Security*, *Programming*, *Statistics* and *Data Science: Project*.

What themes or topics will you study?

Data science for social good: Non-technical skills are important in data science, such as communication and using compelling stories to show the impact of your results. There will be an emphasis on thinking about the impact of data, having compassion and acting ethically and morally. You will learn how data can help you get better answers to questions about healthier lifestyle choices about alcohol, driving, health and fitness. You may learn how to use data to counter negative stereotypes.

Understanding the data, and using it safely and responsibly: You will learn about how to act safely and responsibly with the data you collect and use. You will learn about issues like data integrity and bias. Case studies might include how data has been misused by companies like Facebook, used to influence elections, or how biased data stops some people getting a job or getting a loan, or affects decisions in law courts. You will also find out how data can be used to help people and communities, such as sensing earthquakes or tracking diseases.

Assessment

Assessment is a mix of testing your knowledge and carrying out practical assignments. For example, at level 6 (Higher) you have to analyse a large dataset (comprising at least 10,000 items) to find patterns and trends in the data using software such as Microsoft Excel™.

What's next?

You can progress from level to level within this suite of awards or progress to college or university to undertake more advanced qualifications in data science. Alternatively, you may use the knowledge and skills gained by undertaking this qualification in an entirely different subject area. For example, you might want to do History or Psychology at university and want to learn how to carry out data analysis before commencing your degree course.

What careers are available?

There are variety of future career opportunities including data scientist, business analyst, and data engineer. Data scientists could end up working in business intelligence, artificial intelligence and robotics, finance, tourism, science and medical research, agriculture technology, or in the space industry.

Why should you choose this subject?

Data science is useful to anyone who wants to improve their data skills before pursuing a career in many different fields. Data science is an increasingly important part of many areas of life, learning and work.