Arrangements for:

HNC Building Services Engineering

at SCQF level 7

Group Award Code: GD2H 15

Validation date: May 2011

Date of original publication: January 2012

Version: 01

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

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 revised Group Award in HNC Building Services Engineering and associated Graded Unit which was validated in May 2011. The HN Units that make up the Group Award have been validated separately in accordance with the new Design Principles. 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.

This document gives the frameworks of the new HNC together with guidance on the Delivery, Assessment, Credit Transfer from the previous qualification and Core Skill Signposting.

The Building Services Engineering sector includes the design and installation of heating, ventilating, air conditioning, refrigeration, plumbing and electrical services, for domestic, commercial and industrial buildings. Peripheral industries often involved in Building Services Engineering contracts, include communication, data and security systems.

Work within the sector comprises new build projects undertaken within construction contracts, with a significant proportion involving refurbishment of existing building stock. On many new build and refurbishment contracts the building services installer is the main contractor.

SummitSkills is the Sector Skills Council with strategic responsibility for education and training for this sector.

Building Services Engineering in Scotland represents a relatively small proportion of the UK turnover. Individual businesses comprise a similar mix to that in the rest of the UK with many very small firms. The majority of the larger organisations in Scotland are branches of national and multi-national firms.

The new HN qualification in Building Services Engineering is designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment or for progression to further academic and/or professional qualifications.

2 Rationale for the revision of the Group Award

The current HNC programs were last reviewed in 2005.

Modern building design concepts, embracing the importance of sustainability and environmental protection together with technological developments, have created a need for review of building services engineering qualifications.

With updated National Occupational Standards and development of other courses suitable of candidates entering the sector from school with progression to HNC level, it was necessary to review the HNC to ensure consistency and that the award meets industry standards.

The review has provided an opportunity for inclusion of updated technical content, revised assessment strategies, flexibility to match current employment needs and more appropriate recognition of the needs of candidates for progression to higher education and professional qualification.

3 Aims of the Group Award

3.1 General aims of the Group Award

The review and development of the new award has been undertaken using the new design principles for HN awards. The award is fully accessible through full-time, part-time and flexible learning delivery. The award articulates well with other SQA provision and HE awards and provides strong routes into employment.

The Higher National Certificate in Building Services Engineering is designed to provide:

- a national qualification, with detailed common standards, learning Outcomes and Unit grading recognisable to centres, candidates, employers and professional bodies
- a common core of study
- a choice of optional Units appropriate to the main career disciplines of the Building Services Engineering sector
- flexible approach within a national framework
- the opportunity to preserve and build upon existing good practice
- compatibility with feeder qualifications
- a response to changing training and educational needs
- a preparation for employment
- a contribution to the skills, knowledge and understanding required to underpin relevant occupational standards and SVQs
- progression to degree programmes

In the design of the programme, employer needs are balanced with the necessity to provide candidates with the opportunity to maximise their potential, to achieve widely recognised qualifications and to progress within the industry.

This HNC programme is suitable for a wide range of candidates including:

- school leavers
- candidates progressing from a lower level award in Building Services Engineering or a closely related discipline
- adult returners to education
- candidates in employment who wish to enhance their career prospect
- candidates who wish to start their own businesses

3.2 The Scottish Credit and Qualification Framework

Due cognisance has been taken of the requirements of the Scottish Credit and Qualifications Framework (SCQF) during the design of these awards. This means that the HNC award will be broadly equivalent to the first year of a Scottish degree.

3.3 Title of the Group Award

The award title 'HNC Building Services Engineering' reflects the broad nature of the award, adequately describes the two occupational pathways embedded and also allows centres to develop specific functional pathways.

3.4 Progression routes — higher education

The qualification provides candidates with a relevant mix of competencies enabling immediate entry to employment or articulation to degree level study. The HNC in Building Services Engineering Group Award enables articulation to part time or full time degree courses at Heriot Watt and Glasgow Caledonian University's in Scotland, and other degree courses elsewhere in the UK.

The *Engineering Mathematics* Unit has been specifically designed for those candidates wishing to progress to degree level programs.

3.5 Links to professional body qualifications

The Higher National qualification in Building Services Engineering has been developed with career progression and professional development in mind. It is essential that students gain the maximum benefit from their programme of study. Professional bodies relating to Building Services Engineering are variously licensed by the Engineering Council (UK) for registration at Engineering Technician and/or Incorporated Engineer and/or Chartered Engineer.

The HNC in Building Services Engineering will be recognised as satisfying the educational base for registration as an Engineering Technician (Eng Tech), and part satisfaction of requirements for registration as an Incorporated Engineer (IEng), within the Engineering Council (UK) specification of competences, UKSpec.

Professional bodies not registered with EC (UK), or having parallel non-registered membership categories, will recognize this award at SVQ/NVQ level 4 for the appropriate grade of membership.

3.6 Aims of the award

The HNC qualification in Building Services Engineering is designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment as design engineers or project managers in any of the four pathways included in the framework.

Generally, the award should develop:

- skills of study, research and analysis
- ability to define and solve problems
- transferable skills
- ability to be flexible and work cooperatively with others

- responsibility for own learning
- planning, organisational and review/evaluation skills
- technical skills- broadening and deepening
- oral, written and pictorial communication skills
- numerical and ICT skills
- resource management ability
- flexibility, knowledge, skills and motivation as a basis for progression to graduate and postgraduate studies

Specifically, the award should:

- prepare candidates for a range of technical, professional and management careers in Building Services Engineering
- provide specialised studies which build upon previous study and experience, and are directly relevant to the individual vocations and professions in which candidates are currently working, or in which they intend to seek employment
- enable candidates to make an immediate contribution in employment in the building services sector

3.7 Core Skills

SQA Core Skills at levels from Access 2 to Higher are:

- *Communication*
- *Information and Communication Technology (ICT)*
- *Numeracy*
- *Problem Solving*
- *Working with Others*

The HNC has been developed using the new design principles and therefore the importance of Core Skills has been recognised and these are developed within the award.

It should be noted that there are no mandatory entry or exit levels for Core Skills. The recommended exemplar Core Skill profiles for the HNC Building Services Engineering award are:

Core Skill	Exemplar entry level	Recommended exit
Communication	Intermediate 2	Higher
ICT	Intermediate 1	Intermediate 2
Numeracy	Intermediate 2	Higher
Problem Solving	Intermediate 2	Higher
Working with Others	Intermediate 1	Intermediate 2

Given the various possible access routes it is likely that some candidates in each cohort will not meet the exemplar entry profile. It will be for centres to enable candidates to take maximum advantage of opportunities within the programme to raise their Core Skill achievement levels.

The general aims of the Higher National award in Building Services Engineering include developing a range of personal and key skills that will improve ability, confidence and employability. All practical teaching and learning activities of the HNC programme provide a context for developing and enhancing the five Core Skills to a significant level beyond those recommended at entry. Many discrete Core Skill elements are included within the context of assessments. The use of technology as a tool to research, analyse and present complex reports and to synthesize statistical information is essential to the course. Planning, organising and evaluating work and listening and talking with a wide range of people is critical.

Appendix 1 provides details of the opportunities for the development of Core Skills, through the learning and teaching assessment process, in the Mandatory Units. This signposting guide focuses on indicating specific Outcomes that offer opportunities for skills development. This guidance is not intended to be exhaustive, particular learning and teaching programs, and the Optional Units, may well provide additional opportunities.

Additional skills recognised as critical by employers and Higher Education, such as meeting deadlines, attention to detail, personal target setting, enterprise and effective dealing with clients are not precisely reflected in the SQA Core Skill specifications. Awareness and opportunity for development of these skills exists within this Award. The Graded Unit integrates knowledge and skills developed and provides further opportunities for candidates to demonstrate transferable skills and a high level of achievement.

4 Access to Group Award

As with all SQA qualifications, access to the Awards will be at the discretion of the centre. The following recommendations are for guidance only.

4.1 Access to year 1

Higher National programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- an HNC or NC in a related discipline
- at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in an appropriate science or technology subject.
- a SVQ in Building Services Engineering or a related discipline
- those with other entry qualifications who demonstrate a realistic chance of success
- for some pathways the entry route might be a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

4.2 Access to year 2

Access to year two of the award is available to those having successfully completed year one (subject to any re-assessment requirements).

Access to year two might also be made available to candidates who, in the opinion of the center, have an equivalent qualification in a closely related subject. Such access decisions should be confirmed with the Moderator.

4.3 Work experience

Mature candidates with suitable relevant work experience may be accepted for entry provided the enrolling centre believes that the candidate is likely to benefit from undertaking the awards. Centres may wish to use Core Skills profiling to assist them in this process.

5 Group Award structure

5.1 Conditions of the award

Candidates must achieve 12 credits, of which six are mandatory core credits common to all pathways (including the Group Award Graded Unit) and six from the twelve optional Units which provide preparation for one of two occupational pathways.

- HVAC — Heating, Ventilating and Air Conditioning
- Plumbing

Particular combinations of Units in each pathway have been chosen to maximise delivery efficiency and to attract professional body recognition. With the agreement of the Awarding Body training providers might develop other combinations of Units in order to satisfy specific employer needs.

Mandatory Units are shown in Table 5.2 and Optional Units in Table 5.3.

5.2 HNC Unit framework

Mandatory Unit framework

Unit title	Credit value	SCQF level	Unit number
Design Principles and Application	1	7	DP12 34
Analytical Methods	1	7	DP0X 34
Health and Safety in the Building Services Industry	1	7	DP17 34
Building Services Engineering Science	1	7	FT95 34
Building Services Engineering Project Management	1	7	DP10 34
Building Services Engineering: Graded Unit 1	1	7	DP0M 34
Total mandatory credits	**6**		

+ Optional Units 6
Total credits required 12

5.3 Optional Unit framework

Unit title	Credit value	SCQF level	Unit number
Engineering Mathematics	1	8	DP13 35
Thermofluids and Acoustic Criteria	1	7	DP0T 34
Maintenance and Quality Assurance in Building Services	1	7	DP18 34
Air Conditioning A	1	7	DP0V 34
Air Conditioning B	1	7	DP0W 34
Heating A	1	7	DP15 34
Heating B	1	7	DP16 34
Piped Distribution Services	1	7	DP0N 34
Energy Utilisation and Efficiency	1	7	DP14 34
Building Management Systems	1	7	DP0Y 34
Plumbing Technology	1	7	DP0P 34
Electricity and Lighting	1	7	DP0R 34
Total optional credits	**12**		

5.4 Articulation, professional recognition and credit transfer

In principle candidates can be given credit transfer between current HNC Units, or Units from other appropriate qualifications, and the Units of the new award.

Credit transfers for mandatory and optional Units are listed in Appendix 3.

Centres will have access to the SQA Moderator in order to validate credit transfer applications other than those listed in Appendix 3.

Candidates who are given credit transfer between current HNC Units and the new HN Units must still satisfy all other conditions of the Award of the new design principles for HNC's, including the mandatory Units and the correct number of credits at the correct SCQF level. It is recommended that existing candidates transfer to the new awards as soon as possible.

It is recommended that Credit Transfer should only take place for a maximum of 4–5 years from the introduction of the new award.

6 Approaches to delivery and assessment

6.1 Delivery

All of the Units may be delivered as stand-alone qualifications. Where they are delivered within the frameworks described in this document they constitute a coherent, attractive and very relevant programme, which will equip candidates with the Knowledge and/or Skills needed for the present and future working environment. The range of options allows for either a vocational or academic route for progression.

The design of the building services HNC recognises that the sector embraces a wide range of occupational specialist areas, but with relatively low numbers of trainees in many geographical areas. The combination of mandatory and optional Units should allow centres to deliver a sustainable education and training provision having a credible mix of occupational alternatives, maximising the opportunity for common teaching across different occupational areas, but importantly maintaining an adequate level of coherence and credibility for each candidate group.

The award can be delivered in a variety of modes of study including full-time, part-time and flexible study. Under all circumstances individual centers will be responsible for ensuring authenticity of candidates work.

It is envisaged that where possible centres will deliver the award in an integrative manner and guidance follows on this.

Provided that adequate material and tutorial expertise exists the HNC could be delivered by Open/Distance learning, including an online basis. Centre devised supervision agreements should detail controlled conditions to ensure authenticity of evidence.

6.2 Sequence of delivery

It is for centres to decide the order in which to teach the Units, a suggested delivery schedule is included in Appendix 2.

6.3 Assessment strategy

The assessment strategy should create an appropriate level of rigour, whilst not imposing excessive demands on centres or candidates.

The new design principles for HN awards encourage a more holistic approach to assessment, this has been adopted in the design of this award. The new HN specification places the emphasis on assessing a whole Outcome, or a combination of Outcomes, rather than on individual Performance Criteria. It is also the intention to achieve a realistic assessment loading for both candidates and centres by the use of ‘sampling’ of Knowledge and/or Skills.

Each Unit descriptor includes guidance on delivery, assessment and, where appropriate, any relationship with delivery and assessment of other Units. Requirements for knowledge, skills, sampling, evidence and conduct of assessments is provided for each Outcome in the Unit. Assessment

guidance includes a variety of conditions including open/closed-book, case study, etc.

Exemplar assessment instruments are available for all mandatory Units and a selection of optional Units. The Exemplar provides guidance on content, conduct, evidence required and marking and grading. Centres are expected to use these exemplars as templates when producing further assessment instruments.

Certain Units offer particular opportunity for integrative/holistic assessment covering one or more Units.

Particularly but not exclusively

Unit/s	Assessment guidance
Design Principles and Applications	This Unit provides a broad treatment of criteria and considerations in the design of building engineering services. As such the Unit embraces aspects of all other Units in the award and assessment within other relevant Units might be considered.
Analytical Methods	Assessment tasks for this Unit should relate to relevant analytical problems in building services engineering. It is likely to be beneficial to undertake all or part of the assessment within other Units within which the problems occur.
Building Services Engineering Science. Thermofluids and Acoustic Criteria. Maintenance and Quality Assurance in Building Services Engineering. Health and Safety in the Building Services Industry Building Services Engineering Project Management.	Assessment tasks for these Units should relate to relevant problems in building services engineering. It is likely to be beneficial to undertake all or part of the assessment within other Units within which the problems occur.
Project (Graded Unit)	This Unit is designed to provide the opportunity for testing of knowledge and skills obtained across all the Units in an integrated manner.

6.4 The Graded Unit

The purpose of the Graded Unit is to assess the candidate's ability to integrate and apply the Knowledge and/or Skills gained in the individual Units to demonstrate that they have achieved the principal aims of the Group Award, and to grade candidate achievement.

Candidates will sit one Graded Unit at level 7 for the HNC.

The Graded Unit is one in which the candidate works independently, but within the context of a design team in order to complete a building services design Project. In order to ensure that an appropriate level of individual contribution is made to the Graded Unit it is proposed that an oral examination of each candidate be conducted. Whilst not mandatory it would be good practice to include an employer amongst the examiners.

6.5 Re-assessment

Process

The way that centres re-assess candidates is integral to the way that they manage assessment as a whole and as such, will be subject to internal moderation. In order to ensure that the assessment process is as holistic as possible and that assessors are able to effectively judge candidates' performance in the Outcome or Unit as a whole, it may not always be possible to re-assess only those parts of the performance in which candidates have not satisfactorily demonstrated competence. Scenarios where candidates may require to re-do the whole assessment include:

- assessments which test knowledge and other cognitive skills and where it may not be possible to extract some of the items for re-assessment
- where parts of several Outcomes are involved
- where a project has been designed as an integrated assessment and where there is a requirement to complete the project as a single complex task

Candidates may require to do only part of an assessment, where their evidence has been generated over a period of time and/or a discrete part of the Unit, such as an Outcome, has been assessed originally.

Re-assessment opportunities

SQA advises that there should normally be one, or in exceptional circumstances two, re-assessment opportunities. (Please refer to SQA's *Guide to Assessment and Quality Assurance for Colleges of Further Education*, for details).

Eligibility

Candidates who have not satisfactorily demonstrated their attainment of Knowledge and/or Skills and/or competence in the whole or only part of an assessment may be considered for re-assessment.

Developing alternative assessments

The design of the original assessments inform the re-assessment process to a large extent, as these determine the type of assessment instruments used and the purpose of the assessment. Normally, centres build up banks of assessments that can be used in whole or part for re-assessment purposes.

Assessment writers should refer to the Unit specification when developing an alternative assessment and ensure that it is of equal demand to the original assessment and that it covers all necessary criteria — for example Core Skill achievement. Where candidates have not provided satisfactory evidence for knowledge and/or skill items which have been sampled, they would normally be re-assessed on a different sample.

HN Graded Units

Applying the above general policy to re-assessing HN Graded Units means that reassessing an examination-based Group Award Graded Unit would normally be based on an alternative examination and re-assessment of a project-based Graded Unit would normally be based on an alternative assessment task. For the latter, centres would be encouraged to set the parameters at the start of the project class giving details of the draft (one only) submission date and final submission date. Candidates must pass each section of the project/investigation. The overall grade is derived from the total number of marks across all the sections. The Conditions of Assessment section on the Graded Unit specification gives additional guidance.

7 General information for centres

Quality Assurance and verification

In most centres there are established quality assurance frameworks that must be followed by those responsible for the administration of courses. In addition all courses are subject to external verification. The assessment exemplars provided with the new HNC in Building Services Engineering have been vetted and approved by the Senior Verifier and therefore should be used to indicate a national standard. Should centres wish to use these exemplars in the first year of delivery, they should ensure that all Internal Verification procedures are complied with to ensure the reliability, validity and security of the material. There are no longer any merit statements within the new specifications and candidates will either pass or fail the Unit.

Graded Units

Should centres wish to develop their own assessment materials they can do so, but are strongly advised to contact SQA and seek prior moderation before use of their own devised assessments. Further guidance is available on Prior Verification for Group Award Graded Units from SQA.

Centre internal verification processes should ensure that all candidates have been fairly treated, that the assessment has been valid and reliable, and that the assessment decisions, marks and grades allocated are fair and in

accordance with national standards. A suggested method for the internal moderation of the marking process is for the internal verifier to:

- Select and check a sample of scripts marked by the assessor — the sample should include A, B and C grades and fails
- Decide whether the marking is:
  - at the appropriate standard
  - generally lenient, and by how much
  - generally severe, and by how much
  - lenient or severe at a particular point in the marks range, and how much
  - inconsistent
- Discuss any problem cases with the assessor and agree on the appropriate adjustments to be made to the sampled scripts and, if necessary, to other scripts marked by the assessor.
- Complete the documentation which underpins any further action required
- Make a judgement on the type of training/guidance/support to offer the assessor

Further information on guidance in marking and making assessment decisions is available from SQA.

Guidance on Open Learning

Information regarding open/flexible learning delivery is contained within each Unit specification. The introduction of 'sampling' within the assessment strategy means that more assessment must now be carried out in 'controlled conditions'. Centres must have procedures in place to authenticate the work produced by candidates who do not undertake assessment within the Centre. For more information on normal open learning arrangements, please refer to the *SQA Guide to Assessment and Quality Assurance of Open and Distance Learning*.

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

Suggested Guidance for candidates is provided in Appendix 4.

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 HN credit is equivalent to 8 SCQF credit points. This applies to all HN Units, irrespective of their level.

SCQF levels: The SCQF covers 12 levels of learning. HN Units will normally be at levels 6–9. Graded Units will be at level 7 and 8.

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

Graded Unit: Graded Units assess candidates' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage candidates to retain and adapt their skills and knowledge.

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 HNC/HND 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 HNCs and HNDs are those developments or revisions undertaken by a group of centres in partnership with SQA.

Specialist single centre and specialist collaborative devised HNCs and HNDs are those developments or revisions led by a single centre or small group of centres who provide knowledge and skills in a specialist area. Like consortium-devised HNCs and HNDs, these developments or revisions will also be supported by SQA.

10 Appendices

Appendix 1: Core Skills signposting
Appendix 2: Sequencing of Unit delivery
Appendix 3: Credit transfer between previous and new HNC
Appendix 4: Guidance for candidates

Appendix 1: Core Skills signposting

Introduction

This Core Skills Sign Post Guide provides identifies opportunities for the development of Core Skills **through the learning and teaching assessment process** for all Units. The guide focuses on indicating specific areas that offer opportunities for skills development in the mandatory Units. The guide is not exclusive nor exhaustive, particular learning and teaching programs and the Optional Units may well provide additional opportunities.

The Core Skill levels indicated in the guide are based on the opportunities identified within the mandatory Units. Opportunities for developing skills at other levels may exist in the optional Units.

Additional skills recognised as critical by employers and higher education, such as meeting deadlines, attention to detail, personal target setting, enterprise and effective dealing with clients are not precisely reflected in the SQA Core Skill specifications. Awareness and opportunity for development of these skills exists within this award. The Graded Units integrates knowledge and skills developed, and provides further opportunities for candidates to demonstrate transferable skills and a high level of achievement.

Communication (Higher)

Written Communication (Reading)

Read and understand complex written communication

(a) Identify and summarise all significant information, ideas and supporting details in a complex written communication
(b) Evaluate fully the effectiveness of a communication in meeting its purpose and the needs of its intended readership

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
Design Principles and Applications	Outcome 2 Interpret a client's brief for a non-domestic building, identify services requirements and authenticate the interpretation with the client.	Developed	✓	✓			
Building Services Engineering Project Management	Outcome 4 Evaluate the differences between various 'standard' building contracts identifying rights, obligations, onerous clauses and legal responsibilities.	Developed	✓				

Written Communication (Higher)

Written Communication (Writing)

Present well structured Written Communication on complex topics

(a) Present all essential ideas/information and supporting detail in a logical and effective order
(b) Use a structure which takes account of purpose and audience and links major and minor points in a way which assist clarity and impact
(c) Use conventions which are effective in achieving the purpose and adapted as necessary for the audience
(d) Use spelling, punctuation, sentence structures which are consistently accurate
(e) Vary sentence structure, paragraphing, and vocabulary to suit purpose and target audience

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
Design Principles and Applications	Outcome 2 Produce a design brief for a complex building	Developed	✓	✓	✓	✓	✓
Health and Safety in the Building Services Industry	Outcome 2 Develop a Health and Safety policy appropriate to a building services engineering site operation	Developed	✓	✓	✓	✓	✓
Graded Unit 1 — Project	Development phase Produce a portfolio forming the basis for an oral examination	Developed	✓	✓	✓	✓	✓

Oral Communication (Higher)

Produce and respond to oral communication on a complex topic

(a) Use vocabulary and range of spoken language structures consistently and effectively at an appropriate level of formality
(b) Convey all essential information, opinions or ideas with supporting detail accurately and coherently and with varied emphasis as appropriate
(c) Structure communication to take full account of purpose and delivery
(d) Take account of situation and audience during delivery
(e) Respond to others, taking account of their contributions

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 2						
Design Principles and Applications	Prepare and deliver a proposal to a client outlining selected design criteria and proposed solutions including capital and operational cost implications	Developed	✓	✓	✓	✓	✓
Graded Unit 1 — Project	Development phase Prepare and deliver a an executive summary of the design proposal as an introduction to the oral examination	Developed	✓	✓	✓	✓	✓

Using Number (Higher)

Apply in combination a wide range of numerical, statistical and other mathematical skills to process complex information in generalised contexts

(a) Work confidently with a numerical or statistical concept
(b) Decide on the steps and operations to be carried out
(c) Carry out a number of sustained, complex calculations

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcomes 1–4						
Analytical Methods	Apply statistical and other numerical techniques to design, planning and control issues for building services projects	Developed	✓	✓	✓		
Graded Unit 1 — Project	Development phase Apply statistical and other numerical techniques to design, planning, control and evaluation issues for building services systems	Developed	✓	✓	✓		

Graphical Information (Higher)

Apply a wide range of graphical skills to interpret and present complex information in generalised contexts

(a) Analyse and interpret complex graphical information
(b) Select an appropriate form of table, chart, graph, diagram or qualitative form and communicate information in that form

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 3						
Analytical Methods	Use statistical techniques in the recording and analysis of data relating to design, manufacturing and installation of building services systems	Developed	✓	✓			
	Outcomes 3 and 4						
Health and Safety in the Building Services Industry	Analyse, interpret and publish risk assessment and incident data	Developed	✓	✓			
	Development phase						
Graded Unit 1 — Project	Use graphical and other pictorial data in the design of building services engineering systems	Developed	✓	✓			

Information Technology (Intermediate 2)

Using an IT system effectively and responsibly to process a range of information

(a) Make effective and responsible use of the range of IT equipment in everyday use
(b) Carry out straightforward processing in two types of software application
(c) Carry out complex processes to use one further application in depth
(d) Integrate different types of data in a piece of work
(e) Carry out searches to extract and present relevant information form electronic data sources

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 4						
Design Principles and Applications	Produce sketch plans and detailed drawings using both manual and CAD packages.	Developed	✓	✓	✓	✓	✓
	Development phase						
Graded Unit 1 — Project	Use IT software for the analysis of design data and production of plant and system specifications	Developed	✓	✓	✓	✓	✓
	Outcomes 2 and 3						
Building Services Engineering Project Management	Use IT systems for the development of project plans and the management of simulated projects	Developed	✓	✓	✓	✓	✓

Critical Thinking (Higher)

Analyse a complex situation or issue

(a) Identify the factors involved in the situation or issue
(b) Assess the relevance of these factors to the situation or issue
(c) Develop and justify an approach to deal with the situation or issue

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 2						
Design Principles and Applications	Interpret a client's brief for a non-domestic building, identify services requirements and authenticate the interpretation with the client.	Developed	✓	✓	✓		
	Outcome 4						
Health and Safety in the Building Services Industry	Undertake risk assessment and produce policy to deal with issues arising	Developed	✓	✓	✓		
Graded Unit 1 — Project	Planning phase Consider and evaluate a client brief for a complex building and produce justified proposals	Developed	✓	✓	✓		

Planning and organising (Higher)

Plan, organise and complete a complex task

(a) Develop a plan
(b) Identify and obtain resources to carry out the plan
(c) Carry out the task

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 1						
Analytical Methods	Apply numerical analysis to the preparation of plans relating to production, installation and commissioning of building services systems	Developed	✓				
	Outcome 3						
Building Services Engineering Project Management	Define a plan including roles and contribute effectively to implementation and evaluation of the plan	Developed	✓	✓	✓		
Graded Unit 1 — Project	Planning phase Plan the undertaking of the tasks defined, identify resources and carry out the plan	Developed	✓	✓	✓		

Reviewing and Evaluating (Higher)

Review and evaluate a complex problem solving activity

(a) Evaluate the effectiveness of the strategy/strategies
(b) Identify and gather appropriate evidence
(c) Draw conclusions and make recommendations

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
	Outcome 2						
Design Principles and Applications	Assess the need for services required for a project, how these may be integrated into the overall design strategy and forecast the environmental, capital and operational costs and sustainability performance	Developed	✓	✓	✓		
	Outcomes 1–4						
Health and Safety in the Building Services Industry	Review legislation, define the H&S strategy for a particular project and evaluate the impact on operational activities	Developed	✓	✓	✓		
Graded Unit 1 — Project	Evaluation phase. Evaluate and identify 'lessons to be learned' from individual performance against original plan and critical appraisal of technical solutions	Developed	✓	✓	✓		

Reviewing and Evaluating (Higher) (cont)

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
Building Services Engineering Project Management	Outcomes 1 and 3 Define monitoring procedures when managing a project and specify the decision making process required	Developed	✓	✓	✓		

Working with Others (Intermediate 2)

Work with others in a group to analyse, plan and complete a complex activity

(a) Analyse the activity and identify the component tasks and roles which make up the activity
(b) Agree allocation of responsibilities taking account of own strengths and weaknesses and those of others
(c) Support co-operative working
(d) Evaluate and draw conclusion about own contribution to group activity, justify this by referring to supporting evidence

Mandatory Unit	Knowledge/Skills/Evidence	Developed/Assessed	a	b	c	d	e
Design Principles and Applications	Outcome 3 Identify the responsibilities of all the parties involved in the design and planning and construction processes	Developed	✓	✓	✓	✓	
Graded Unit 1 — Project	Develop a plan for the completion of the task/s specified and work individually but within the context of a design team to complete the activity	Developed	✓	✓	✓	✓	
Building Services Engineering Project Management	Outcome 3 Contribute effectively to a team project and understand the roles and needs within a team	Developed	✓	✓	✓	✓	

Appendix 2: Sequencing of Unit delivery

Institutions will need to develop their own rationale and logic for programme delivery. The following chart is intended as guidance only.

Sequencing is indicated with consideration of the need for Units to be progressive and taking account of the pathway is being followed.

Suggested delivery period shown by the shaded area.

Unit	Status	Year 1	Year 2
Building Services Engineering Science	M		
Analytical methods	M		
Heating A	O		
Air Conditioning A	O		
Design Principles and Application	M		
Electricity and Lighting	O		
Health and Safety in the Building Services Industry	M		
Piped Distribution Services	O		
Energy Utilisation and Efficiency	O		
Thermofluids and Acoustic Criteria	O		
Maintenance and Quality Assurance in Building Services	O		
Air Conditioning B	O		
Heating B	O		
Building Management Systems	O		
Building Services Engineering Project Management	O		
Plumbing Technology	O		
Building Services Engineering: Graded Unit 1	M		
Engineering Mathematics	O		

Status key:

M = Mandatory
O = Optional

Appendix 3: Credit transfer between previous and new HNC

The following table provides credit transfer equivalence when comparing previous Units with those in the new HNC Award. Credit will be granted providing valid evidence of satisfactory completion of the existing Unit/s is available.

Claims for credit based on existing Units other than those listed here will require the approval of an external verifier.

New HNC Unit title	Status	Current HNC Unit title/s	Credit transfer status
Design Principles and Application	M	Design Project U(A1RG04)	Full credit
Analytical methods	M	Mathematics U(A1RD04)	Full credit
Health and Safety in the Building Services Industry	M		
Building Services Engineering Science	M		
Building Services Engineering Project Management	M	Contract Management U(A1RA04)	Full credit
Engineering Mathematics	O	Engineering Mathematics U(A1RD04)	Full credit
Thermofluids and Acoustic Criteria	O	Thermofluids and Noise & Vibration U(A1RC04) and U(A1RE04)	Full credit for students holding both A1RC04 and A1RE04 Units
Maintenance and Quality Assurance in Building Services	O		
Air Conditioning A	O	Air Conditioning U(A1RF04)	Full Credit
Air Conditioning B	O	Air Conditioning U(A1RF04)	Full Credit
Heating A	O	Heating Services and Combustion U(A1RH04)	Full Credit
Heating B	O	Heating Services and Combustion U(A1RH04	Full Credit
Piped Distribution Services	O	Associated Services Systems U(A1RB04)	Full Credit
Energy Utilisation and Efficiency	O		
Building Management Systems	O		
Plumbing Technology	O		
Electricity and Lighting	O		

Appendix 4: Guidance for candidates

Introduction

The Building Services Engineering sector includes the design and installation of heating, ventilating, air conditioning, refrigeration, plumbing and electrical services, for domestic, commercial and industrial buildings. Peripheral industries often involved in Building Services Engineering contracts, include communication, data and security systems.

Work within the sector comprises new build projects undertaken within construction contracts, with a significant proportion involving refurbishment of existing building stock. On many new build and refurbishment contracts the building services installer is the main contractor.

The new HN qualification in Building Services Engineering is designed to equip students with the knowledge, understanding and skills required for success in current and future employment or for progression to further academic and/or professional qualifications.

What is a Higher National Certificate in Building Services Engineering?

The Higher National Certificate in Building Services Engineering is designed to provide:

- a national qualification, with detailed common standards, learning Outcomes and Unit grading recognisable to centres, candidates, employers and professional bodies
- a common core of study
- a choice of optional Units appropriate to the main career disciplines of the Building Services Engineering sector
- flexible approach within a national framework
- the opportunity to preserve and build upon existing good practice
- compatibility with feeder qualifications
- a response to changing training and educational needs
- a preparation for employment
- a contribution to the skills, knowledge and understanding required to underpin relevant occupational standards and SVQs
- progression to degree programmes

Who might benefit from the HNC programme?

The programme is suitable for a wide range of candidates including:

- school leavers
- candidates progressing from a lower level award in Building Services Engineering or a closely related discipline
- adult returners to education
- candidates in employment who wish to enhance their career prospects
- candidates who wish to start their own business

Do I need a previous qualification in order to enter the HNC?

If you enter the program with at least one of the following qualifications you are likely to benefit more readily from the programme:

- an HNC or NC in a related discipline
- at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in an appropriate science or technology subject.
- a SVQ in Building Services Engineering or a related discipline
- those with other entry qualifications who demonstrate a realistic chance of success
- for some pathways the entry route might be a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

Will the HNC enable me to progress to a higher qualification?

Successful completion of the HNC in Building Services Engineering, with suitable grades, enables you to enter part-time or full-time degree courses at Heriot Watt and Glasgow Caledonian Universities in Scotland, and other degree courses elsewhere in the UK.

If you wish to progress to degree level programs you must obtain the *Engineering Mathematics* Unit.

Is the HNC recognised by Professional Bodies?

The HNC in Building Services Engineering will be recognised as satisfying the educational base for registration as an Engineering Technician (Eng Tech), and part satisfaction of requirements for registration as an Incorporated Engineer (IEng), within the Engineering Council (UK) specification of competences, UKSpec.

Professional bodies not registered with EC (UK), or having parallel non-registered membership categories, will recognise this award at SVQ/NVQ level 4 for the appropriate grade of membership.

Which subjects do I have to study?

You will be required to undertake six Mandatory Units that are common to all pathways, followed by a choice of six from 12 optional Units that will provide prepare you for one of two occupational pathways:

- HVAC — Heating, Ventilating and Air Conditioning
- Plumbing

Mandatory Unit framework

Unit title	Credit value	SCQF level
Design Principles and Application	1	7
Analytical Methods	1	7
Health and Safety in the Building Services Industry	1	7
Building Services Engineering Science	1	7
Building Services Engineering: Graded Unit 1	1	7
Building Services Engineering Project Management	1	7
Total mandatory credits	**6**	

+ Optional Units 6

Total credits required 12

Optional Unit framework

Unit title	Credit value	SCQF level
Engineering Mathematics	1	8
Thermofluids and Acoustic Criteria	1	7
Maintenance and Quality Assurance in Building Services	1	7
Air Conditioning A	1	7
Air Conditioning B	1	7
Heating A	1	7
Heating B	1	7
Piped Distribution Services	1	7
Energy Utilisation and Efficiency	1	7
Building Management Systems	1	7
Plumbing Technology	1	7
Electricity and Lighting	1	7

Can I obtain credit for Units I already?

If you possess another HNC qualification or are transferring from an existing HNC to the new HNC you may be able to claim credit on a Unit for Unit basis. You should consult your college tutors to establish the credit to which you may be entitled.

What do I have to do to succeed in obtaining the HNC?

In order to obtain the award you will need to successfully undertake assessments in each Unit of study and the Graded Unit. Assessments may be open or closed-book or case study based. For assessments in Units of study you will receive a Pass or Fail result.

For the Project (Graded Unit), which will test your knowledge and skills across all Units, you will receive a Grade. Pass grades are A, B and C.