SCOTTISH QUALIFICATIONS AUTHORITY

ARRANGEMENTS DOCUMENT

G7TT 16 HND COMPUTING: SOFTWARE DEVELOPMENT

G7TR 16 HND COMPUTING: TECHNICAL SUPPORT

Version 12 (September 2014)

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 candidates for the Unit which has been revised where they are expected to complete the Unit before its finish date.

Version number	Description	Date
12	*2D Animation* (F209 34) added as an optional Unit to HND Computing: Software Development.	30/09/14
11	*Software Development: Developing Small Scale Standalone Applications* (H17W 34) added as optional Unit to both frameworks. *Developing Software: Introduction* (H173 34) added as an optional Unit to HND Computing: Technical Support framework.	18/07/14
10	*Computer Forensics: Fundamentals* (H1EN 34) and *Software Development: Programming Foundations* (H17X 34) added as local optional Units to HND Computing: Technical Support	09/08/13
09	*Developing Mobile Web Based Applications: An Introduction* (H17J 34) has been added as a local optional Unit to Computing: Software Development.	21/05/13
08	**Changes to codes (G7TR 16)**: *Computing: Graded Unit 1* from DH36 34 *(Lapse date 31/07/2013, finish date 31/07/2015)* to H1J8 34. *IT in Business – Spreadsheets* from DE1M 34 *(Lapse date 31/07/2012, finish date 31/07/2014)* to F84V 34. **Added to Framework (G7TR 16):** *Mathematics: Calculus and Matrices for Computing* DP8F 34.	04/02/13
07	**Added to framework (G7TT 16):** *Mobile Technology* H17R 35.	25/01/13
	No History of Changes table when previous version changes were made.	

RATIONALE

FOR THE DEVELOPMENT OF THE AWARD(S) AND THE PROCESSES OF CONSULTATION AND MARKET RESEARCH CARRIED OUT

INTRODUCTION

This document is the 'Arrangements' for the 'revised' Higher National Diploma in Computing. This HN Computing award has been offered in unitised format since 1989. The last revisions were 1995 and then in 2001, following a change in the design rules.

The 2001 revision has been used as a 'pilot' award, and in particular has been used to test the appropriateness of the new design rules. While the 'pilot' HN Computing awards have been successful, experience has shown that they did indeed need some revision.

Two HNDs in Computing are available - Software Development and Technical Support. This follows the pattern of earlier awards.

BACKGROUND TO THE DEVELOPMENT OF THE AWARD

OVERVIEW

In effect, this arrangements document is the final stage of what has proved to be a five year development of HNC and HND in Computing. The redesign of the HNC and HND arose directly from the change in the SQA Design Rules which took place in the year 1999. However, it was also a consequence of considerable changes in the Computer Industry since the establishment of the then 'current' HNC and HND awards. The decision was made to undertake a bold change initiative by going to first principles and establishing precisely what was needed in terms of computing and associated skills in order to effectively support the Scottish economy at the level of technician (for the HNC) and computer professional (for the HND).

The difficulty in working from first principles is that continuity may be lost with what has gone before and changes in structure and design may be made which, over time, prove not to be satisfactory. It was therefore decided to implement the change in two phases:

Phase 1 was the major initiative. It involved thorough research of the market place and close consultation with centres, colleges and other professionals in advisory groups so that the necessary changes could be implemented, but that the implications of such changes could be anticipated and adverse effects ameliorated. These HNC/Ds were known as the 'Pilot' awards and, as expected, ran for several years. Their development was supervised by the HN Computing (pilot) Steering Group who were set up for the purpose.

Phase 2 has now been finalised. It was intended to review the running of the pilot courses and awards and would seek to modify them in an incremental manner to overcome any disadvantages which had become manifest. The HNC and HND which emerged from this work would be known as the 'Revised' Awards. This work was supervised by the HN Computing Review Advisory Group (HNCRAG) who replaced the Steering Group from Phase 1.

Phase 1 has been completed and the 'Pilot' awards were validated in 2001. Most colleges and centres have presented these awards, but some continue to present the 'Current' awards ie. those which preceded the 'Pilots'.

As part of Phase 2, the planned review of the 'Pilot' awards took place in late 2003 and early 2004.

The 'Revised' HNC was presented for validation in April 2004 and was validated successfully in September 2004.

This arrangements document details the 'Revised' HND Computing awards was successfully validation in May 2005 - this completes the broad plan.

Use of Terminology

The terms 'Current', 'Pilot' and 'Revised' have had specific meanings during the progress of Phases 1 and 2. However they do not make technical documents easy to read. The use of 'Current' to refer to HN qualifications used in 1997, for example, is particularly inappropriate. Therefore in the remainder of this document and in future publications by the SQA the awards from before, during and after this development plan will be referred to respectively as the 1995, 2001 and 2004/5 versions of the HNC and HND.

GENERAL BACKGROUND

The SQA and its predecessor bodies have been offering Higher National awards in the Computing area since the early 1980s. The HNC and HND awards in Computing have been offered in unitised format since 1989. They were last fully revised in 1995.

The HN Computing awards are extremely popular and the number of candidates entered for these awards continues to rise, as Table A shows.

			2001/2		2002/3		2003/4		Total	
Award	**code**	**level**	**entries**	**awards**	**entries**	**awards**	**entries**	**awards**	**entries**	**awards**
HNC Computing	G5VS	15	433	0	850	247	1112	553	**2395**	**800**
HND Computing: TS	G5VV	16	89	0	314	29	528	207	**931**	**236**
HND Computing: SD	G5VT	16	123	0	301	36	349	127	**773**	**163**
		total	**645**	**0**	**1465**	**312**	**1989**	**887**	**4099**	**1199**

Table A: Number of Candidate Entries per Year

SQA initiated a revision of the HN Computing awards in November 1999 as one of three pilot areas developing awards under the revised HN Qualification Design Rules. More recently these rules have been replaced by a set of 'Design Principles' which are summarised in Appendix 1.

DEMAND FOR COMPUTING SKILLS

Since 1995, the field of Computing and Information Technology has seen massive change, both in the technology and in the skills required of computing professionals. In particular three important changes stand out. These are: the immense importance of the ***Internet*** to

modern society; an emphasis on ***object-oriented techniques*** for analysis, design and implementation of software systems; and a considerable extension of ***networks and network technology*** into almost every part of life. All of these are reflected in the 2004 HN frameworks.

As part of this development work, two reviews were undertaken to find information on the IT 'skills gap', the number of IT vacancies and the IT skills most in demand. These reviews took place in 2000 and 2004. They looked at a number of reports commissioned by industry bodies and considered aspects of the IT skills gap in Scotland, the UK, Europe and world wide. (See Market Research below)

This qualification has been developed in response to these changes along with feedback from practitioners and delivering centres. This award aims to provide a candidate with the skills and knowledge that will assist in meeting the fundamental skills needs of the Computing sector.

QUALIFICATION DESIGN TEAM

A Qualifications Design Team has performed the development work for both the 2001 and 2004/5 HN awards. Throughout the two phases of development this Qualification Design Team has been supported and advised by a supervisory panel. In 2001 this was the HN Computing (pilot) Steering Group, and in 2003 it was replaced by the HN Computing Review Advisory Group (HNCRAG).

The membership details of the Qualifications Design Team, the Steering Group and HNCRAG are shown in Appendix 2.

CONSULTATION & MARKET RESEARCH

The Qualification Design Team has conducted market research to ensure that these HNDs will meet the needs of employers, the professional bodies and the Higher Education institutes. It has also gathered feedback from delivering centres, practitioners and students. The students surveyed in 2000 were studying on the 1995 award and those surveyed in 2004 were studying the 2001 awards. The aim in all these consultations was to discover or anticipate problems and identify modifications and/or improvements which were needed in order to improve the usefulness, quality and practicability of the awards.

MARKET RESEARCH

The ultimate market for these qualifications is the work place. All the stakeholders in these developments would wish to see the holders of these new HN awards as successful computing/IT professionals who will be recruited into appropriate jobs in companies, public service or in voluntary organisations. Alternatively they themselves may start small or medium sized businesses. Because, in economic terms at least, the wealth producers in our economy are primarily the companies, the team decided to research the business sector in particular to establish their computing needs. In simple terms what did employers need and did they think that people holding an HNC or HND in Computing would meet these needs?

Two other types of body mediate in the process, which results in a qualified person obtaining a suitable job and succeeding within it:

The first of these is the Higher Education (HE) institutes - mainly universities. People who hold an HNC/D in Computing may apply to take a first degree which may typically be in Computing, IT or Engineering and from there go on to work in the computing industry at a professional level in a technical support or a software development role. The question here is whether the universities will accept holders of an HNC or HND in computing as a suitable student on a degree programme. Further, will they accept such a person, especially if holding an HND in computing, into Year 2 or Year 3 of their programme. This latter arrangement is known technically as 'articulation'.

The second type of mediating body is the professional computing associations, societies and institutes of various types. Membership of such bodies is a form of professional recognition and may assist the holder in obtaining suitable employment. Such bodies typically have grades of membership, personal development programmes and criteria by which people joining the body may be accredited in order to join with a particular level of membership. The question here is whether holders of an HNC or HND will be acceptable to such bodies and at what levels of membership they might join.

So it can be seen that the thrust of the market research should be aimed at trying to provide Scotland with a supply of HN award holders who will meet the needs of employers, sometimes directly and sometimes following the achievement of an HE degree or diploma and/or membership of a professional body.

SUMMARY OF MARKET RESEARCH ACTIVITY

The market research took place as a natural part of the two phases of development.

Phase 1 - in the year 2000 (Information can be found in G7GL 15 – HNC Computing Arrangements Document)

1. A total of 109 Scottish IT companies were surveyed by telephone.
2. A review of research into the computer industry was undertaken.
3. All Universities in Scotland were surveyed by hard copy questionnaire.
4. Two professional bodies the British Computer Society (BCS) and the Institute for the Management of Information Systems (IMIS) were surveyed by letter.

While these surveys provided valuable information for the development of the 2001 awards, the panel who validated the 2004 HNC felt that they were dated and might not reflect recent changes in the computing industry. They recommended that more current data should be collected in order to support the validation of the 2004/5 awards so a second set of surveys was conducted.

Phase 2 - in the year 2004

1. A total of 73 Scottish companies which have IT as the sole or a major function were surveyed by telephone.
2. Five Scottish universities were surveyed by interview, e-mail and telephone.
3. The same two professional bodies - BCS and IMIS - were surveyed by e-mail and telephone.

Phase 3 - in the year 2005

1. A review of recent research by e-Skills UK was undertaken.
2. A further six Scottish universities and two Colleges of Higher and Further Education were surveyed by interview, e-mail and telephone.

Findings from the Market Research

Surveys of Employers

The telephone interview survey of representative IT firms asked them what skills they needed, what qualifications they looked for in recruiting their employees, and what experience they had of employing holders of qualifications in HN Computing.

The telephone interviews were administered by a commercial organisation whose main business is telephone surveys. The number of companies approached far exceeded the numbers who responded (347). The range of firms who responded in terms of size, activity and geographical distribution was a reasonable approximation to the entire distribution of companies offering IT jobs within Scotland.

In the main, results about recruiting were not surprising. Companies were prepared to consider applicants with HN qualifications, but an apparent preference for these qualifications in 2001 was not repeated in 2004. One fact that emerged from the 2004 analysis was that firms who employed people to develop software were much more inclined than others to employ graduates, often exclusively graduates.

Questions about specific computing/IT subject areas showed that the following are all considered relevant or very relevant: Applications and Applications Development; Hardware and Operating Systems; Internet Working; Information Systems; Professional Issues; and Project Management.

Two areas stood out markedly in their reported relevance. These were, **Network Administration & Technologies** and **Providing Support to Users**. Both of these are normally considered to fall within the Technical Support version of the HND.

On the Software Development side there were also clear patterns. A group of 25% of the companies accorded no relevance whatever to Programming nor to Systems Analysis & Design. The remaining 75% thought at least one programming language and one method of Systems Analysis WAS important. Of this 75% some two thirds thought that more than one programming language and more than one method of Systems Analysis were relevant to their needs. The close similarity of the figures should not be a surprise because these two areas are closely linked in functional terms.

Questions about skills gaps and skill vacancies in the reports by e-Skills UK have supported these findings. They also reported the need for professional software developers with both recruiting problems and skill gaps in employed staff.

Employers were asked about the relevance of five transferable core skills. **(The table on page 16 shows the standard five SQA core skills. Because IT was so evidently relevant to computing, respondents**

were instead asked about the importance of a foreign language, which has been the subject of debate in the past.)

90% said that ALL of these transferable skills were relevant or very relevant, except the foreign language. Only 10% thought a foreign language to be relevant.

The reviews of research confirmed the importance of the computing sector and indicated a continuing demand for qualified employees.

Conclusion on Employers: The needs of employers were well articulated in these results and have not altered very much between the 2000 and 2004 surveys. The emphasis on data communications, internet working, network technology and giving support to users has been designed into the framework for technical support as has the continuing need for software development in the other version of this HND. The recent publication by e-skills UK raised the great importance of IT strategy and the integration of IT into the business model. These both involve skills which can be developed in those holding the proposed awards.

Articulation

Evidence from surveys and post course destination statistics confirm that traditionally many HND students progress to HEI to study at undergraduate and post-graduate levels and have contributed significantly to the success of these programmes.

While these links have either been semi-formal or formalised locally, efforts will continue to provide a secure foundation at national level as the basis for advice to colleges on articulation to HEIs. This process, driven on a strategic level to provide consistency of opportunity and access for students, using the SCQF approach will be ongoing and further work with HEIs in the light of recommendations by major stakeholders will be progressed.

Surveys of Universities

The 2000 survey was not very helpful. However it did produce general support for the changed HND structures.

Of the five universities which were consulted in the 2004 survey, all are prepared to consider the formal recognition of HND Computing as a valid qualification for entry to their degree programmes and four of these will actively consider such entry in the second or third academic year of such a degree course programme.

The universities and colleges surveyed in 2005 were on the whole very positive about articulation into second or in some cases third year of their degrees. In some instances articulation agreements existed for previous versions of the HND award and were likely to be renegotiated. Arrangements to provide bridging modules (especially in Java and mathematics) were also already established.

Because the HND design is new, it will take time to establish articulation agreements or policies in any detail. However the agreements, which are most likely to be established over the next two years are likely to limit to some extent the degree programmes that may be taken by ex-HNDs. Further, the different universities may express preferences about the choice of some of the optional units which should be contained in the programme of study followed by HND candidates. In addition universities may well state preferences about the particular programming language(s) in which the student should be proficient.

Conclusion on Universities: The HND in Computing is very likely to be accepted by Scottish universities. Articulation will certainly be feasible in the mid-term future for most students to gain entry to Year 2 or Year 3 of a degree programme. However, it will be important that guidance staff in FE colleges develop some expertise in the different requirements, specifications and demands of universities in order to guide students and to offer courses which will give them a reasonable set of progression routes.

Surveys of Professional Bodies

Two professional bodies were approached in 2000: the British Computer Society (BCS) and the Institute for the Management of Information Systems (IMIS), but only IMIS gave a formal reply in writing. They judged that the 2001 HND would equate to their Higher Diploma and would consider award holders eligible for Associate Membership. It is anticipated that after application and due process the HND will also attract the same level of IMIS recognition.

In the 2004 survey, the BCS said they were prepared to recognise the HND Computing to some extent. If requested, they will accredit or exempt such HND courses delivered by applicant FE colleges that meet their specific requirements. Apart from these, any student who achieves the HND award will gain some (lesser) recognition in their 100-point member progression system.

Conclusion on Professional Bodies: The HND in Computing will be recognised and respected by professional bodies and will lead to improved levels of membership, but only after the necessary administrative steps have been taken by the applicants or their colleges.

Achievement of the Market Research

The market research into the requirements of the employers, the universities and the professional bodies explored a number of real life factors which are external drivers and which should, and did, affect the design of the HN awards. The conclusions provided a firm base upon which to design the HNC and HND.

However, it was also important to obtain the views of people involved in the delivery of these awards, and in their administration and also the views of students who are ultimately the 'victims' of all these plans and processes. This was achieved through formal consultation.

SUMMARY OF CONSULTATION ACTIVITY

Urged by the two steering groups[1] and implemented by the Design Team, consultation has taken place throughout the entire 5 year development of these HN awards. Such consultation continues currently, and will continue as a means of identifying and addressing problems during the presentation of these HND courses and awards. In order to further this, a qualification support team has been set up which will work on a continuing basis.

The sources of consultation have primarily been practitioners (ie. lecturers, moderators, heads of department in centres, and inspectors,) and also students. The students could usefully advise on the appearance, the user friendliness and the general experience of the courses that are offered. While the practitioners can also comment on these aspects, perhaps more importantly, they can also comment on the design and presentation of courses with regard to their practicability, balance, academic content, options, sequence, assessment, success and the associated difficulties which flow from these. A number of other professionals have also been consulted including HE staff and academics, employers, and other advisors.

[1] These were the HN Computing (pilot) Steering Group for 2001 awards and the HN Computing Review Advisory Group (HNCRAG) for the 2004 awards

Consultation has been conducted within three main formats. These are:

- An on-line e-mail discussion group for practitioners and other interested professionals was set up. This was later improved by a conferencing facility known as a 'smartgroup', which enables correspondence, file transfer, voting and questionnaires to be employed as part of the consulting process.
- Postal surveys and other communication, primarily to and from students and practitioners. Throughout the five years the development team has been open to written communications from concerned and interested persons and in addition has actively sought responses to paper surveys.
- Seminar or consultation days where those attending were briefed on the current status of the development and from which questions and comments were received.

In addition practitioners and other interested parties have been encouraged to raise their ideas and concerns. The willingness of the Development Team to listen, which has been evident in the smartgroup correspondence, has made this also a fruitful source of ideas.

The Computing Public Online Forum

The initial online discussion group was replaced by the 'Smartgroups'. Due to closure of 'Smartgroups' the new online public forum is http://uk.groups.yahoo.com/group/sqahncomputingit/. This is a powerful communication tool which has given stakeholders the ability to discuss issues in an open forum and to allow practitioners within centres to gain knowledge in light of the experiences of others. In addition members of the design team could raise issues or pose questions at any time. The whole history of the consultations may be reviewed by reading through the website correspondence which at the time of writing holds over 1300 communications, organised into discussion 'threads'.

During the last three years five specific consultations have been carried out electronically via the public Smartgroup. These were:

- **Request for Suggestions**

  This database was active throughout 2002 and most of 2003. It aimed to collect from members specific suggestions for change which arose from their personal experience of presenting and delivering the 2001 awards.

- **Award Frameworks**

  This survey in early February 2004 aimed to gather feedback from practitioners and establish whether the content of the proposed frameworks was correct for the HN Computing awards.

- **Level of Core Skills**

  This survey in late February 2004 aimed to establish whether the Qualification Design Team had included the correct core skills profile within the award(s).

- **Content of HNC Computing Graded Unit – Project or Examination**

  This survey in early April 2004 was designed to get feedback from practitioners about the proposed changes to the 2001 awards, in particular, whether an examination or project was preferred for the graded unit in the HNC Computing, or some mixture of both.

- **Proposed HNC Framework**

  The framework for the HNC Computing was sent out for consultation. A number of centres and individuals have given feedback and, where appropriate, these have been incorporated into the HNC.

- **Proposed HND Framework**

  The framework for the HND Computing was sent out for consultation in October 2004. As with the HNC a number of centres and individuals have given feedback. These have been discussed and, where appropriate, have been incorporated into the HND.

As can be seen, the smartgroup was a highly effective consultation tool and has added to the confidence of the Design Team that they are fully aware of the views of practitioners. It is a very flexible instrument and for example proved very useful in the early stage of the 2001 awards in enabling centres to request a coordination visit to assist them with any implementation problems.

Postal Surveys and Communications

For the 2001 awards there was in March 2000 a postal consultation involving staff within centres. This produced a considerable amount of agreed advice, which the development team used and it raised many useful issues for consideration of the team.

A postal questionnaire in June 2000 was administered to 118 HND students of the 1995 awards at five colleges. It asked about the suitability of their courses and what preferences they had over examinations, choice of units and were there any general problems which they had experienced. In 2004 this survey was duplicated. This time the respondents were 46 students at Aberdeen College and they were given a briefing before responses were collected. The findings were similar to the earlier survey. The main point of special interest which emerged from the latter analysis was a declared feeling of envy amongst some of these students who regarded the 2004/5 HND award as being more valuable than the 2001 HND, especially because of the arrangements being made for PDAs.

Written comments have also been encouraged from practitioners at various stages of both Phase 1 and 2 of the development. Batches of these have been gathered via SQA representatives at centres.

Seminars and Other Open Day Events

While the smartgroup correspondence was a useful source of information for all those involved, it was felt to be important that practitioners should be fully briefed on progress and persuaded of the value and importance of the changes being made. Therefore a number of face to face events were arranged to explain the team's views and plans, but also to listen to and respond to concerns of the audience.

The meetings arranged were:

1. A one-day consultation event for colleges was held in Perth in June 2000. An early draft of the framework was discussed and outline unit proposals were considered.
2. A one-day consultation event for colleges was held at SQA's Glasgow premises in November 2000. A more developed version of the framework was discussed and version 1 and 2 unit specifications were reviewed. This event was repeated at Stow College and Falkirk College to allow more college representatives the opportunity of contributing directly.
3. In May 2002, an event was held in Stirling to update centres and provide the necessary information about the changes to the framework.
4. Practitioner Focus Groups were held across the country to gather feedback from Centres either on a group basis or from individuals. These comments were used by the Qualification Design Team in presenting developing and proposing the necessary changes to the HNCRAG. This information was used to determine and scope the changes required to the award.
5. An articulation event was held in conjunction with Stirling University to ease the progression of candidates articulating between FE and HE. Significantly, it ensured that HE were fully aware that the 'merit' system which applied in the 1995 awards was now discontinued and replaced by the use of integrated assessments. It was also a useful opportunity for the FE centres to discuss and network with their HE equivalents.
6. A seminar was held in November of 2004 in Glasgow, which updated those present on the work of the Development Team in designing the HND frameworks. This also enabled practitioners to raise problems with the early implementation of the 2004 HNC Computing, which had been validated in September of 2004 for delivery in the autumn.

Conclusion on Consultation

Consultation has been an important component in the development of these awards. It has been used both pro-actively and reactively with great success. The willingness of the Design Team to listen has been evident and this has led to practitioners and others concerned feeling free to raise issues at an early stage. This adds considerably to the level of confidence, which can be placed in the emergent frameworks.

UPTAKE & PROGRESSION

The number of students studying on the 2001 HND Computing courses has been lower over the last few years than the preceding 1995 versions. This has been due to a number of reasons, including the running of 1995 courses and 2001 courses in parallel; not every centre moving over to deliver the newer course; and the course management of the 2001 courses being difficult to deliver to part-time students, particularly evening cohorts. Difficulties with HNC numbers have of course led to matching difficulties with HND numbers.

PROJECTED UPTAKE

ACADEMIC YEAR	HNC/D
2001-2	447 (2001 Award)

2002-3	865 (2001 Award)
2003-4	1000 (2004 HNC)
2004-5	1150 (HNDs Revised)
2005-6	1300 (HNDs Revised)

Table 1 – Previous and projected uptake for Scotland

It is envisaged that these 'projected uptake' numbers will be achievable as all centres move over to the delivery of the 2004 HN courses from the 1995 and 2001 awards. While the 12 credit HNC will probably restore the HNC numbers, especially part time, it is unlikely to have much effect on the HNDs where a total of 30 credits is still required.

In order to improve further the value of the awards to students, centres should be encouraged to consider the delivery of PDAs alongside the delivery of both the HNC and the HND. Further PDAs, including some for software development are still under negotiation.

HND Computing Destination Statistics Summer 2004 - from eight FE Colleges.

The table distributed to Centres did not discriminate between SD and TS students, but several of the contributors did. Hence the three columns. The employment destination was sometimes unclear. It can be taken that the Information Technology (IT) row is certain, and the next row might include some IT jobs.

HND Focus	HND SD	HND TS	HND (?)	TOTAL
Number of Students being reported on	**29**	**75**	**41**	**145**
Number who entered a HEI **degree** program	**26**	**58**	**17**	**101**
Number who entered employment working in Computing /IT		**5**	**5**	**10**
Number who entered employment (not necessarily in IT)	**2**	**12**	**4**	**18**
Number to other destinations		**3**	**2**	**5**
Number unknown	**1**	**7**	**13**	**21**

Table 2

Table 2 figures were taken as a representative sample of Centres presenting the award and are thought to show typical progression history.

TARGET SECTOR & LEVEL OF EMPLOYMENT

The HND Computing course aims to equip students with the necessary skills required to follow a career within the computing field at a professional or junior managerial level. It is also aimed at those who wish to study computing at this level before undertaking a career in another field where such skills are subsidiary, but often very necessary.

In designing the award, the Steering Group has been fully aware of this need for qualifications that will allow articulation to degree and Advanced Diploma courses while at the same time containing relevant technical and transferable skills which will enable immediate entry to employment. The Advisory Group (HNCRAG) believes that an appropriate balance between 'academic' and 'vocational' (i.e. between knowledge and its practical application) has been achieved.

As can be seen in Table 2 those whose first destination after HND is HE (ie. about 70%) normally expect to articulate into the second or third academic year of a degree programme. Of the remaining 30% of successful HNDs about 19% of those surveyed entered employment.

The links with vendor qualifications, which have been built into the frameworks should also ease the transition into employment.

TARGET CANDIDATES

This award is designed to offer candidates academic, technical and professional training leading to the skills necessary to design, implement, support, evaluate or manage IT systems in a vast range of industries. The award is targeted at candidates who have the formal education requirement and –

- Who intend to leave school and further their career path in a college. OR
- Who intend to progress their career after the study of either the NQ in Computing, the NQ in Information Systems, or the HNC in Computing. OR
- Who leave employment with the intention of changing their career path. OR
- Who are unemployed and wish to study to assist gaining employment. OR
- Who wish to study on a part-time (day or evening) or day-release mode. However, this is not easy because most HND students are full-time, at least in their second year.

At the discretion of a centre, a candidate may be permitted to enter the award by waiving some of the entry requirements - based on their previous experience. Experience has shown that mature candidates often study this award after having succeeded at the HNC and perhaps having also achieved some vendor qualifications.

A candidate may move on to study at a higher level at a college or use the award to articulate to a degree course.

RELATIONSHIP WITH OTHER SQA AWARDS

Links to S/NVQs

The HN Computing awards also contain the knowledge and understanding for some components of Scottish/National Vocational Qualifications (S/NVQs) in Information Technology at levels 3 and 4. The S/NVQs are qualifications developed by the e-skills National Training Organisation, the lead body for the Computing/IT industry (www.e-skills.com).

In the development of the 2001 award, the HN Computing unit writers took cognisance of the Scottish and National Vocational Qualifications when writing units and tried, where appropriate, to incorporate knowledge and understanding which related to the S/NVQs.

Since S/NVQs are work-based awards, it was not practical or sensible to attempt to cover all of the elements of each VQ. However an effort was made to assist candidates who gain the

HN awards to undertake S/NVQs in the work-place. This has been achieved quite effectively because the knowledge and understanding for some VQ elements will have been covered, at least in part, within the HN awards.

In light of the changes happening to the VQ curriculum it is recognised that these standards would have to be remapped to the HNC Computing when published.

RATIONALE FOR STRUCTURE & CONTENTS

The awards are designed for those who will design, implement, support, evaluate and manage IT systems in a vast range of industries. The HN Computing award has a long history and is extremely popular with students and well recognised in industry. This award helps to satisfy the government's stated aims of developing the 'knowledge economy' and the IT industry, of enhancing the IT skills of the population and of closing the IT skills gap and so increasing economic competitiveness. These awards reflect the skills most in demand in today's IT industry developed under the umbrella of the SQA HN Design Principles. (See Appendix 1).

The *HND Computing: Software Development*, which usually incorporates the HNC in the first year of study, has an emphasis on programming, systems analysis and design together with project management and core skills. As such, it is intended to prepare candidates for employment as Software Developers/ Programmers. These are occupations for which a need has been established. In addition, this award will enable successful candidates to progress to appropriate degree courses in Software Engineering, Computer Science or Information Systems. Third year degree entry should be possible in many cases, otherwise second year entry is certainly feasible.

The *HND Computing: Technical Support*, which usually incorporates the HNC in the first year of study, develops skills and knowledge in operating systems, computer hardware, local and wide area networks, data communications and core skills. The HND is designed to lead to employment as a senior computing technician, network administrator, or network engineer. Again, these are occupations for which a need has been established. Successful candidates should be able to progress to degree courses in Computer Science, Computer Networks or Internetworking. Third year degree entry is anticipated, with second year entry likely where the 'fit' is less good.

Historically, these awards have been generally well accepted in the community and similar success is anticipated with the 2004/5 versions of both HNC and HND.

The HN Computing awards are capable of being studied full-time, part-time or by day release. However, while this is true of the HNC (especially as the new Design Principles have restored the 12 credit HNC), it is not normally possible for the HND. The most common occurrence by far is that the HND awards are studied full-time, with students achieving 15 credits in the first year and the final 15 in the second year of full-time study. The difficulty for part-time or day-release students is that, typically, they can achieve the 12 credits of the HNC over two years, but the balance of 18 credits required to upgrade the HNC to an HND makes very heavy demands on their time and proves difficult for centres to organise. A feasible pattern for part-time or day-release students is that in two years they achieve 15 credits, giving them an HNC plus three more credits. They then take the 'second year' of HND studies full-time. This approach means that they can assess their options quite late and base the final decisions on their degree of success in the first 12 or 15 credits. Provided the centre in question also has a pool of full time students, this approach can work well.

On the basis of 8 SCOTCAT points for each credit, the HNC award will earn 96 SCOTCAT points. Now it is normal for a candidate who wishes to gain entry into the 2nd year of a degree course to have achieved 120 SCOTCAT points. So the usefulness of achieving 15 credits (rather than 12) during the first full-time year of study is apparent, even if s/he does not opt to take the full HND.

Past evidence from First Destination Statistics of students achieving HND Computing awards indicate that around 70% of successful students currently go on to further study with the remaining 30% entering employment. Therefore these HN Computing awards have been designed to meet employers needs directly or after further study and/or the achievement of membership of a professional body. Appendices 3, 4 & 5 show that these awards are well conceived for these purposes. The need for the qualifications has been clearly identified and these awards should contribute to an overall strategy for reducing the IT skills gap and enhancing Scottish prosperity by enabling further expansion of the 'knowledge economy'.

In designing the awards, the HNCRAG (HN Computing Review Advisory Group) has been fully aware of the need for qualifications, which will allow articulation to degree courses while at the same time containing relevant technical and transferable skills, which will enable immediate entry to employment. The HNCRAG believes that an appropriate balance between 'academic' and 'vocational' (i.e. between knowledge and its practical application) has been achieved.

To further this bridging between theory and practice negotiations are well advanced to gain industry recognition in addition to these awards. As part of their study progress towards HND, candidates may also enter one of a number of Professional Development Awards (PDAs). The intention is that these PDAs could be achieved during their HN studies. Two PDAs can be taken during the HNC, these are CompTIA A+[2] and MCDST[3].

Other PDAs are achievable during the second year of HND studies. One of these, the MCSA[4], will offer a means of progressing, either from CompTIA, A+ or from MCDST.

At the time of writing further PDAs, including some pitched more towards software development, are under negotiation with Microsoft, Oracle, Macromedia and Sun. The HN Development Team believe that PDAs can usefully augment the HN awards, and give better employment opportunities to candidates and a useful supply of recruits to industry which can meet their specific technical requirements.

[2] CompTIA A+ = The Computing Technology Industry Association A+ Certification

[3] MCDST = Microsoft Certificate in Desktop Support

[4] MCSA = Microsoft Certificate in Systems Administration

RATIONALE FOR CORE SKILL PROFILES

The surveys of employers both rated core skills as more important than any specific technical skills. So their importance has been well established by our research and in consequence, such core skills have been developed throughout the awards. The appropriate levels established in both 2001 and 2004 are:

CORE SKILL	LEVEL IDENTIFIED THROUGH RESEARCH
Communications	Higher
Working With Others	Higher
Problem Solving	Higher
Numeracy	Intermediate 2
Information Technology	Higher

Despite a thorough review of these levels, it is felt that Intermediate 2 is not an appropriate level for an HND core skill - in this case Numeracy. So that this issue can be addressed if required by a centre, additional mapping has been carried out to ensure that the Numeracy level can be raised from Intermediate 2 to Higher by the use of specific optional units available within the award.

The entry levels, interrelation between HNC and HND and the ultimate achievement of these exit levels are discussed below (see Core Skills Profile).

AIMS

OF THE GROUP AWARD(S)

GENERAL AIMS

These HNC and HND awards have a range of broad aims, which are generally applicable to all equivalent Higher Education qualifications. Some of these general aims are:

- To develop the candidate's knowledge and skills such as planning, analysing and synthesizing
- To develop employment skills and enhance candidates' employment prospects
- To enable progression within the Scottish Credit and Qualifications Framework
- To develop study and research skills
- To develop transferable skills including core skills
- To provide academic stimulus and challenge, and foster an enjoyment of the subject.

SPECIFIC AIMS

The specific aims of the **HND Computing: Software Development** award are:

1. To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role
2. To develop a range of specialist technical software development skills and knowledge in programming and systems development
3. To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline
4. To develop an awareness of professional IT issues such as legal and ethical considerations

The specific aims of the **HND Computing: Technical Support** award are:

1. To prepare students for employment in an IT/Computing-related post at technician or professional level in a technical support role
2. To develop a range of specialist technical support skills and knowledge in the use and support of stand-alone and network computer systems
3. To prepare students for progression to further study in Computing and Technical Support
4. To develop an awareness of professional IT issues such as legal and ethical considerations

RECOMMENDED ACCESS

TO THE GROUP AWARD(S)

PRIOR EXPERIENCE AND/OR QUALIFICATIONS

This statement is about access to the HNC and HND awards as a whole. However, in addition to the detail which follows, part of the specification of each and every HN unit includes recommended access levels. Students should normally be expected to satisfy both sets of access requirements.

As with all SQA qualifications, access will be at the discretion of the Centre and the following recommendations are for guidance only.

Some examples of appropriate formal entry qualifications are specified below. They are not exhaustive or mutually exclusive and may be offered in a variety of combinations.

(i) Scottish Group Awards in Computing and Information Technology at Intermediate 2 or Higher.

(ii) Any other relevant Scottish Group Award at Intermediate 2 or Higher.

(iii) Any two relevant National Courses at Higher together with three Standard Grade passes at level 3 or above.

(iv) An SVQ at level 2 or 3 in Computing, Information Technology or other relevant area.

(v) Relevant National Units at appropriate levels (e.g. core skills units at Intermediate 1 or 2) combined with any of the above.

Different combinations of relevant National Qualifications, Vocational Qualifications and equivalent qualifications from other awarding bodies may also be acceptable, as would suitable vendor qualifications at an appropriate level.

Mature candidates with suitable work experience may be accepted for entry provided the enrolling Centre believes that the candidate is likely to benefit from undertaking the award.

It would be advisable for all candidates to have some prior knowledge of computing or information technology although formal qualifications may not be necessary if suitable experience had been gained informally or through work experience.

Such work experience may provide inferred or actual evidence of a candidate's skills and knowledge as they apply either to particular HN units or to the required core skills which are listed in the next section.

CORE SKILLS PROFILE FOR ENTRY

The recommended core skill profile for entry to this award is defined in the following table.

CORE SKILL	LEVEL
Communication	
Oral Communication	Intermediate 2
Written Communication	Intermediate 2
Numeracy	
Using Graphical Information	Intermediate 2
Using Number	Intermediate 2
Information Technology	Intermediate 2
Problem Solving	
Critical Thinking	Intermediate 2
Planning & Organising	Intermediate 2
Reviewing & Evaluating	Intermediate 2
Working with Others	Intermediate 2

■ ***Table 3: Recommended core skill entry profile***

The importance of core skills has been recognised (the surveys of employers rated core skills as more important than any specific technical skills) and these have been developed throughout the awards.

The HNCRAG considered it appropriate to recommend Intermediate 2 as entry level for core skills for the HNC/Ds. Students who had completed a Scottish Group Award at Higher would have Intermediate 2 or above in each of the core skills.

STRUCTURE

OF THE GROUP AWARD(S)

CONDITIONS OF AWARD
HIGHER NATIONAL DIPLOMA COMPUTING: TECHNICAL SUPPORT

A total of 30 credits must be achieved, comprising 240 SCQF points, to gain an HND Technical Support and this must incorporate at least 64 SCQF points at SCQF level 8.

Total credit value of award: 30 credits of which a minimum of 8 credits must be gained at SCQF Level 8.

1. Mandatory units

A total of **18** credits must be gained by undertaking the credits from Table1.

Table1 – All units must be undertaken (18 credits)

Unit No	Unit Title	Level	Credit
DH2T 34	Computer Architecture 1	7	1
DH33 34	Computer Operating Systems 1	7	1
DH35 34	Computing: Planning	7	1
D75X 34	Information Technology: Applications Software 1	7	1
DH21 34	Working within a Project Team	7	1
DF9M 34	Client Operating Systems	7	2
	OR		
H1EM 34	Client Operating Systems	7	2
DF9N 34	Network Server Operating System	7	2
DM2X 35	Computer Operating Systems 2	8	1
DM30 35	Project Management 1	8	1
D75V 35	Computer Networks: Network Technology and Data Communications (finish date 31.07.2015)	8	2
	OR		
DF9X 35	Networking Technology (finish date 31.07.2013)	8	2
FR24 35	Networking Technology	8	2
	OR		
H16V 35	Network Technology and Data Communications	8	2
F0N0 35	Professional Issues in Computing	8	2
H1J8 34*	Computing: Graded Unit 1	7	1
DN4P 35	Computing: Graded Unit 2	8	2

*Refer to History of Changes for revision changes.

2. Optional units

Additional units must be selected from the Table 2.

Table2 – Optional Units

Unit No	Unit Title	Level	Credit
DG0K 33	*Hardware Concepts*	*6*	*1*
DF9L 33	*Operating Systems Concepts*	*6*	*1*
	OR		
F1XA 34 *H17E 34*	*Computing: PC Hardware and Operating System Essentials (finish date 31.07.2015)* ***OR*** *Computing: PC hardware and Operating System Essentials*	*7* *7*	*1* *1*
F1X9 34 *H17F 34*	*Computing: PC Hardware and Operating System Support (finish date 31.07.2015)* ***OR*** *Computing: PC Hardware and Operating System Support*	*7* *7*	*1* *1*
D77H 34	Employment Experience 2	7	1
DE1K 33	Workplace Communication in English	6	1
DH37 34 H1G0 34	Information Technology: Information Systems and Services (finish date 31.07.2015) **OR** Information Technology: Information Systems and Services	7 7	1 1
DH39 34	Internet: Introducing e-commerce	7	1
DH38 34	Internet: Internet Client Services	7	1
D76E 34	Mathematics for Computing 1	7	1
DH3A 34	Multi User Operating Systems	7	1
DH2X 34 H17T 34	Providing Support to Users (finish date 31.07.2015) **OR** Providing Support to Users	7 7	1 1
DH3J 34	SQL: Introduction	7	1
DM34 34	Supporting Users and Troubleshooting Desktop Applications	7	1
DH3F 34 H180 34	Systems Development: Introduction (finish date 31.07.2015) **OR** Systems Development: Introduction	7 7	1 1
DH3G 34	Systems Development: Object Oriented Design (Introduction)	7	1
DH3H 34	Systems Development: Structured Design Methods (Introduction)	7	1
DF6C 34	Systems Development: Introduction	7	1
DE3R 34	Personal Development Planning	7	1
DH2Y 34 H1FY 34	Computer Hardware: Hardware Installation and Maintenance (finish date 31.07.2015) **OR** Computer Hardware: Hardware Installation and Maintenance	7 7	2 2
DH31 34 H17C 34	Computer Networks: Building Local Area Networks (finish date 31.07.2015) **OR** Computer Networks: Building Local Area Networks	7 7	2 2
DH2R 34	Multimedia: Developing Multimedia Applications	7	2
DM35 34	Supporting Users and Troubleshooting a Desktop Operating System	7	2
D4FB 34	Publishing on the Internet	7	2
F0E0 34	IT Infrastructure: Service Support	7	2
DH2V 35	Computer Architecture 2	8	1
D7JW 35	Computer Networks: Internet Network Connectivity	8	1
D7JV 35	Enhancing Network Security and Configuring Remote Access Methods	8	1
DM39 35	Internet: Client Side Web Scripting	8	1
D7CY 35	Information Technology: Applications Software 2	8	1
D76F 35	Mathematics for Computing 2	8	1
DM2Y 35	Project Management 2	8	1
DM3E 35	Software Development: Advanced Programming	8	1
DM3G 35	Software Development: Assembly Language and Interface Programming	8	1
DM31 35 H16Y 35	Software Development: Array Data Structures (finish date 31.07.2015) **OR** Software Development: Data Structures	8 8	1 1
DM2W 35	Wireless and Mobile Technology	8	1
DH2W 35	Computer Hardware: Building a Network PC	8	1
DG6E 34 DG6G 35	Work Role Effectiveness (2003) **OR** Work Role Effectiveness (2003)	7 8	3 3
F0DY 35	IT Infrastructure: Service Delivery	8	1

DF9R 35	Network Infrastructure 1: Implementation and Management	8	2
DM37 35	Computer Hardware: Desktop Computer Troubleshooting	8	2
D75S 35	Computer Networks: Administering Network Systems	8	2
DM38 35	Computer System Security and Data Assurance	8	2
DM3A 35	Internet: Configuration and Administration of Internet Services	8	2
DM3C 35	Internet: Web Server Management	8	2
DM3J 35	Internet: Web Technology and Security	8	2
DF9X 35	Networking Technology (Finish date 31/07/2013) **OR**	8	2
FR24 35	Networking Technology	8	2
DF9Y 35	Routing Technology (Finish date 31/07/2013) **OR**	8	2
FR22 35	Routing Technology	8	2
DG09 35	Switching Technology (Finish date 31/07/2013) **OR**	8	2
FR23 35	Switching Technology	8	2
DG0A 35	Internetworking Technology(Finish date 31/07/2013) **OR**	8	2
FR25 35	Internetworking Technology	8	2
DH30 35	Software Development: Applications Development	8	2
DH32 35	Software Development: Developing for the World Wide Web (finish date 31.07.2015) **OR**	8	2
H1J9 35	Software Development: Developing Websites for Multiplatform Use	8	2
DH34 35	Software Development: Event Driven Programming	8	2
D76S 35	Software Development: Fourth Generation Environment	8	2
DM32 35	Software Development: Linked Data Structures	8	2
DM33 35	Software Development: Object Oriented Collections	8	2
DH3C 35	Software Development: Object Oriented Programming (finish date 31.07.2015) **OR**	8	2
H172 35	Systems Development: Object Oriented Analysis and Design	8	2
DM3F 35	Software Development: Rapid Applications Development & Prototyping	8	2
DH3D 35	Software Development: Relational Database Systems (finish date 31.07.2015) **OR**	8	2
FE77 35	Software Development: Relational Database Systems (finish date 31.07.2015) **OR**	8	2
H16W 35	Relational Database Management Systems	8	2
DH3E 35	Software Development: Structured Programming	8	2
DM3H 35	Systems Development: Object Oriented Design	8	2
D77F 35	Systems Development: Structured Design Methods	8	2
DV5M 34	Web Design: An Introduction	7	1
F84V 34*	IT in Business: Spreadsheets	7	1
F1W0 34	Project Management for IT	7	1
F1VY 34	Manage Database Systems Using SQL	7	1
F86A 35	Games Development: Object Oriented Programming	8	3
F86H 35	Games Physics	8	2
F203 34	Web Development Fundamentals	7	1
DG02 34	Security Concepts	7	2
F8HC 34	Structured Programming for Games	7	3
F6BM 35	Web Server Platform	8	2
DF9P 34	Network Concepts	7	2
F4TJ 35	Software Development: Programming in PL/SQL	8	2
FK89 34	Configuring a Desktop Operating System	7	2
FK8A 34	Troubleshooting a Desktop Operating System	7	2
FK88 35	Managing a Desktop Operating System Deployment	8	2
H173 34*	Developing Software: Introduction	7	1
H17W 34*	Software Development: Developing Small Scale Standalone Applications	7	2

*Refer to History of Changes for revision changes.

Local Options (Optional): up to 2 credits needed			
F577 34	Communication: Producing and Presenting Complex Information	7	1
DX42 35	Internet: Web Technology and Security	8	2
DF60 35	Internet: Web Development	8	2
D76N 34	Software Development: Applications Development	7	2
DF4E 34	Developing Skills for Personal Effectiveness	7	1
A5FL 33	Basic Communication in Italian 1 (finished)	6	1
F1YY 34	Web Development: Essential Context	7	2
DG06 35	Internet: Web Server Management	8	2
DV0M 34	Work Experience	7	1
DP8F 34*	Mathematics: Calculus and Matrices for Computing	7	1
H17J 34*	Developing Mobile Web Based Applications: An Introduction	7	2
H1EN 34	Computer Forensics: Fundamentals	7	1
H17X 34	Software Development: Programming Foundations	7	1

*Refer to History of Changes for revision changes.

A total of 30 credits must be achieved, comprising 240 SCOTCAT points, to gain an HND Software Development and this must incorporate at least 64 SCQF points at SCQF level 8.

Total credit value of award: 30 **credits of which** a minimum of 10 credits **must be gained at SCQF Level 8.**

1. Mandatory units

A total of **13** credits must be selected from Table1, 1 credit from Table2, a minimum of **4** credits from Table3.

Table1 – All 13 units must be undertaken

Unit No	Title	Level	Credit
DH2T 34	Computer Architecture 1	7	1
DH33 34	Computer Operating Systems 1	7	1
DH36 34	Computing: Group Award Graded Unit 1	7	1
DH35 34	Computing: Planning	7	1
D75X 34	Information Technology: Applications Software 1	7	1
DH3F 34 H180 34	Systems Development: Introduction (finish date 31.07.2015) **OR** Systems Development: Introduction	7 7	1 1
DH21 34	Working within a Project Team	7	1
DM30 35	Project Management 1	8	1
DM31 35 H16Y 35	Software Development: Array Data Structures (finish date 31.07.2015) **OR** Software Development: Data Structures	8 8	1 1
DN4N 35	Computing: Group Award (Software Development) Graded Unit 2	8	2
F0N0 35	Professional Issues in Computing	2	8

Table2 – Select a minimum of 1 credit

DH3G 34	Systems Development: Object Oriented Design (Introduction)	7	1
DH3H 34	Systems Development: Structured Design Methods (Introduction)	7	1

Table3 – Select a minimum of 4 credits

Unit No	Title	Level	Credit
DH32 35 H1J9 35	Software Development: Developing for the World Wide Web (finish date 31.07.2015) **OR** Software Development: Developing Websites for Multiplatform Use	8 8	2 2
DH34 35	Software Development: Event Driven Programming	8	2
DH3C 35 H172 35	Software Development: Object Oriented Programming (finish date 31.07.2015) **OR** Systems Development: Object Oriented Analysis and Design	8 8	2 2
DH3E 35	Software Development: Structured Programming	8	2

2. Optional units

Additional units must be selected from the Table2, Table3 or Table4.

Table4 – Optional Units

Unit No	Title	Level	Credit
DG0K 33	*Hardware Concepts*	*6*	*1*
DF9L 33	*Operating Systems Concepts*	*6*	*1*
	OR		
F1XA 34	*Computing: PC Hardware and Operating System Essentials (finish date 31.07.2015)* ***OR***	*7* *7*	*1* *1*
H17E 34	*Computing: PC Hardware and Operating System Essentials*		
F1X9 34	*Computing: PC Hardware and Operating System Support (finish date 31.07.2015)* ***OR***	*7*	*1*
H17E 34	*Computing: PC Hardware and Operating System Support*	*7*	*1*
DE1K 33	Workplace Communication in English	6	1
D77H 34	Employment Experience 2	7	1
DH37 34	Information Technology: Information Systems and Services (finish date 31.07.2015) **OR**	7	1
H1G0 34	Information Technology: Information Systems and Services	7	1
DH39 34	Internet: Introducing e-commerce	7	1
DH38 34	Internet: Internet Client Services	7	1
D76E 34	Mathematics for Computing 1	7	1
DH3A 34	Multi User Operating Systems	7	1
DH2X 34	Providing Support to Users (finish date 31.07.2015) **OR**	7	1
H17T 34	Providing Support to Users	7	1
DH3J 34	SQL: Introduction	7	1
DM34 34	Supporting Users and Troubleshooting Desktop Applications	7	1
DF6C 34	Software Development: Introduction	7	1
DE3R 34	Personal Development Planning	7	1
DF9M 34	Client Operating Systems (finish date 31.07.2015) **OR**	7	2
H1EM 34	Client Operating Systems	7	2
DF9N 34	Network Server Operating System	7	2
DH2Y 34	Computer Hardware: Hardware Installation and Maintenance (finish date 31.07.2015) **OR**	7	2
H1FY 34	Computer Hardware: Hardware Installation and Maintenance	7	2
DH31 34	Computer Networks: Building Local Area Networks (finish date 31.07.2015) **OR**	7	2
H17C 34	Computer Networks: Building Local Area Networks	7	2
DH2R 34	Multimedia: Developing Multimedia Applications	7	2
DM35 34	Supporting Users and Troubleshooting a Desktop Operating System	7	2
D4FB 34	Publishing on the Internet	7	2
F0E0 34	IT Infrastructure: Service Support	7	2
A5NY 34	Introductory Mathematics for Computing	7	1
DV5M 34	Web Design: An Introduction	7	1
DG6E 34	Work Role Effectiveness **OR**	7	3
DG6G 35	Work Role Effectiveness	8	3
DH2V 35	Computer Architecture 2	8	1
D7JW 35	Computer Networks: Internet Network Connectivity	8	1
DM2X 35	Computer Operating Systems 2	8	1
D7JV 35	Enhancing Network Security and Configuring Remote Access Methods	8	1
DH2W 35	Computer Hardware: Building a Network PC	8	1
D7CY 35	Information Technology: Applications Software 2	8	1
DM39 35	Internet: Client Side Web Scripting	8	1
D76F 35	Mathematics for Computing 2	8	1
DM2Y 35	Project Management 2	8	1
DM3E 35	Software Development: Advanced Programming	8	1
DM3G 35	Software Development: Assembly Language and Interface Programming	8	1
DM2W 35	Wireless and Mobile Technology	8	1

F0DY 35	IT Infrastructure: Service Delivery	8	1
DF9R 35	Network Infrastructure 1: Implementation and Management	8	2
DF9X 35 FR24 35	Networking Technology (Finish date 31/07/2013) **OR** Networking Technology	8 8	2 2
DF9Y 35 FR22 35	Routing Technology (Finish date 31/07/2013) **OR** Routing Technology	8 8	2 2
DG09 35 FR23 35	Switching Technology (Finish date 31/07/2013) **OR** Switching Technology	8 8	2 2
DG0A 35 FR25 35	Internetworking Technology(Finish date 31/07/2013) **OR** Internetworking Technology	8 8	2 2
DM37 35	Computer Hardware: Desktop Computer Troubleshooting	8	2
D75S 35	Computer Networks: Administering Network Systems	8	2
D75V 35 H16V 35	Computer Networks: Network Technology and Data Communications (finish date 31.07.2015) **OR** Network Technology and Data Communications	8 8	2 2
DM38 35	Computer System Security and Data Assurance	8	2
DM3A 35	Internet: Configuration and Administration of Internet Services	8	2
DM3C 35	Internet: Web Server Management	8	2
DM3J 35	Internet: Web Technology and Security	8	2
DM3F 35	Software Development: Rapid Application Development and Prototyping	8	2
DM3H 35	Systems Development: Object Oriented Design	8	2
D77F 35	Systems Development: Structured Design Methods	8	2
DH30 35	Software Development: Applications Development	8	2
D76S 35	Software Development: Fourth Generation Environment	8	2
DM32 35	Software Development: Linked Data Structures	8	2
DM33 35	Software Development: Object Oriented Collections	8	2
DH3D 35 FE77 35 H16W 35	Software Development: Relational Database Systems (finish date 31.07.2015) **OR** Software Development: Relational Database Systems (finish date 31.07.2015) **OR** Relational Database Management Systems	8 8 8	2 2 2
DG0G 35	Database Design and Implementation	8	2
F6C2 35	Web Development: Dynamically Generated Content	8	2
F6C1 35 FM97 35	Self Describing Data (XML) (finish date 31/07/2013) **OR** Self Describing Data (XML)	8 8	1 1
F6BN 35	Developing Rich Internet Applications	8	2
F4TJ 35	Software Development: Programming in PL/SQL	8	2
F1W034	Project Management for IT	7	1
F1VY34	Manage Database Systems Using SQL	7	1
F86A35	Games Development: Object Oriented Programming	8	3
F86H35	Games Physics	8	2
F8HC 34	Structured Programming for Games	7	3
F203 34	Web Development Fundamentals	7	1
FK89 34	Configuring a Desktop Operating System	7	2
FK8A 34	Troubleshooting a Desktop Operating System	7	2
FK88 35	Configuring a Desktop Operating System Deployment	8	2
DK2L 33	Marketing Skills for the Entrepreneur	6	1
H1R7 35*	Mobile Technology	8	1
H17W 34*	Software Development: Developing Small Scale Standalone Applications	7	2
F209 34*	2D Animation	7	2
Local options – unit(s) must be levelled by SQA – (up to 4 credits)			4 (max)

*Refer to History of Changes for revision changes.

SUMMARY

As a mandatory part of the HNC, candidates will have taken an examination based graded unit (single credit). Progression to the HND Technical Support or HND Software Development will involve a second graded unit which is project based and worth two credits. Extensive research was carried out under the management of the HNCRAG to decide on the best and most appropriate method for the Graded Unit at this level. (See Appendices 8 & 9)

The essence of the project is that it is an independent piece of work and will involve the student in identifying, specifying and agreeing a requirement document; outlining and then detailing the design of the solution; implementing and testing the solution; and then documenting it and presenting it to the 'client'. The nature of the project will vary between technical support and software development students and a number of different problems may be used during the same presentation of this assessment. This will give the students more choice and reduce the difficulties associated with ensuring that student submissions are authentic.

HOW THE GRADED UNITS INTEGRATE THE PRINCIPAL AIMS OF THE AWARD(S)

The Graded Units for these awards are designed to ensure and to provide evidence that the candidate has achieved the following principal aims of HN Computing. Within the HNC graded unit three general aims are achieved. These are:

- To develop the candidate's knowledge and skills such as planning, analysing and synthesising
- To develop study and research skills
- To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline.

Within the HND the graded units achieve two further aims. For HND (Software Development) these are:

- To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role.
- To develop a range of specialist technical software development skills and knowledge in systems development and programming.

For HND (Technical Support) these are:

- To prepare students for employment in an IT/Computing-related post at technical or professional level in technical or network support.
- To develop a range of contemporary vocational skills, ie technical computing skills relating to the use and support of IT systems appropriate to employment at technician (or equivalent) level.

Each Graded Unit will require application of knowledge and skills which have been developed in one or more of the 22 mandatory credits required for HND Software Development or upon the 17 mandatory credits required for HND Technical Support. This will ensure that what they have learned in theory can be put into practice.

The importance of core skills has been well recognised (the survey of employers rated core skills as more important than any specific technical skills). These skills are therefore developed throughout the awards. Recommended entry and mandatory exit levels for the core skills profiles are shown in the table:

Core Skill	***Recommended* Entry Level HNC/D**	**Mandatory Exit Level HNC**	**Mandatory Exit Level HND**
Communication	Intermediate 2	Higher	Higher
Information Technology	Intermediate 2	Higher	Higher
Numeracy	Intermediate 2	Intermediate 2	Intermediate 2
Working with Others	Intermediate 2	Higher	Higher
Problem Solving	Intermediate 2	Intermediate 2	Higher

SCQF Level 6 is the most advanced level of Core Skill currently defined by the Scottish Qualifications Authority. The Qualification Design Team considered it appropriate to recommend Intermediate 2 as an entry level for all Core Skills for HNC. Candidates who had completed a Scottish Group Award at Higher would have Intermediate 2 or above in each of the Core Skills.

It is recognised that many candidates, particularly adult returners, may not possess a specific Core Skills Profile on entry and hence entry level is only recommended. The recommended exit level Core Skills Profile is what the Qualification Design Team considered would denote the level of proficiency required to enable candidates to derive the maximum benefit from studying the HNC/HND Computing awards in terms of opportunities for further study (including Higher Education), personal development and employment.

Market Research targeted mainly at industry gave a high prominence to the importance of Core Skills. This is most noticeable in demand for communication, problem solving and working with others core skills. A high level of proficiency was expected among employers for the IT core skill.

The Qualification Design Team considered it important to develop each of these Core Skills within the HNC award, and thus the recommended exit level for the Core Skills set has been set at 'Higher', with the exception of Numeracy, which has remained at Intermediate 2 available within the mandatory *DH2T 34 Computer Architecture 1* unit. It should be noted that for candidates wishing to gain the Higher Level Numeracy Core Skill, it is possible to achieve the Using Number component at Higher Level through the completion of the optional units: *D76F 35 Mathematics for Computing 2 or D76E 34 Mathematics for Computing 1*.

The Qualification Design Team have included the Core Skill of Problem Solving within the mandatory unit *Computing: Planning* in conjunction with one of the limited option units of *Software Development: Event Driven Programming, Software Development: Object Oriented Programming, Software Development: Structured Programming, Software Development: Developing for the World Wide Web* or *Software Development: Applications Development*. In addition this core skill has been built into the Project graded unit in both Software Development and Technical Support frameworks.

The Core Skills 'Working with Others' and 'Communications' can be developed comfortably and naturally within the mandatory unit called *DH21 34 Working within a Project Team*.

The Core Skill of IT is available within the mandatory unit *D75X 34 Information Technology: Applications Software 1* unit.

The Qualification Design Team gave due consideration to setting the Numeracy Core Skill exit profile to Higher Level. It should be noted that feedback from industry rated the Numeracy Core Skill as the least significant among the five Core Skills. In light of all factors, the consensus of the Qualification Design Team was to insert this Core Skill within the Computer Architecture units, ie. Computer *Architecture 1* and *Computer Architecture 2*. However, if required, Numeracy at Higher level can be achieved by a candidate studying the optional units: *D76F 35 Mathematics for Computing 2 or D76E 34 Mathematics for Computing 1*. The Qualification Design Team agree that to force a Higher Level exit profile, at HNC, for the Numeracy Core Skill would detract from the vocational nature of the awards and place a greater emphasis on Core Skills rather than technical skills.

APPROACHES TO DELIVERY & ASSESSMENT

OF THE GROUP AWARD(S)

CONTEXT & CONTENT

Although conditions will vary between centres in terms of resources, staff and student profiles, timetabling constraints, etc., the assessment context of individual units has been set within a typical assessment loading for an HND. In the majority of units there will be normally one assessment set within a closed book setting which will test the underpinning knowledge and skills. This methodology ensures that some student work is objectively known to be authentic and sets out to ensure that candidates attain the necessary standard to use units being studied as building blocks which enable them to progress through first the HNC framework and then the particular HND framework which they have elected to study.

Some of the evidence requirements for units may be produced using e-assessment. This may take the form of e-testing (for knowledge and understanding) and/or e-portfolios (for practical abilities). This use of an e-portfolio approach to assessment is being encouraged. A number of units have being streamlined to allow a composite approach to studying a particular grouping or theme which will offer additional flexibility for course designers in adding HND streams.

ASSESSMENT STRATEGY

Assessment in an HND will cover a variety of knowledge and practical skills as well as the more intellectual skills of planning and evaluating which are part of many units. These together with the core skills mean that a large number of different methods are employed to ensure that a student 'can do what s/he is supposed to do' and 'knows what s/he is supposed to know'.

A large proportion of units take a ‘project’ approach using the product of a previous assessment, as the foundation of the next and the purpose is to give the candidate a true reflection of how items being studied integrate and relate to industrial practice. Where this is practical, a holistic approach is encouraged to be taken by centres in assessing across a number of outcomes within units or across a number of units.

The benefit of such so-called 'cross-assessment', if it goes well, is the achievement of several outcomes on several units with just one assessment instrument. A matching disadvantage is that a failure results in several units not being achieved. It would be wise for centres to consider separating out the 'retake' assessments of students who have failed in their first attempt at a composite assessment instrument.

USE OF E-ASSESSMENT

The opportunity/decision for a centre to utilise a VLE/MLE remains within the organisation and management of each centre. However, the use of e-assessment is encouraged and could be managed in a number of ways.

It has been the intention of the Qualification Design Team throughout the planning of these awards to identify specific areas where on-line assessment techniques for closed book assessments could be used as part of the assessment process. In order to encourage and support such innovations, a common phraseology has been used throughout the units which have been either designed anew or revised as part of these developments and in which such e-assessment seems feasible.

An example of this common phraseology is listed below in this case extracted from the specification of the unit "*Software Development: Rapid Applications Development and Prototyping*"

Assessment guidelines

Some of the evidence requirements may be produced using e-assessment. This may take the form of e-testing (for knowledge and understanding) and/or e-portfolios (for practical abilities). There is no requirement for you to seek prior approval if you wish to use e-assessment for either of these purposes so long as the normal standards for validity and reliability are observed. Please see the following SQA publications for further information on e-assessment: (1) "SQA Guidelines on Online Assessment for Further Education" (March 2003) and (2) "Assessment & Quality Assurance in Open & Distance Learning" (Feb. 2001).

If a centre is presenting this assessment on-line the following assessment methods, where appropriate, may be selected –

- Multiple-choice
- Drag and drop
- Multiple response
- Mix and match
- Or a combination of the above

Further guidance is offered within the 'statement of standards' under the 'assessment' heading, which is –

"It is expected that the questions will be of the multiple choice variety. Centres may consider the use of alternative questions types particularly if using Computer Assisted Assessment approaches. However care should be taken that the questions are valid and at an appropriate level. The use of simple true/false question responses is unlikely to achieve this. "

In order to focus attention on the opportunities for e-assessment, a table has been drawn up which lists some examples of units with a suitable e-assessment component.

The use of online assessment and testing methods for assessing 'under-pinning' skills/knowledge have been identified. In the table below are some examples within the following units (with their relative outcomes identified). For a full list of units detailing which outcomes can be assessed online, please visit http://www.solarproject.org/.

UNIT TITLE	OUTCOME
Computer Architecture 1	1
Computer Operating Systems 1	1
Computer Hardware: Installation and Maintenance	1
Computer Hardware: Building a Network PC	1
Computer Architecture 2	1

Multi User Operating Systems	1
Providing Support to Users	1
Information Technology: Information Systems and Services	1, 2
Computer Networks: Building Local Area Networks	1
Computer Networks: Network Technology and Data Communications	1, 2
Internet: Introducing e-Commerce	1, 2, 3
Internet: Internet Client Services	1,2
Systems Development: Introduction	1, 2
Sys. Development: Object Oriented Design (Introduction)	1
Sys. Development: Structured Systems Methods (Introduction)	1
Software Development: Structured Programming	2 (part only)
Software Development: Developing for the World Wide Web	3 (part only)
Software Development: Object Oriented Programming	2 (part only)
Software Development: Event Driven Programming	2 (part only)
HNC Integrated Assessment Credit – Examination	Section 1

Table 5: Identified On-line Assessment Opportunities

Table 5 shows some examples where e-assessment may take place. It has been determined that there are further innovative opportunities when gathering evidence in all units for e-assessment, e-portfolios and/or digital log-books. Some of these units are identified in the Table 6 below.

UNIT TITLE	OUTCOME
Computer Hardware: Installation and Maintenance	2,3
Computer Hardware: Building a Network PC	3,4
Computer Operating Systems 1	2,3,4
Computer Operating Systems 2	1,2,3
Client Operating System	1,2,3,4,5,6,7
Network Server Operating System	1,2,3,4,5
Computer Networks: Building Local Area Networks	2

Table 6: Identified On-line Assessment Opportunities

Tables 5 and 6 only provide examples of e-assessment opportunities and it is likely other opportunities exist.

OPEN LEARNING & E-LEARNING

These awards may be delivered by open and distance learning methods, provided that adequate preparations are made. There is an intrinsic difficulty if specialised equipment is required, but companies, other agencies and even the student him or herself may be able to make suitable equipment available. While learning may often progress well, it is often the case with practical skills assessments that a centralised testing facility is needed - for example the FE college or centre itself. Alternatively, as with on-job assessment in SVQs, an assessor may need to visit the candidate's work location and administer the test, having first had time to check and prepare the local equipment. On some occasions a mix of conventional and

innovative assessment may be used. Whichever method is employed, additional planning and resources will be required for candidate support, assessment and reassessment.

Quality assurance procedures must also be sufficiently robust to fully support open and distance learning. Further advice and guidance is contained in the SQA publication '*Assessment and Quality Assurance for Open and Distance Learning – SQA February 2001'.*

CREDIT TRANSFER

The establishment of the new awards may require credit transfer between the 2001 and 2004 frameworks. Credit transfer between the 1995 award and the 2001 has also been established. Tables have been produced showing this mapping. Please refer to the SQA website for the most up-to-date version of the credit transfer documentation.

GUIDANCE FOR CANDIDATES & PROGRESSION ROUTES

These awards are designed to articulate into HE in a multitude of award areas which have a hybrid content containing computing as a discipline. Formal articulation agreements have existed in the past and may well be set up in the immediate future between individual centres offering the HND Computing awards and their feeder HE institutions and this should be encouraged.

It should be possible for a candidate to articulate directly to the third year of some HE degree programmes. Typically such articulation will be limited in two ways:

1. the successful student will have taken at least some optional units which are preferred by the target university. Without these, students may instead articulate only into the second year.
2. the target university may limit the range of degree programmes to which an HND student may be given articulated access.

Examples of degree programmes where it should be possible for a candidate with HND Computing to articulate directly under the SCQF are:

- BSc Network Computing
- BSc Computer Science
- BSc Multimedia
- BSc Information Management
- BSc Applications Development
- BSc Games Technology

PLEASE REFER TO THE SQA WEBSITE FOR THE MOST UP-TO-DATE VERSION OF THE GRADED UNIT SPECIFICATION

Higher National Graded Unit Specification

General Information for Centres

This Graded Unit has been validated as part of the Computing: Technical Support. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit Title: Computing: Technical Support: Graded Unit 2

Graded Unit Code: DN4P 35

Type of Graded Unit: Project

Assessment Instrument: Practical Assessment

Credit points and level: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HND Computing: Technical Support:

- To prepare students for employment in an IT/Computing-related post at technical or professional level in technical or network support.
- To develop a range of contemporary vocational skills, ie technical computing skills relating to the use and support of IT systems appropriate to employment at technician (or equivalent) level.

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Unit relating to the above specific aims prior to undertaking this Graded Unit:

- DH35 34 Computing Planning

Core Skills: This Unit gives automatic certification of the Core Skill: Problem Solving at Higher level.

Assessment: This Graded Unit will be assessed by the use of practical assessment. The "fleshed-out" Practical Assessment should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Graded Unit that it covers.

General Information for Centres (cont)

Assessment is based on the **product, its evaluation** and the **process.** A candidate must:

- Interpret the needs of the brief
- Gather information to clarify the brief
- Decide upon and develop a design approach
- Carry out the development
- Evaluate the product and their performance

Each candidate should undertake an individual project.

Administrative Information

Graded Unit Code: DN4P 35

Graded Unit Title: Computing: Technical Support: Graded Unit 2

Date of publication: May 2005

Source: SQA

Special Needs: This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Graded Unit Title: Computing: Technical Support: Graded Unit 2

Conditions of Assessment

The candidate should be given a date for completion of the Practical Assessment. However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date. Reassessment of this Graded Unit should be based on a significantly different assessment task.

If a candidate is found to have cheated or to have gained an unfair advantage the assessor has the authority to deem that the candidate has failed the assessment. Plagiarism is a major issue so it is necessary for a candidate to provide references in the form of footnotes and/or bibliography for any materials used and/or accessed which is not their own. The practical assignment will be based on the development of a technical solution for a real client or based on a case study scenario supplied by the Centre. If the optional method by a Centre is to offer a case study scenario to a number of candidates then the centre must ensure the originality of the candidate submission and, if possible, make sure **each** candidate's submission is unique.

At this level, candidates should work independently. It is up to Centres to take reasonable steps to ensure that the project is the work of the candidate. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- variables which are complex or unfamiliar
- relationships which need to be clarified
- a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- analyse the task and decide on a course of action for undertaking the project
- identify the users' requirements for the project
- consider and evaluate alternative and possible solutions for the project
- plan, organise and document work, carrying it through to project completion
- design and build the product to meet the specification
- test and evaluate the solution, tracking changes and making amendments where required

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

Produce evidence of meeting the aims which this group award Graded Unit has been designed to cover (including the use of tools and techniques introduced in the related units).

THE CRITICAL ANALYSIS SHOULD COVER TWO AREAS:

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1. **product produced** - reflect on the product that has been produced, critically evaluating the approach and methods used in developing the project
2. **individual reflective analysis** - a candidate should provide a comprehensive and thoughtful evaluation of their experiences drawing conclusions which could help future performance

GUIDANCE ON GRADING CANDIDATES

CANDIDATES WHO MEET THE MINIMUM EVIDENCE REQUIREMENTS WILL HAVE THEIR ACHIEVEMENT GRADED AS C – COMPETENT, OR A – HIGHLY COMPETENT OR B SOMEWHERE BETWEEN A AND C. THE GRADE RELATED CRITERIA TO BE USED TO JUDGE CANDIDATE PERFORMANCE FOR THIS GRADED UNIT IS SPECIFIED IN THE FOLLOWING TABLE.

Grade A	Grade C
Is a seamless, coherent piece of work which:	Is a co-ordinated piece of work which:
♦ has sufficient evidence for all three essential stages of the project, is produced to a high standard, and is clearly inter-related.	♦ has sufficient evidence for all three essential stages of the project and is produced to an adequate standard.
♦ is complete and demonstrates the candidate's high level of understanding from each stage, Planning, Developing, Evaluating.	♦ is complete and demonstrates the candidate's acceptable level of understanding from each stage, Planning, Developing, Evaluating.
♦ demonstrates an intelligent and accurate interpretation of the project brief.	♦ demonstrates an acceptable interpretation of the project brief
♦ is highly focused and relevant to the tasks associated with the project brief.	♦ is focused and relevant to the tasks associated with the project brief.
♦ is clear and well structured throughout and language used is of a uniformly high standard in terms of level, accuracy and technical content.	♦ is satisfactorily structured and language used is adequate in terms of level, accuracy and technical content.
♦ effectively consolidates and integrates the required knowledge and skills. ♦ uses information resources effectively throughout the entire process	♦ consolidates and integrates knowledge and skills, but may lack continuity and consistency.

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

The project will be marked out of 100. Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the candidate for this graded unit based on the following grade boundaries.

A = 70% - 100%
B = 60% - 69%
C = 50% - 59%

The candidate must achieve a minimum of:

8 marks for the planning stage
24 marks for the developing stage
8 marks for the evaluating stage.

The following marking scheme should be used to grade candidate's work.

Note: the candidate must achieve all of the minimum evidence specified below for each stage of the project in order to achieve the graded unit.

EVIDENCE REQUIREMENTS

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Graded Unit.

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Minimum Evidence Requirements
Stage 1 — Planning 20%	**Additional Guide to Grading (Planning)** The assessor's role is as a facilitator and so to gain high marks the candidate **must** demonstrate a high degree of autonomy in the planning activities. Evidence, in the form of a report, which is an initial analysis of what is involved in the project, identification of the key factors influencing the project, how they relate to each other and their relative importance. Up to **5 marks** for: ♦ identifying user requirements ♦ identifying constraints ♦ determining acceptable performance levels ♦ choice of media Evidence of developing and selecting an approach to deal with the problem. Up to **2 marks** for: ♦ selection of a new approach **or** ♦ modification of an existing approach Justification for selecting the approach to be utilised. Up to **5 marks** for: ♦ referring to key factors ♦ choosing a design method that is scalable ♦ utilisation of resources and time available Evidence of developing a project plan to carry out the project based on the analysis undertaken by using Project Management Software. Up to **4 marks** for: ♦ production of an outline project plan ♦ identifying milestones ♦ identifying main tasks - Design, Testing, Implementation ♦ production of hard copy critical path analysis, Gantt chart or other appropriate project plan detailing the above bulleted points Identification of resources required to carry out the project. Up to **4 marks** for evidence of obtaining these resources (Bibliography). *The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing 60%	**Additional Guide to Grading (Developing)** The assessor's role is as a facilitator and so to gain high marks the candidate **must** demonstrate a high degree of autonomy in the developing activities. Evidence of the candidate designing a solution to the project, testing the design, implementing the design (either in its entirety or in part) testing the implemented solution and managing the project. **Design** The candidate should produce a floor plan of his/her design solution. A report should be produced which details all appropriate components required to implement the design: ♦ Up to **10 marks** for Hardware – Servers, Workstations, Printers, Cabling, Switching Devices, etc. ♦ Up to **5 marks** for Software – Operating System(s), Applications, Drivers etc. The above bullet points are for guidance only and the candidate may select some or all of the above and/or other Hardware and/or Software components. The candidate should design a relevant file structure and/or user/group structure to meet user requirements. The design should be tested for robustness and scalability. The candidate should report on any legislation that may affect the implementation of the solution. Up to **5 marks** for evidence should be allocated. ♦ Data protection ♦ Computer misuse ♦ Health and Safety at Work ♦ Protection of the Environment etc. The above bulleted list is not prescriptive. The candidate should identify appropriate legislation relating to the project. **Implementation** Up to **10 marks** for the physical installation and configuration of all or part of the designed solution Up to **10 marks** for the installation of appropriate systems and application software, implementation of the designed file structure and/or user group structure and the writing of script(s) to automate user(s) login

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing (cont)	**Testing** Up to **15 marks** for testing all aspects of the implementation to ensure the solution meets the user requirements. Where testing of a component has failed. The component should then be retested. Evidence of Implementation, and Testing should be in the form of a log book designed and updated by the candidate. **Project Plan** Up to **5 marks** for the reviewed project plan monitoring all aspects of the project. *The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Minimum Evidence Requirements
Stage 3 — Evaluating 20%	**Additional Guide to Grading (Evaluating)** The assessor's role is as a facilitator and so to gain high marks the candidate **must** demonstrate a high degree of autonomy in the evaluating activities. An evaluation of the effectiveness of the approach/strategy taken, which includes all stages of the activity. Up to **8 marks** for: ♦ analysis of the project brief ♦ planning, organising and updating the project plan ♦ designing the solution ♦ testing the solution ♦ implementing the solution ♦ testing the implementation ♦ documentation produced The evaluation should include: Up to **12 marks** for: • identifying the criteria on which to base the evaluation • identification of gathering appropriate evidence • evaluating the effectiveness of the problem solving activity (related to the original analysis of the project) • referring to any modifications to the approach, design or implementation, that were made during the project • concluding how the process of carrying out the project could be improved, with evidence to support the conclusions drawn effectively • recommendations for the future, which are relevant to the problem, and justification of these recommendations All of the evaluation should be in the form of a formal report. *The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on the content and context for this Unit

The project should be designed to meet the expectations of the aims and objectives of the HND Computing award, which are –

- To prepare students for employment in an IT/Computing-related post at technical or professional level in technical or network support.

- To develop a range of contemporary vocational skills, i.e., technical computing skills relating to the use and support of IT systems appropriate to employment at technician (or equivalent) level.

The assessor should meet the candidate at certain milestones to discuss their progress through the stages. These milestones should be determined from discussions with the assessor and the candidate. This should be treated by the assessor as a management review of the candidate's activities keeping track of the progress of the project comparing the actual with the planned progress. This opportunity will allow the assessor to modify deliverable dates (in agreement with the candidate) so that the candidate manages to complete the work in the required time. An assessor should take a 'project' approach to this graded unit with a candidate delivering a coherent piece of work. The project undertaken should provide the candidate with the opportunity to develop knowledge and skills gained in the other units of study.

An assessor should ensure that the project allows a candidate to produce the required evidence at SCQF level 8.

Plagiarism is a major issue for assessors in education and the assessor must ensure the authenticity of the candidate evidence. A candidate should be formally issued with the statement, which follows:

Plagarism

Assessors are required to ensure the authenticity of the candidate's work. Regular progress meetings are one way of ensuring that the candidate's work is their own. The opportunity should be taken at these meetings to use probing questions to authenticate the assessment material. Plagiarism is a potential issue with written work. Assessors must ensure that the candidate is aware of their centre's plagiarism policy and ensure that submitted material is consistent with that policy. Further advice about plagiarism is available from SQA.

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on the Content and Context for this Unit

It is recommended that the candidate should have completed or be in the process of completing the following Units related to the specific aims of the award prior to undertaking this Group Award Graded Unit.

- DM3D 35 Professional Issues in Computing
- DM30 35 Project Management 1
- DM2X 35 Computer Operating Systems 2
- D75V 35 Computer Networks: Network Technology and Data communications
- DF9M 34 Client Operating Systems
- DF9N 34 Network Server Operating System

The project brief should include a sample of topics and issues selected from the following list of outcomes from mandatory units. The assessor may want to consider some suggestions in the table below.

Unit Code	Unit Title	Topics /Issues
DH35 34	Computing Planning	1. Produce a precise specification from a given brief. 2. Derive a detailed design for the required specification. 3. Produce a test plan for the required specification.
DM3D 35	Professional Issues in Computing	1. Describe legislation applying to the computer profession in terms of: ♦ Protection of the environment ♦ Health and Safety ♦ Intellectual Property Rights ♦ Disability Discrimination and/or other appropriate legislation applicable to the project.
DM30 35	Project Management 1	1. Develop and manage an appropriate plan using 2. Project Management Software. 3. Produce standard and customised reports as required.
DM2X 35	Computer Operating Systems 2	1. Automate Operations by creating a batch file or shell script to carry out automated tasks. 2. Create login script(s).
D75V 35	Computer Networks: Network Technology and Data Communications	1. Define characteristics and construction of LANs and WANs (as appropriate to the project specification).
DF9M 34	Client Operating Systems	1. Install an appropriate client operating system. 2. Implement and administer resources (hardware and software).
DF9N 34	Network Server Operating System	1. Manage and maintain physical and logical devices. 2. Manage users, computers and groups. 3. Manage and maintain access to resources.

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Note: The list of Topics/Issues in the above table is not exhaustive. Depending on the characteristics of the project brief, the assessor may draw outcomes from other units in the HN framework provided such units were undertaken by the candidate.

Using ICT to Support Assessment

The assessor may decide to utilise a software package to provide a virtual infrastructure/platform, which would allow the candidate to build a network, develop and test applications as required to meet the evidence requirements stated in the HND Computing (Technical Support) Graded Unit - Project specification. One example of software available is VMWare. A trial version of the software is available to download from www.vmware.com. The company claim to be 'the Global Leader in Virtual Infrastructure Software for Industry-Standard Systems'. The assessor should make his/her own judgement call on this.

There is opportunity for peer evaluation of product design and implementation. The candidates may be inclined to do this anyway but would benefit from a more formalised approach. The assessor must re-iterate to the candidates that direct copying of work is not allowed, but in industry it would be normal practice to confer with colleagues and stimulate discussion, which may assist with problem solving.

Candidates should be encouraged to produce an e-portfolio of all work, or a digitised log-book. This may lift barriers for distance learning students. If e-portfolios and or log-books are used the assessor should consult the following SQA Publications:

- SQA Guidelines on Online Assessment for Further Education (March 2003)
- Assessment and Quality Assurance in Open & Distance Learning (February 2001)

Candidates with Additional Support Needs

This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk

PLEASE REFER TO THE SQA WEBSITE FOR THE MOST UP-TO-DATE VERSION OF THE GRADED UNIT SPECIFICATION

Higher National Graded Unit Specification

General Information for Centres

This Graded Unit has been validated as part of the Computing: Software Development. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit Title: Computing: Software Development: Graded Unit 2

Graded Unit Code: DN4N 35

Type of Graded Unit: Project

Assessment Instrument: Practical Assessment

Credit points and level: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HND Computing: Software Development.

- To develop a range of specialist technical software development skills and knowledge in systems development and programming.
- To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role.
- To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline.

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Unit relating to the above specific aims prior to undertaking this Graded Unit:

- DH35 34 Computing: Planning

Core Skills: This Graded Unit gives automatic certification of the Core Skill: Problem Solving at Higher level.

General Information for Centres

Assessment: This Graded Unit will be assessed by the use of Practical Assessment. The "fleshed-out" Practical Assessment should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Graded Unit that it covers.

The assessment is based on the **product, its evaluation** and the **process**. A candidate must:

- Interpret the needs of the brief
- Gather information to clarify the brief
- Decide and develop a design approach
- Carry out the development
- Evaluate the product and their performance

Each candidate should undertake an individual project.

Administrative Information

Graded Unit Code: DN4N 35

Graded Unit Title: Computing: Software Development: Graded Unit 2

Date of publication: May 2005

Source: SQA

Special Needs: This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Graded Unit Title: Computing: Software Development: Graded Unit 2

Conditions of Assessment

The candidate should be given a date for completion of the Practical Assessment. However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date. Reassessment of this Graded Unit should be based on a significantly different assessment task.

If a candidate is found to have cheated or to have gained an unfair advantage the assessor has the authority to deem that the candidate has failed the assessment. Plagiarism is a major issue so it is necessary for a candidate to provide references in the form of footnotes and/or bibliography for any materials used and/or accessed which is not their own.

The project will be based on the development of a software product for a real client or based on a case study scenario supplied by the centre. If the optional method by a centre is to offer a case study scenario to a number of candidates then the centre must ensure the originality of the candidate submission and, if possible, make **each** candidate's submission is unique.

At this level, candidates should work independently. It is up to Centres to take reasonable steps to ensure that the project is the work of the candidate. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- variables which are complex or unfamiliar
- relationships which need to be clarified
- a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- analyse the task and decide on a course of action for undertaking the project
- identify the users requirements for the project
- consider and evaluate alternative and possible solutions for the project
- plan, organise and document work, carrying it through to project completion
- design and build the software product to meet the specification
- test and evaluate the solution, tracking changes and making amendments where required

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

Produce evidence of meeting the aims which this Graded Unit has been designed to cover (including the use of tools and techniques introduced in the related units). The critical analysis should cover two areas:

1 **product produced** – reflect on the product that has been produced, critically evaluating the approach and methods used in developing the project

2 **individual reflective analysis** – a candidate should provide a comprehensive and thoughtful evaluation of their experiences drawing conclusions which could help future performance

GUIDANCE ON GRADING CANDIDATES

CANDIDATES WHO MEET THE MINIMUM EVIDENCE REQUIREMENTS WILL HAVE THEIR ACHIEVEMENT GRADED AS C – COMPETENT, OR A – HIGHLY COMPETENT OR B SOMEWHERE BETWEEN A AND C. THE GRADE RELATED CRITERIA TO BE USED TO JUDGE CANDIDATE PERFORMANCE FOR THIS GRADED UNIT IS SPECIFIED IN THE FOLLOWING TABLE.

Grade A	Grade C
Is a seamless, coherent piece of work which: ♦ has sufficient evidence for **all** three essential stages of the project, is produced to a high standard, and is clearly inter-related. ♦ is complete and demonstrates the candidate's high level of understanding from each stage, ie Planning, Developing and Evaluating. ♦ demonstrates an intelligent and accurate interpretation of the project brief and user requirements. ♦ is highly focused and relevant to the tasks associated with the project brief. ♦ is clear and very well structured throughout and the language used is of a uniformly high standard in terms of level, accuracy and technical content. ♦ effectively consolidates and integrates the required knowledge and skills. ♦ uses information resources effectively throughout the entire process.	Is a co-ordinated piece of work which: ♦ has produced evidence for **all** three essential stages of the project and is produced to an adequate standard. ♦ is complete and demonstrates the candidate's acceptable level of understanding from each stage, ie Planning, Developing and Evaluating. ♦ demonstrates an acceptable interpretation of the project brief and user requirements. ♦ is focused and relevant to the tasks associated with the project brief. ♦ is satisfactorily structured and language used is adequate in terms of level, accuracy and technical content. ♦ consolidates and integrates knowledge and skills but this may lack some continuity and consistency.

The project will be marked out of 100. Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the candidate for this graded unit based on the following grade boundaries.

A = 70% - 100%
B = 60% - 69%

C = 50% - 59%

Higher National Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

The candidate must achieve a minimum of:

8 marks for the Planning Stage
24 marks for the Developing Stage
8 marks for the Evaluating Stage

The following marking scheme should be used to grade candidate's work.

Note: the candidate must achieve all of the minimum evidence specified below for each stage of the project in order to achieve the graded unit.

EVIDENCE REQUIREMENTS

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Project Stage	**Minimum Evidence Requirements**
Stage 1 — Planning (20%)	*Additional Guide to Grading (Planning)* *The assessor's role is as a facilitator and so to gain high marks the candidate* ***must*** *demonstrate a high degree of autonomy in the planning activities.* Evidence, in the form of a report, analysing what is involved in the project – ♦ Up to **5 marks** for the initial investigation of the project, identifying the factors influencing the project which will include functional and non-functional requirements ♦ Up to **4 marks** for producing evidence of developing an approach to deal with the project using recognised interview and analysis and design techniques ♦ Up to **4 marks** for a justification adopting the selected approach in terms of resources available (eg development and delivery platform, time available, etc.) and comparison with other possible approaches ♦ Up to **5 marks** for a project plan (based on the analysis undertaken) using project management software with realistic timescales and identifying the necessary tasks and project deliverables ♦ Up to **2 marks** for an investigation into possible alternative approaches *The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing (60%)	**Additional Guide to Grading (Developing)** *The assessor's role is as a facilitator and so to gain high marks the candidate must demonstrate a high degree of autonomy in the planning activities.* Evidence of the candidate designing a solution to the project, testing the design, implementing the design, testing the design and managing the project **Analysis (15%)** • Up to **6 marks** for the analysis of the existing system, eg UML, use case, identification of objects, classes, multiplicity and operations as well as limitations or/and problems or data items, inputs, processes, outputs and limitations or/and problems • Up to **6 marks** for the analysis of data and functional requirements required by the system, eg behavioural and structural models or normalisation of data, entity relationship diagram, entity/event matrix and entity life history diagrams • Up to **3 marks** for the selection of, and justification for the use of appropriate development tools **Design (15%)** • Up to **4 marks** for the production and design user interface and outputs using appropriate design principles which should include a justification of interface type e.g. Browser-based, Windows application, CLI • Up to **2 marks** for the produced processed descriptions using an appropriate methodology • Up to **3 marks** for the production of a data dictionary • Up to **6 marks** for the creation of a test plan, test strategy and test data **Implementation (30%)** • Up to **20 marks** for implementing the solution making effective use of the hardware and software, using the features of the selected development

	tool throughout the implementation of the software product • Up to **10 marks** testing the solution using the test plan, test strategy and test data developed during the design phase, rectifying errors found as a result of testing and recording findings *The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Stage 3 — Evaluating (20%)	*Additional guide to grading (Evaluating)* The assessor's role is as a facilitator and so to gain high marks the candidate **must** demonstrate a high degree of autonomy in the evaluating activities. An evaluation of the effectiveness of the approach/strategy taken, which includes all stages of the activity: Up to **8 marks** for: ♦ analysis of the project ♦ planning, organising and updating of the project plan ♦ designing the solution ♦ implementing the solution ♦ testing the implementation ♦ documentation produced. The evaluation should include: Up to **12 marks** for ♦ identifying the criteria on which to base the evaluation ♦ identification of gathering appropriate evidence ♦ evaluating the effectiveness of the problem solving activity (related to the original analysis of the project) ♦ referring to any modifications to the approach, design or implementation, that were made during the project ♦ concluding how the process of carrying out the project could be improved, with evidence to support the conclusions drawn effectively ♦ recommendations for the future, which are relevant to the problem, and justification of these recommendations All of the evaluation should be in the form of a formal report. *The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.*

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on the content and context for this Unit

The project should be designed to meet the expectations of the aims and objectives of the HND Computing award which are –

- To develop a range of specialist technical software development skills and knowledge in systems development and programming.
- To prepare students for employment in an IT/Computing-related post at technician or professional level in a software development role.
- To prepare students for progression to further study in Computing, Software Development, Software Engineering or a related discipline.

The assessor should meet with the candidate at certain milestones to discuss their progress through the stages. These milestones should be determined from discussions with the assessor and the candidate. This should be treated by the assessor as a management review of the candidate's activities keeping track of the progress of the project comparing the actual with the planned progress. This opportunity will allow the assessor to modify deliverable dates (in agreement with the candidate) so that the candidate manages to complete the work in the required time. An assessor should take a 'project' approach to this graded unit with a candidate delivering a coherent piece of work. The project undertaken should provide the candidate with the opportunity to develop knowledge and skills gained in the predecessor units of study.

An assessor should ensure that the project allows a candidate to produce the required evidence at SCQF level 8.

Plagiarism is a major issue for assessors in education and the assessor must ensure the authenticity of the candidate evidence. A candidate should be formally issued with the statement, which follows:

Assessors are required to ensure the authenticity of the candidate's work. Regular progress meetings are one way of ensuring that the candidate's work is their own. The opportunity should be taken at these meetings to use probing questions to authenticate the assessment material. Plagiarism is a potential issue with written work. Assessors must ensure that the candidate is aware of their centre's plagiarism policy and ensure that submitted material is consistent with that policy. Further advice about plagiarism is available from SQA.

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on the content and context for this Unit

It is recommended that the candidate should have completed or be in the process of completing the following Units related to the specific aims of the award prior to undertaking this Group Award Graded Unit.

- *DM30 35 Project Management 1*
- *DM3D 35 Professional Issues in Computing*
- *DH3F 34 Systems Development: Introduction*
- *DM31 35 Software Development: Array Data Structures*

and at least **three credits** from the following units:

- *DH3G 34 Systems Development: Object Oriented Design (Introduction)*
- *DH3H 34 Systems Development: Structured Design Methods (Introduction)*
- *DM3H 35 Systems Development: Object Oriented Design*
- *D77F 35 Systems Development: Structured Design Methods*

And at least **two credits** from the following units:

- *DH32 35 Software Development: Developing for the World Wide Web*
- *DH34 35 Software Development: Event-Driven Programming*
- *DH3C 35 Software Development: Object Oriented Programming*

The project brief should include a sample of topics and issues selected from the following list of outcomes from mandatory units.

Unit Code	Unit Title	Topics /Issues
DH35 34	Computing Planning	1. Produce a precise specification from a given brief 2. Derive a detailed design for the required specification 3. Produce a test plan for the required specification
DM3D 35	Professional Issues in Computing	1. Describe legislation applying to the computer profession in terms of: • Data Protection • Computer Misuse • Intellectual Property Rights • Freedom of Information • Regulation of Investigatory Powers • Disability Discrimination
DM30 35	Project Management 1	1. Develop and manage an appropriate plan using Project Management Software 2. Produce standard and customised reports as required

Higher National Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

DM31 35	Software Development: Array Data Structures	1. Describe data representation and storage in computer systems 2. Develop and implement operations on array data structure 3. Develop, implement and use searching and sorting techniques
DH3G 34 or DH3H 34	Systems Development: Object Oriented Design (Introduction) Systems Development: Structured Design Methods (Introduction)	1. Describe object oriented concepts 2. Produce a model of the dynamic aspects of a system 3. Produce a model of the static aspects of a system. 1. Describe systems analysis and design techniques 2. Use structured systems analysis techniques 3. Use system design techniques
DH32 35 or DH34 35 or DH3C 35 or DH3E 35	Software Development: Developing for the World Wide Web Software Development: Event-Driven Programming Software Development: Object Oriented Programming Software Development: Structured Programming	1. Describe the features of Web-based applications 2. Design a web-based application using the principles of software planning 3. Use appropriate tools and techniques to implement Web based applications 4. Utilise server side scripting including database processing 1. Use programming techniques to produce program modules 2. Implement a solution from a design 3. Test the completed product 4. Create technical and user documentation 1. Use programming techniques to produce program modules 2. Implement a solution from a design 3. Test the completed product 4. Create technical and user documentation 1. Use programming techniques to produce program modules 2. Implement a solution from a design 3. Test the completed product 4. Create technical and user documentation

Note: The list of topics/issues in the above table is not exhaustive. Depending on the characteristics of the project brief, the assessor may draw outcomes from other units in the HN framework provided such units were undertaken by the candidate.

Candidates with Additional Support Needs

This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk.

The following specification describes the examination graded unit which is mandatory for the HNC in Computing and which all HND candidates will need to have gained.

Higher National Group Award Graded Unit Specification

General Information for Centres

This group award Graded Unit has been validated as part of the **HNC Computing.** Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of group award Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Group Award Graded Unit Title: HNC Computing Graded Unit - Examination

Group Award Graded Unit Code: DH36 34

Type of Group Award Graded Unit: Examination

Assessment Instrument: Closed Book

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

SCQF (the Scottish Credit and Qualifications Framework) brings Scottish qualifications into a single framework of 12 levels ranging from SQA Access 1 to doctorates. The SCQF includes degrees; HNC/Ds; SQA National Qualifications; and SVQs. Each SQA Unit is allocated a number of SCQF credit points at a specific level. 1 SCQF point = 10 hours of learning. HN candidates are normally expected to input a further number of hours, matched to the credit value of the Unit, of non-contact time or candidate-led effort to consolidate and reinforce learning.

Purpose: This group award Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HNC Computing:

- To develop the candidate's knowledge and skills such as planning, analysing and synthesising
- To develop study and research skills
- To prepare students for progression to further study in Computing or a related discipline.

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed, or be in the process of completing, the following Units relating to these specific aims prior to undertaking this group award Graded Unit:

- HN Unit DH2T 34: Computer Architecture 1
- HN Unit DH35 34: Computing: Planning
- HN Unit DH33 34: Computer Operating Systems 1

General Information for Centres (cont)

Core Skills: There are no Core Skills embedded in this group award Graded Unit specification.

Assessment: This examination-based group award Graded Unit is closed book. It will consist of a written examination of three hours duration. Candidates may not have access to any books, handouts, notes or other learning material. The assessment must be invigilated. There must be no communication between candidates and communication with the invigilator must be restricted to matters relating to the administration of the assessment.

If e-testing is used for part (or all) of this examination, centres must ensure the security of the questions and the identity of the candidates.

Calculators are not allowed, however, a centre may supply an ASCII and/or the appropriate Unicode code tables where necessary.

Administrative Information

Graded Unit Code: DH36 34

Graded Unit Title: HNC Computing Graded Unit - Examination

Date of publication: June 2004

Source: SQA

Special Needs: This group award Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing candidates

Group Award Graded Unit Title: HNC Computing Graded Unit - Examination

Conditions of Assessment

The assessment is based on a closed book written examination lasting three hours. The grade given will reflect the candidate's achievement on the first assessment event. A candidate may wish to retake the group award Graded Unit but this should be based on a significantly different examination.

The examination should be unseen and the assessment should be conducted in controlled and invigilated conditions.

Instructions for designing the assessment task:

The examination should be designed to assess the candidate's critical knowledge and understanding of the topics relating to the specific aims which this group award Graded Unit is designed to cover.

The questions and corresponding marks should be designed in accordance with the ranges indicated in the table that follows. However, the overall total mark for the examination is 100.

The question paper will be divided into two sections as follows:

Section 1 Thirty objective response questions, worth one mark each, totalling 30 marks.

Section 2 Seven constructed response questions, worth 10 marks each, totalling 70 marks.

Section 1

Topic	**Level of knowledge/ understanding**	**Weighting/ Mark Allocation**
Computer Architecture 1	15 objective response questions relating to knowledge and comprehension.	Each question is worth one mark.
Computer Operating Systems 1	15 objective response questions relating to knowledge and comprehension.	
	TOTAL	30 marks

Section 2

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
Computer Architecture 1	Two constructed response questions relating to comprehension, analysis, synthesis or evaluation.	Each question is worth 10 marks.
Computer Operating Systems 1	Two constructed response questions relating to comprehension, analysis, synthesis or evaluation.	
Computing: Planning	Two constructed response questions relating to comprehension, analysis, synthesis or evaluation.	
Computer Architecture 1 Computer Operating Systems 1 Computing: Planning	One constructed response question relating to the integration of knowledge and/or understanding between at least two of the defined topics (units).	10 marks.
	TOTAL	70 marks

Half marks should not be awarded (for any question).

To achieve a pass in this Graded Unit, candidates must attain a minimum number of marks **in each section** as described in the following table:

Section	Available marks	Minimum mark
1	30	15
2	70	25

The examination will be marked out of 100. Assessors will aggregate the marks achieved by the candidate to arrive at an overall mark for the examination. Assessors will then assign a grade to the candidate for this group award Graded Unit based on the following grade boundaries:

- A = 70% – 100%
- B = 60% – 69%
- C = 50% – 59%.

Candidates will be awarded one of these grades only if they satisfy the minimum mark requirements for each section (irrespective of their total mark).

The format of the objective response questions will be limited to:

- multiple-choice questions (MCQs)
- multiple-response questions (MRQs).

The majority of the questions will be MCQs, consisting of a single key and three distractors. A minority of the questions will be MRQs, consisting of two or more keys selected from four options. MRQs should be used as discriminators to differentiate candidate performance at the upper grade boundaries.

The constructed response questions will consist of:

- short answer questions
- extended response questions.

The majority of the questions will be short answer, requiring a response consisting of, at most, a few sentences. A minority of the questions will be extended response, which will provide candidates with an opportunity for detailed writing on a specific topic.

Ten marks have been set-aside for an integrative question. This question should assess the candidate's knowledge and understanding of two or more topics, assessed within a single question. This question should require the candidate to combine their knowledge of two or more (defined) topics. As such, it is likely that this question will serve to discriminate between candidates at the upper grade boundaries.

The question paper should cover the full range of cognitive competencies. The majority of the available marks should be awarded for low-order cognitive skills (knowledge, comprehension and analysis). The distribution of marks across the competencies is illustrated below:

Knowledge	25%
Comprehension	25%
Analysis	20%
Application	10%
Synthesis	10%
Evaluation	10%

Centres may alter this allocation while retaining its general distribution.

OPPORTUNITIES TO ACHIEVE CORE SKILLS

The five core skills of Communications, Numeracy, Information Technology, Problem Solving and Working with Others have been designed into this award.

Communications

This core skill is included at SCQF level 6 within the mandatory unit DH21 34 Working within a Project Team.

Numeracy

This core skill is included at SCQF level 5 within the mandatory unit DH2T 34 Computer Architecture 1. This core skill can be enhanced to SCQF level 6 by a candidate undertaking either of the optional D76E 34 Mathematics for Computing 1 or D76F35 Mathematics for Computing 2 units.

Information Technology

This core skill is included at SCQF level 6 within the unit D75X 34 Information Technology: Application Software 1.

Problem Solving

This core skill is included at SCQF level 6 within the units DN4N 35 Computing: Software Development Graded Unit 2 (Project) and DN4P 35 Computing: Technical Support Graded Unit 2 (Project).

Working with Others

This core skill is included at SCQF level 6 within the mandatory unit DH21 34 Working within a Project Team.

APPENDIX 1: SQA HN DESIGN PRINCIPLES

For the sake of completeness the design rules, which applied for the 2001 HN Computing awards, are shown at the rear of this appendix.

DESIGN PRINCIPLES FOR DEVELOPING HNCS AND HNDS

HNCs and HNDs have supported technician, technologist and first line manager occupations for over 75 years, including progression in professional qualifications and other higher education awards. More recently, some HNs have been specifically designed to support progression from Modern Apprenticeships and to degrees.

In order to continue serving these occupations, HN programme designers should adhere to the following design principles. Design teams must always conduct market research, particularly among candidates and employers to ensure the continuing fitness for purpose of the HNs. Where this clearly indicates that any of those design principles marked with an asterisk needs to be re-interpreted or modified, SQA will work with the design team to develop alternatives, which are coherent with the other principles.

The validity of the market research and the fitness for purpose of the proposed alternatives will be confirmed at validation.

Further considerations for design teams are also indicated.

A DESIGN PRINCIPLES

SCQF LEVEL AND POINTS

1. HNCs shall be designed to be at SCQF level 7 and shall comprise 96 SCQF credit points
2. HNDs shall be designed to be at SCQF level 8 and shall comprise 240 SCQF credit points
3. HNCs should incorporate at least 48 SCQF credit points at SCQF level 7
4. HNDs should incorporate at least 64 SCQF credit points at SCQF level 8

Core Skills

5. HNC and HND programmes shall incorporate opportunities for candidates to develop Core Skills

6. *HNCs and HNDs should clearly include opportunities for candidates to develop Core Skills to levels required by the occupations or progression pathways the HNs support. This would mean all five Core Skills should be developed in every HN programme

Mandatory Section

7. HNCs should include a mandatory section of at least 48 SCQF credits points including a Graded Unit. (See Principles 9 and 10 under ‘Graded Units’ below).

8. HNDs should include a mandatory section of at least 96 SCQF points, including Graded Units.

Graded Units

9. *HNCs should include one Graded Unit of 8 SCQF credit points at SCQF level 7.

10. *HNDs should include one Graded Unit of 8 SCQF credit points at SCQF level 7 plus 16 SCQF credit points of Graded Unit (s) at SCQF level 8.

The purposes of Graded Units will be to assess the candidate's ability to integrate and apply the knowledge and/ or skills gained in the individual HN Units to demonstrate that they have the principal aims of the group award, and grade candidate achievement.

B FURTHER CONSIDERATIONS

HN Unit and group award Graded Unit Specifications

SQA produces guidance on how to write HN Unit and group award Graded Unit Specifications. These include templates and examples of how the specifications should be laid out. This guidance should always be used in developing new or revised HN Unit or group award Graded Unit Specifications. The minimum change to current Unit specifications would be to remove the merit statement and to add an SCQF level and credit points.

Validation of HN Unit Specifications

A key part of validation is to confirm the proposed allocation of SCQF levels and credit points to each Unit, and this needs to be seen to be done consistently. Until the process of devolving this to centres is fully worked out, SQA will validate all new or revised HN Unit specifications. Centres may continue to develop HN Unit specifications for validation by SQA.

Validation of HN Group Awards and group award Graded Units

Group award validation may continue to be done by those centres with devolved powers to do so. As Graded Units relate to the principle aims of a group award, these too may be validated by devolved centres as part of Group Awards.

Validation periods

HN Units, Graded Units and Group Awards will be kept under review by design teams in order to ensure continuing fitness for purpose. Normally, these will be reviewed every five years or more frequently if recommended by validation panels. However, specific time periods of validation will not be specified.

Core Skills

HNCs and HNDs should clearly include opportunities for candidates to develop Core Skills to levels needed in the occupations or progression pathways the HNs support. This would normally mean all five Core Skills should be developed in every HN programme, unless one or more be a pre-requisite for entry.

Design Rules from 2001 HN Awards.
These have now been replaced by the 2004 Design Principles.

Summary of year 2000 changes to Higher National design rules and reasons for change

Design and structure of HNC/Ds

- To maintain the position of HNCs within the Higher Education part of the Scottish Credit Qualifications Framework (SCQF), **the credit value of HNCs will increase from 12 to 15 credits**
- To standardise the design and structure of HNC/Ds, **the credit value of HNCs and HNDs will be 15 and 30 credits respectively**. This means that in future all HNCs will be the same notional size, as will all HNDs. In addition, **all HNCs and HNDs will have a mandatory section which every candidate for the group award will take**. For HNCs, this will be a minimum of six credits, including two integrative assessment credits. For HNDs, it will be a minimum of 12 credits, including four integrative assessment credits.
- To confirm and strengthen the position of HNC/Ds as Higher Education qualifications and to maintain and improve progression and articulation to degree programmes, **all HN Units will be allocated a level appropriate to their position in the SCQF**. The level of HN Units will be established in tandem with the development of the SCQF.

  HNCs can include up to two credits at SCQF level 6 (Higher) — the remaining 13 credits will normally be at level 7 (Advanced Higher/HNC/ SD1) but a small number at level 8 (HND/SD2) can also be included if that is considered appropriate for the subject area. The two integrative assessments in HNCs will be at SCQF level 7.

  HNDs must contain a minimum of 13 credits at SCQF level 8. The remaining credits would be at level 7 with the exception that up to two credits can be at level 6 and a small number can be at level 9 where that is appropriate. HNDs will contain two integrative assessments at level 7 and two at level 8.
- In line with government policy and to meet employment and progression needs, **all HNCs and HNDs will have a recommended entry, and a mandatory exit, core skills profile**. All five core skills, i.e. communication, numeracy, IT, problem solving and working with others, must feature in HNC/Ds but at a level appropriate to the subject area. The exit level of core skills for a particular HNC/D should take account of the level of core skills in the recommended entry qualification but would normally require problem solving at Higher and the other four core skills at Intermediate 2. In many cases, a Scottish Group Award (SGA) at Higher in a closely related area will be the natural benchmark for core skills. In this case, the exit core skills of the HNC/D would be at the same level or higher than those in the related SGA.

  Centres will have the discretion to admit candidates who do not have the recommended core skills profile but all candidates achieving the group award will have to have attained the necessary exit core skills profile.

Assessment of HNC/Ds

- To assess that candidates have achieved the principal aims and objectives of the group award, **all HNCs will include two and all HNDs will include four mandatory integrative assessments each of one credit.** The integrative assessments will assess candidates' ability to integrate and apply the knowledge and/or skills gained in the individual units. Integrative assessments will be set and assessed by centres but will be externally moderated by SQA. They will be graded at three levels of achievement A, B, or C. The grading of individual units (merit) will be phased out.
- **The format of HN Units has been revised to encourage a more holistic approach to assessment.** The new unit specification places the emphasis on assessing whole outcomes or a combination of outcomes rather than on performance criteria. It is hoped that this will encourage a more holistic approach to assessment and reduce the assessment loading on both candidates and assessors and help to improve credit transfer between HNC/D and degree programmes.

Validation of HNC/Ds

- **HNC/Ds will no longer have a specific lifespan – currently up to five years.** This will bring HNC/Ds into line with National Qualifications. HNC/Ds will be reviewed on a regular basis and the frequency of revision will reflect the pace of change in the subject area and occupational sector.
- To rationalise the HN Unit Catalogue, **the responsibility for validating HN Units will revert to SQA**. Centres with the necessary devolved responsibility will still be able to validate HNC/Ds made up of units from the SQA catalogue. The validation system and criteria remain unchanged. •
- The introduction of a more flexible unit specification will enable centres to deliver and assess units to fit individual needs. We will work with centres to ensure that we have an appropriate range of units. Where gaps are identified, we will work quickly to fill them.

MARKET RESEARCH

Design teams must always conduct market research, particularly among candidates and employers to ensure the continuing fitness for purpose of the HNs. Where this clearly indicates that any of the design principles needs to be re-interpreted, modified or abandoned,

SQA will work with the design team to develop alternatives, which are coherent with the rest of the design principles.

The validity of the market research and the fitness for purpose of the proposed alternatives will be confirmed at validation.

FURTHER CONSIDERATIONS

HN Unit and Integrative Assessment Specifications

SQA produces guidance on how to write HN Unit and Integrative Assessment Specifications. These include templates and examples of how the specifications should be laid out. This guidance should always be used in developing new or revised HN Unit and Integrative Assessment Specifications.

Validation of HN Unit Specifications

A key part of validation is to confirm the proposed allocation of SCQF levels and SCOTCAT points to each Unit, and this needs to be seen to be done consistently. Until the process of devolving this to centres is fully worked out, SQA will validate all new or revised HN Unit specifications. Centres may continue to develop HN Unit specifications for validation by SQA (often in partnership with the developing centre).

Validation of HN Group Awards and Integrative Assessment Specifications

Group award validation may continue to be done by those centres with devolved powers to do so. As Integrative Assessments relate to the principle aims of a group award, these too may be validated by devolved centres as part of Group Awards.

Validation periods

HN Units, Integrative Assessments and Group Awards will be kept under review by design teams in order to ensure continuing fitness for purpose. Normally, these will be reviewed every five years, or more frequently if recommended by validation panels. However, specific time periods of validation will not be specified.

APPENDIX 2: QUALIFICATION DESIGN TEAM & STEERING GROUPS

The SQA Qualification Design Team are:

- Frank Bradley, Consultant
- Caroline Douglas, Qualifications Officer (SQA)
- Bobby Elliott, Qualifications Manager (SQA)
- Mike Jannetta, Consultant & Lecturer (Lauder College)
- June McCamlie, Consultant & Lecturer (South Lanarkshire College)
- Shirley Sampson, Qualifications Officer (SQA)

The development of the 2001 awards was undertaken by members of a Steering Group which was formed specifically to deal with these qualifications.

The following individuals were members of the HN Computing (pilot) Steering Group:

- Ron Dillon (Stow College)
- Bobby Elliott (SQA)
- Eddie Gray (Glasgow Caledonian University)
- John Knowles (Lauder College)
- John McGhee (Newell and Budge)
- Chris Morrow (e-skillsNTO)
- Walter Patterson (HMI)
- Shirley Sampson (SQA)

The Steering Group were disbanded after the validation of the 2001 award.

They have been replaced with the HN Computing Advisory Group (HNCRAG) to oversee the modifications required for the 2004 award:

- George Banks (Lews Castle College)
- Frank Bradley, Consultant
- Sandra Cairncross (Napier University)
- Caroline Douglas, Qualifications Officer (SQA)
- Bobby Elliott (SQA – Qualifications Manager)
- Alan Gannon (Glenrothes College)
- Mike Jannetta (Consultant)
- Lynda Lamont (SQA – Moderator)

- June McCamlie, Consultant & Lecturer (South Lanarkshire College)
- Deryck Nutley (Cardonald College)
- Walter Paterson (HMI)
- Shirley Sampson (SQA – Qualifications Officer)
- Christine Sinclair (Fife College)
- Ian Torrance (Falkirk College)

APPENDIX 3: PROGRESSION ROUTES FROM THE HND COMPUTING INTO HIGHER EDUCATION (HE)

Report 1 – Research During 2004

Background

Progression routes through the Higher Education (HE) Sector will be directly affected by the recognition a particular HE institution gives to this HND. Some universities make formal arrangements for HND students to move smoothly into the second or even third year of a first degree course. The technical term used to describe such a planned and formal connection is 'Articulation'.

Universities have a common set of recruiting aims. Some are that they wish to ensure that their degree standards are maintained, that the students entering their courses are likely to do well, and that alternative means of entry to courses by such students are fair and equitable. However, in achieving these recruiting aims, different institutes may take a different stance:

1. **Recognition of HND as "likely to offer useful advantages".** This is the most common stance found during this survey. In these establishments, holding an HND in Computing might be viewed as 'a good start', but still nothing would be guaranteed. However, in such institutes, a student holding the HND in Computing is **likely** to gain entry to Year 2 of several alternative degree courses and may gain entry to Year 3 in some. Typical additional factors which may affect the final recruiting decision are:

    - The amount and level of mathematics studied by the student.
    - The particular programming languages already used by the student. Object Oriented Languages are preferred and Java seems to be a distinct advantage.
    - The practical experience of computing systems and especially networks and networking.
    - The student's experience of systems analysis, database structures and the normalising of database tables.
    - The amount of formal examination experience the student has had.

2. **Articulation agreements which formally recognise the HND.** In these establishments a written agreement - which is not limited to Computing studies - has typically been made between the university and a named Further Education (FE) college (there may be several such colleges). The basic agreement includes the following:

    - The particular HND - in our case Computing - and whether it is in Software Development (SD) or in Technical Support (TS).
    - The particular degree course that can be entered (there is often more than one of these).
    - The year of study which can be entered. Typically this is year 2 or year 3.
    - Any arrangements which may be required in order to achieve a smooth transition of the students. (This might include such things as a bridging course arranged by the university or an early briefing from the university while students are still attending an FE college.)

- Any extra conditions or features that may vary or alter the basic agreement. Examples of these may include items similar to those listed under Paragraph 1.

Typical technical terminology used in such articulation agreements might be :

- **2 + 2.** This refers to two years of FE study to achieve the HND followed by two years of university study to achieve an honours degree. Entry will be into the third year of the four year degree course.
- **2 + 1.** This refers to two years of FE study to achieve the HND followed by one year of university study to achieve an ordinary degree. Entry will be into the third year of the three year degree course.
- **1 + 3.** This refers to one year of FE study to achieve the HNC, followed by three years of university study to achieve an honours degree. Entry will be into the second year of the four year degree course.
- **1 + 2.** This refers to one year of FE study to achieve the HNC, followed by two years of university study to achieve an ordinary degree. Entry will be into the second year of the three year degree course.

Some universities are flexible over these formal arrangements. For example the Robert Gordon University has in the past accepted a student on the **2+1** model or the **2+2** model, and will wait to see how well s/he does. This means that the student can achieve an ordinary degree, even if s/he cannot manage the honours work. Alternatively a student who is only aiming for an ordinary degree but who does really well can 'upgrade' and take a fourth year for honours. This flexible approach is also under consideration at Aberdeen University.

Articulation of the HND Computing

Articulation agreements can offer an informal measure of the academic value of the HND in Computing. The year of entry to the particular HE institution which becomes established by any such agreements offers a measure of recognition of the academic value of the HND. So, for example, entry to the third year of a course would recognise the HND as being roughly equivalent to having reached the academic standard of completing the second year of the particular degree course in question.

Five Scottish universities have given a response to the idea of articulating their courses with the new frameworks of the HND Computing. These are (in founding order):

- University of Aberdeen
- University of Glasgow
- University of Stirling
- Robert Gordon University
- University of Abertay

Three general difficulties have restricted the ability of the universities who were surveyed to specify the detail of such articulation decisions. These difficulties are that:

a. The internal consultation processes of the SQA development of this HND has meant that final versions of the frameworks could not be shown to the universities who were consulted in time for the publication of this submission paper. In consequence a number of doubts must be raised which cannot be resolved until the new HND

frameworks can be seen. Fortunately, this delay should not penalise the students too much because the earliest qualification date for this HND is the summer of 2006.

b. Some university departments and staff have little or no experience of such agreements and so, in order to gain the acceptance and confidence of the staff involved, negotiations may take several months to reach fruition.

c. While the holding of an HND might guarantee that a student's application will be welcomed and viewed favourably, it cannot guarantee acceptance on a course. This is because other applicants of greater merit than the HND applicant may take the available course places.

General Observations on the HND Frameworks

The draft frameworks which were shown to these universities contained the agreed set of mandatory units and a considerable number of optional units.

The Software Development option of the HND appeared to offer more degree course options than the Technical Support option. Within Software Development, it seems to be accepted that proficiency with at least one programming language would give experience and evidence of the generic skills of solving problems through the use of algorithms. This aside, and also within Software Development, the universities would prefer the student to have used Object Oriented languages and methods rather than the Structured approach. The preferred Object Oriented programming language would be Java.

The implication of this is that students who have not studied Java or at least another Object Oriented programming language may find it harder to achieve articulation without some help.

General Observations on the Previous Success of HND Students

These five universities were asked about their experience of HND students in the past and their expectations of the likely success of HND students when compared with students who were direct recruits to the university courses.

There were three main sets of comments:

a. The HND students find university exams to be a “step change” from what they are used to. They are thrown by their frequency, their size and their formality. This causes their first semester at university to give them a shock. However they "settle down" by the second semester and usually perform reasonably well.

b. HND students can do as well as those following the more conventional routes to a degree. The pass rates which they achieve are similar to those of the other students.

c. HND students are older on average and may have plenty of experience of applying their knowledge in different circumstances. They have usually studied a broader set of computing subjects than the conventional students and often have a "significant work ethic".

The implication of these observations on HND students is that universities will not be reluctant to recruit them as individuals, but will anticipate needing to provide at least some initial support for them.

Conclusions

1. **Overview**

   Of the five universities which were consulted, four are fully prepared to consider the formal recognition of the HND Computing as a valid qualification for entry to the second or third year of a degree course programme. Glasgow may in the future. Some, but not all, of such recognition will involve the creation of formal articulation agreements or the extension of already existing ones. However, because the HND design is new, it will take time to establish such agreements or policies in any detail.

   Academic Aspects

   - The agreements or policies may be established over the next few years are likely to limit to some extent the degree programmes which may be taken by ex-HNDs.
   - In addition the different universities may express preferences about the choice of some of the optional units which should be contained in the programme of study followed by the HND candidate. So the choices of HND optional units taken by candidates may well significantly affect the choice of degree programme available to them.
   - Within such HN units, universities may well state preferences about the particular programming language(s) in which the student should be proficient. So the choice of programming language taken during HND studies, especially by SD students, may well influence the availability and choice of degree programmes and the academic year in which articulation may be possible.
   - The study of Java during HND studies would be a significant advantage to HND (SD) students, both in widening their choice of access to different universities and also to the particular choice of academic year in which they may be accepted.
   - The choice of units taken during HND studies by TS students will influence significantly the choice of degree programmes available and the academic year in which articulation may be possible. The study of networking units may be of considerable advantage to HND (TS) students applying for suitable degree courses – i.e. those which are '***technica***l' in nature.

2. **Advice to Students during their HND studies**

   - Articulation, whether formally established or not, is likely in all cases to require students to choose their optional units wisely. But this they are not well placed to do on their own. In practice, students should actively seek advice at an early stage about which sets of units will make them eligible for consideration by individual HE institutions.
   - Therefore, in order to assist students progress into HE, the FE colleges and the heads of study programmes will need to become familiar with the requirements of the various universities and try to offer programmes that will at the very least not hinder students in their ambitions to progress to HE studies. This already takes place in many FE colleges and this requirement will not be a surprise to FE lecturing staff.
   - To some extent the requirements of HE may affect the actual choice of HN units which are offered by individual FE colleges. However they are by no means the only factors which will affect these decisions.

- With these issues of preference and provision in mind, the SQA plans to establish an on-line database giving outline information on current articulation agreements and arrangements with universities, together with details of extra requirements, and the contact details of the key players. The aim will be that this should become a 'living' electronic document and should be regularly updated by FE and HE lecturers in the light of the most recent experience of articulation in practice.

3. **Summary**

The HND offers students, whether SD or TS, a qualification which is recognised and respected by universities. However the specific optional units which are taken by a student will significantly affect his or her access to HE programmes of study and the academic year of his or her entry. Good advice, both from HE and FE sources, will be needed to maximise the academic chances of those students who intend to study for the new HND Computing frameworks.

Access to Degree Courses by Holders of the HND Computing Awards

Report 2 - Research during 2005

Introduction

This supplementary survey of Higher Education Institutes (HEIs) was commissioned by the Validation Panel and was conducted during April 2005. It augments Report 1 on the 2004 research. The aim was again to ascertain the practical value placed upon the HND Computing by the access and recognition which HEIs were prepared to give it. Some HEIs offer 'advanced entry' - meaning that a suitably qualified candidate may enter a particular degree programme in the second or third year of study. In some cases advanced entry is incorporated within an articulation agreement with one or more FE colleges.

Report 1 discusses five HEIs which were consulted: Aberdeen, Glasgow, Stirling, RGU and Abertay. This report covers the Universities of Dundee, Edinburgh, Glasgow Caledonian, Heriot Watt, Napier, Paisley and St.Andrews, plus two Colleges of Further and Higher Education:- UHI Millenium Institute and Bell College.

Methodology

As before the methodology was to approach a senior responsible person by e-mail asking to conduct a telephone interview with "a member of your staff". This has resulted in each case in the person interviewed being well informed about the recruitment policy and its implementation at their particular HEI.

Conclusions

The two Colleges of FE and HE (UHI and Bell) are structured in such a manner that the move from the Computing HND onto a degree course is a smooth and polished process. Again this will not be a surprise. With certain conditions met, HND holders from other colleges will find this access to be reasonably straightforward.

For the remainder, the universities, the conclusions from this study confirm those from Report 1.

1. **Overview**

   Of the universities which responded, several have not yet consided the formal recognition of the HND Computing as a valid qualification for entry to the second or third year of a degree course programme. Some others do recognise the HND as a basis for advanced entry. Some, but not all, of such recognition involves the creation of formal articulation agreements or the extension of already existing ones. However, because the HND design is new, it may take time to establish such agreements or policies in any detail. Some universities anticipate that some extra support will be needed by HND students who articulate in Years 2 or 3 of the respective degree programmes. In many cases the HEI provides such support - mostly by means of taught classes or modules, but sometimes by self study.

2. **Academic Aspects**

- In some universities the agreements or policies which may be established over the next few years are likely to limit to some extent the degree programmes which may be taken by ex-HNDs.
- In addition some universities may express preferences about the choice of some of the optional HN units which should be contained in the programme of study followed by the HND candidate. This means that the choices of HND optional units taken by candidates may significantly affect the range and choice of degree programmes available to them in such universities.
- Within the mandatory and optional HN units taken by candidates, some universities may well state preferences about the particular programming language(s) in which the student should be proficient. So the choice of programming language taken during HND studies, especially by SD students, may well influence the availability and choice of degree programmes and the academic year in which articulation may be possible.
- As a general rule, the study of Object Oriented Java would be a significant advantage to HND (SD) students, both in widening their choice of access to different universities and also to the particular choice of academic year in which they may be accepted. Some FE colleges teach Java as part of the HND studies, but many do not. Some universities offer modules to introduce Java or augment further the Java skills of HND award holders.
- In some universities the choice of units taken during HND studies by TS students will influence significantly the choice of degree programmes available and the academic year in which articulation may be possible. The study of some networking units may be of considerable advantage to HND (TS) students applying for degree courses which are technical in nature.

3. **Advice to Students during their HND studies**

- Articulation, whether formally established or not, is likely in all cases to require students to choose their optional units wisely. But this they are not well placed to do on their own. In practice, students should actively seek advice at an early stage about which sets of units will make them eligible for consideration by individual HE institutions.
- Therefore, in order to assist students progress into HE, the FE colleges and the heads of study programmes will need to become familiar with the requirements of the various universities and try to offer programmes that will at the very least not hinder students in their ambitions to progress to HE studies. This already takes place in many FE colleges and this requirement will not be a surprise to FE lecturing staff.
- To some extent the requirements of HE may affect the actual choice of HN units which are offered by individual FE colleges. However they are by no means the only factors which will affect these decisions.
- With these issues of preference and provision in mind, the SQA has established an on-line database giving outline information on current articulation agreements and arrangements with universities, together with details of extra requirements, and the contact details of the key players. The

aim is to treat this as a 'living' electronic document which should be regularly updated by FE and HE lecturers in the light of the most recent experience of articulation in practice.

4. **Summary**

The HND offers students, whether SD or TS, a qualification which is recognised and respected by the universities. However the specific optional units which are taken by a student will significantly affect his or her access to HE programmes of study and the academic year of his or her entry. Good advice, both from HE and FE sources, will be needed to maximise the academic chances of those students who intend to study for the new HN Computing frameworks.

These conclusions confirm the findings of Report 1.

APPENDIX 4: MAPPINGS OF HN UNITS TO NATIONAL STANDARDS

This appendix contains work on two forms of mapping which aim to place the Higher National (HN) Computing awards within the context of national standards developed by the e-skillsNTO (formerly ITNTO). The two mappings are :

1. a mapping between the HN units from the HN Computing awards and various S/NVQs. Because the S/NVQs are work based, this work has particularly focused on finding where it might be possible to incorporate within the HN units, the knowledge and understanding required for some VQ elements.
2. a mapping, in broad terms, between HN Units and National Occupational Standards (NOS) for practitioners.

MAPPING BETWEEN HN COMPUTING UNITS AND N/SVQS

It was never the intention to incorporate all of the VQ elements in these mappings. Unit writers were given instructions not to force the VQ if it artificially skewed the HN unit. Those unit writers who have managed to incorporate the knowledge and understanding for some VQ elements have listed the VQ elements in the Support Notes of the HN units. The following outline was given to unit writers indicating where possibilities for inclusion of knowledge and understanding components of the VQs seemed feasible.

The authorative statements of inclusion will be found within the unit specifications. Because the frameworks being proposed include both new and modified units, it will only be possible to produce a final definitive table when the unit revisions are complete. Please refer to the HN Unit Specifications to determine where inclusion has proved possible.

Indication of possibilities for inclusion of Knowledge and Understanding components of Scottish Vocational Qualifications (SVQs) in the new HNC/D Computing Frameworks (2001)

Depending on how the following units are taught by centres, it is considered possible to cover the knowledge and understanding components for the following VQ units. These units may also help to serve as a guide to centres as to the level of competence required by candidates. If centres wish to offer any SVQs then they must be assessed and moderated according to SQA requirements for SVQs.

First Published in 2001

Unit Title: **Computer Networks: Administering Network Systems**

Unit Code: **D75R 34**

VQ	VQ Unit No and Name	VQ Element No	Outcome in this unit
Operating IT Systems Level 3 and Installing & Supporting IT Systems Level 3 and Developing IT Systems Level 3	315 Install software	1, 2 & 3	1 & 4
Operating IT Systems Level 3 and Installing & Supporting IT Systems Level 3	316 Contribute to system testing	1, 2 & 3	2 & 4
Operating IT Systems Level 3	318 Operate information technology systems	1, 2 & 3	4
Operating IT Systems Level 3	319 Provide backup and file storage systems	1, 2 & 3	4
Operating IT Systems Level 3	322 Control the operating of data communications and networks	3a, c, d, e, f, g, h	1, 2, 3 & 4

First Published in 2001

Unit Title: **Computer Networks: Network Technology and Data Communications**

Unit Code: **D75V 35**

Element 412.3 of Managing IT Systems, Level 4, has mostly been covered by this unit.

Unit Title: **Information Technology: Applications Software 1**

Unit Code: **13**

VQ	VQ UNIT NO	VQ ELEMENT NO	Outcome in this unit
Using IT Level 3	301	1, 2 and 3	1 & 2
Using IT Level 3	305	1, 2, 3 and 4	2
Using IT Level 3	306	1, 2, 3 and 4	2
Using IT Level 3	311	1, 2 and 3	2
Using IT Level 3	327	1, 2, 3 and 4	2
Managing IT For Teleworking Level 3	336	1, 2, 3 and 4	2

First Published in 2001

Unit Title: **Providing Support to Users**

Unit Code: **D76K 34**

VQ	VQ UNIT NO AND NAME	VQ Element No	Outcome in this unit
Using IT Level 3	303 Plan and Organise the Effective use of Technology	1	2 & 3
Using IT Level 3	303 Plan and Organise the Effective use of Technology	3	4
Installing & Supporting IT Systems Level 3	317 Provide Customers with Information Technology Support	1, 2, 3	4
Installing & Supporting IT Systems Level 3	323 Contribute to the Evaluation of Products and Services	1	4
Installing & Supporting IT Systems Level 3	323 Contribute to the Evaluation of Products and Services	1, 2, 3	2 & 3
Installing & Supporting IT Systems Level 3	324 Support the Acquisition of Information Technology Products	1 & 2	2 & 3
Installing & Supporting IT Systems Level 3	325 Create and Review User Documentation	1 & 2	2 & 3
Operating IT Systems Level 3	330 Contribute to the Development of Teams and Individuals	3	2 & 3
Installing & Supporting IT Systems Level 3	332 Improve the Effectiveness of Customer Use of Information Technology	1	4
Developing IT Systems Level 4	408 Control the Provision of Information Technology Support	1 & 2	2 & 3
Developing IT Systems Level 4	408 Control the Provision of Information Technology Support	2 & 3	4

First Published in 2001

Unit Title: **Software Development: Event Driven Programming**

Unit Code: **D76R 35**

Developing IT Systems Level 3 VQ

Unit Number	Elements	Outcome Number
307	1. Prepare for the creation of program designs.	2
	2. Produce program designs from specifications.	2
309	1. Prepare for the creation of software	3
	2. Create software components from program designs.	3
	3. Assemble the software components of program designs.	3
	4. Test software against functional requirements.	4
	5. Produce maintenance documentation for software.	4
313	1. Prepare for the production of specifications	2
	2. Produce specifications from definitions of customer requirement	2
321	1. Prepare plans for analysis and design.	2
	2. Construct logical data models.	2
	3. Create normalised data models.	2
	4. Design data structures to represent normalised data models.	3
325	1. Create user reference materials and procedures	4
	2. Review and update reference materials and procedures.	4
328	1. Plan for software testing	5
	2. Carry out software system testing	5
	3. Analyse and respond to the results of software tests.	5

First Published in 2001

Developing IT Systems Level 4 VQ

Unit Number	Elements	Outcome Number
402	1. Plan and prepare for the creation of software.	2
	4. Ensure the quality of program designs	5
	5. Ensure the quality of software components and documentation.	5
403	1. Plan for testing and installation of software	5
	2. Monitor and co-ordinate software testing.	5
404	1. Plan and prepare for the creation of software specifications	2
	2. Monitor and co-ordinate creation of software specifications.	2
	3. Ensure the quality of software specifications.	5
	4. Create software test strategies.	5

First Published in 2001

Unit Title: **Software Development: Object Oriented Programming**

UNIT CODE: **D76V 35**

Developing IT Systems Level 3 VQ

Unit Number	Elements	Outcome Number
307	1. Prepare for the creation of program designs.	1
	2. Produce program designs from specifications.	1
309	6. Prepare for the creation of software	3
	7. Create software components from program designs.	3
	8. Assemble the software components of program designs.	3
	9. Test software against functional requirements.	3
	10. Produce maintenance documentation for software.	3
313	3. Prepare for the production of specifications	1
	4. Produce specifications from definitions of customer requirements	1
328	6. Plan for software testing	3
	7. Carry out software system testing	3
	8. Analyse and respond to the results of software tests.	3

First Published in 2001

Developing IT Systems Level 4 VQ

Unit Number	Elements	Outcome Number
402	1. Plan and prepare for the creation of software. 3. Ensure the quality of program designs 4. Ensure the quality of software components and documentation.	1 3 3
03	3. Plan for testing and installation of software 4. Monitor and co-ordinate software testing.	3 3
404	5. Plan and prepare for the creation of software specifications 6. Monitor and co-ordinate creation of software specifications. 7. Ensure the quality of software specifications. 8. Create software test strategies.	1 1 3 3

First Published in 2001

Unit Title: **Software Development: Program Planning**

Unit Code: **D76W 34**

VQ	VQ UNIT NO AND NAME	VQ Element No	Outcome in this unit
Developing IT Systems Level 3	307 Create Program Designs from Given Specifications	1 & 2	2
Developing IT Systems Level 3	309 Create Software from Given Program Designs	1	2
Developing IT Systems Level 3	328 Conduct Software System Testing	1	3
Developing IT Systems Level 4	402 Control the Software Creation Process	1	2
Developing IT Systems Level 4	403 Control Software Testing and Installation	1	3
Developing IT Systems Level 4	404 Control the Creation of Software Specifications	1 & 2	2
Developing IT Systems Level 4	404 Control the Creation of Software Specifications	4	3

First Published in 2001

Unit Title: **Software Development: Procedural Programming**

Unit Code: **D76X 35**

VQ	VQ UNIT NO AND NAME	VQ Element No	Outcome in this unit
Developing IT Systems Level 3	309 Create Software from Given Program Designs	1	2 & 3
Developing IT Systems Level 3	309 Create Software from Given Program Designs	2 & 3	1 & 2 & 3
Developing IT Systems Level 3	309 Create Software from Given Program Designs	4	4
Developing IT Systems Level 3	309 Create Software from Given Program Designs	5	1
Installing and supporting IT Systems Level 3	325 Create and Review User Documentation	1	5
Developing IT Systems Level 3	328 Conduct Software System Testing	1 & 2 & 3	4
Developing IT Systems Level 4	402 Control the Software Creation Process	1 & 2 & 3	1 & 2 & 3
Developing IT Systems Level 4	402 Control the Software Creation Process	4	1 & 2 & 3 & 4
Developing IT Systems Level 4	403 Control Software Testing and Installation	1 & 2 & 3	4

First Published in 2001

Unit Title: **Software Development: Abstract Data Structures**

Unit Code: **D76L 35**

Developing IT Systems Level 3 VQ

Unit Number	Elements	Outcome Number
309	4 Test software against functional requirements.	4
	5 Produce maintenance documentation for software.	4
325	1 Create user reference materials and procedures.	4
	2 Review and update reference materials and procedures.	4
328	1 Plan for software testing	4
	2 Carry out software system testing	4
	3 Analyse and respond to the results of software tests.	4

First Published in 2001

Unit Title: **Systems Development: Introduction**

Unit Code: **D77D 34**

VQ	VQ Unit No	VQ Element No	Outcome in this unit
Developing IT Systems Level 3	321	2, 3, 4	3

Unit Title: **Systems Development: Structured Design Methods**

Unit Code: **D77F 35**

VQ	VQ Unit No	VQ Element No	Outcome in this unit
Developing IT Systems Level 4	405	1, 2, 3	2,3
Developing IT Systems Level 4	406	1, 2, 3	2, 3, 4

MAPPING BETWEEN HN UNITS AND NATIONAL OCCUPATIONAL STANDARDS

This appendix contains a mapping, in broad terms, between Higher National (HN) Units and National Occupational Standards (NOS) for practitioners developed by e-skillsNTO (formerly ITNTO). The NOS Area of Competence (AOC) was taken from the NOS developed for the Information and Communication Technologies areas, published in 2004. While it is not intended to presume credit transfer between the two awards, there may be opportunity to transfer credit from NOS to HN units depending on whether:

- The AOCs relate to similar knowledge and skills.
- The AOCs are contemporary in terms of terminology, techniques and technology.
- The AOCs present a similar level of cognitive demand. (This should be determined using a recognised taxonomy, such as Bloom's.)
- The range of activities is similar in both outcomes.
- The standard of performance is equivalent in both outcomes.
- The assessment demands are similar in terms of candidate activity and performance criteria, or candidates would be equally likely to pass both assessments.
- Special conditions, (such as the location of assessment; for example, some NOS require assessment to take place in the workplace) where they exist, are applicable to both outcomes.

The level of AOC has been determined by using the Scottish and Qualifications Framework (SCQF), which brings together all Scottish mainstream qualifications into a single, unified framework. An excerpt of which is shown in the Table1 below, where the SVQ level has been estimated from inspection of NOSs.

SCQF Level	SQA National Units, Courses & Group Awards	Higher Education	SVQs & Level
8		Higher National Diploma Diploma in Higher Education	4
7	Advanced Higher Certificate in Education	Higher National Certificate	
6	Higher		3
5	Intermediate 2 Credit Standard Grade		2

Table 1

"The positioning of SVQs in the table gives a broad indication of their place in the framework. Like most Group Awards, SVQs are likely to be made up of Units at a number of levels. The current placing of SVQ 3 at level 6 is based on the way in which SVQs are positioned in statutory documents and national targets. However there is a view that in some sectors, SVQ 3 could be placed at level 7. A project to refine the position of SVQs in the framework reported in January 2003, and the recommendations from it are being taken forward at UK level." (Quoted from Scottish Qualifications Authority, 28th January 2004 See web address:
www.sqa.org.uk/sqa/sqa_nu_display.jsp?pContentID=4608&p_applic=CCC&p)

In Tables 2 to 9 following, AOC Level 4 has been used for the mapping exercise. However if a Level 4 AOC does not exist for the NOS, a Level 3 AOC has been utilised if the said AOC seems to be similar in content and nature to the HN unit outcome(s) being mapped.

Depending on how the following units are taught by centres, it is considered that it is possible to transfer credit from the NOS to the HN units. The smallest element of credit transfer is an outcome. Sub-outcome components are not accredited.

Unit Title: Systems Development: Introduction

Unit Code: DH3F 34

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Data Analysis and Data Structure Design (Level 3) Create data models and design data structures.	The concepts of logical data modelling and using data modelling techniques. Considerations when validating models, refining and rationalising logical data models. Field types and attributes. Organisational conventions for naming structure components.	**3.4**

Table 2

Unit Title: Computing: Planning

Unit Code: DH35 34

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Investigating and Defining Requirements (Level 4) Obtain and analyse client/customer information to identify system requirements.	Understanding relevant client/customers needs and constraints and analysing information to identify these. Awareness of defects, which can arise in information. Checking identified needs, constraints and priorities with client/customer. Clearly recording the results of analyses to agreed formats. Producing requirements definitions.	**1**

Table 3

Unit Title: Software Development: Structured Programming

Unit Code: DH3E 35

Unit Title: Software Development: Object Oriented Programming

Unit Code: DH3C 35

Unit Title: Software Development: Event Driven Programming

Unit Code: DH34 35

Unit Title: Software Development: Applications Development

Unit Code: DH30 35

Unit Title: Software Development: Developing for the World Wide Web

Unit Code: DH32 35

(Unit(s) mapping dependant on programming language(s) used. Both NOS are utilised to achieve HN unit outcomes.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Software Development - Design (Level 4) Create Designs and test specifications for software.	Knowledge of what software development procedures are applicable to projects. The contents of requirements definitions, software designs, test specifications. Functionality and capability of available runtime environments. Interpretation of requirements definitions. Creation of software designs, technical architecture, test specifications, selection and defining appropriate runtime environments. Following relevant organisational software development procedures. Knowledge of the syntax and constructs of the programming language(s) in use, use of available pre-defined functions of said programming languages(s).	**1,2,3**
Software Development Component Creation (Level 3) Create Software from given specifications.	Creation of detailed designs for software from given specifications. Creation of software components, building, testing and debugging software. Using software development environment(s) effectively. Selection of meanful identifiers for all components and constituent parts.	

Table 4

Unit Code: DH33 34

Unit Title: Computer Operating Systems 1

(Mapping dependant on graphical user interface being utilised to carry out installations/upgrades of both Systems and Applications software.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Software Installation and Upgrade (Level 4) Create, implement and manage installation and upgrade processes.	Install /upgrade different types of software according to organisational policies. Creating and implementing installation/upgrade procedures. Understanding different types of loading facilities and developing supporting documentation.	**3,4**

Table 5

Unit Title: Computer Operating Systems 2

Unit Code: DM2X 35

(Mapping dependant on command driven interface being utilised to carry out installations/upgrades of Systems software.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Software Installation and Upgrade (Level 4) Create, implement and manage installation and upgrade processes.	Install /upgrade different types of software according to organisational policies. Creating and implementing installation/upgrade procedures. Understanding different types of loading facilities and developing supporting documentation.	2,3

Table 6

Unit Title: Computer Hardware: Hardware Installation and Maintenance

Unit Code: DH2Y 34

(All five NOS are utilised to achieve HN Unit outcomes.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Technical Advice and Guidance (Level 4) Provide and control the provision of, advice and guidance.	Effects of advances in technology. Use of appropriate methods to gather information, analysing that information and applying this information to the task.	**2,3**

Technical Fault Diagnosis (Level 4) Maintain the diagnostic process and provide specialist support to others.	Understanding, analysing and applying diagnostic methods. Developing diagnostic tools.	**2,3**
Technical Fault Remedy Selection (Level 4) Specify remedies for a range of faults and maintain organisational policy for fault rectification.	Understanding the types and applicability of considerations to be taken into account when selecting fault remedies. Identifying and specifying suitable alternative remedies. Reviewing organisational policy for fault rectification to improve procedures and working practices.	
Testing ICT Systems **(Level 4)** Maintain the testing process and provide specialist support to others.	Understanding the testing process and the purpose of testing. Which test preparation and conclusion activities are deemed necessary. Knowledge of specialist technical information on a range of products and testing strategies of the organisation. Maintaining and modifying the testing process. Gathering, recording and analysing test information and results. Development of documentation to support the testing process. Developing of testing tools. Providing specialist advice to support testing and contributing to the development of testing strategies.	
Working with ICT Hardware and Equipment **(Level 4)** Create, implement and manage working processes.	Knowledge of the working process, regulatory requirements, appropriate uses of tools and techniques. Applying knowledge to use of appropriate tools and techniques. Obtaining and allocating required materials. Development of tools. Creating documentation to support the working process. Assessing and minimising risk.	

Table 7

Unit Title: Providing Support to Users

Unit Code: DH2X 34

(All five NOS are utilised to achieve HN Unit outcomes.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Technical Advice and Guidance (Level 4) Provide and control the provision of, advice and guidance. **Technical Fault Diagnosis (Level 4)** Maintain the diagnostic process and provide specialist support to others. **Technical Fault Remedy Selection (Level 4)** Specify remedies for a range of faults and maintain organisational policy for fault rectification. **Testing ICT Systems (Level 4)** Maintain the testing process and provide specialist support to others. **Working with ICT Hardware and Equipment (Level 4)** Create, implement and manage working processes.	Effects of advances in technology. Use of appropriate methods to gather information, analysing that information and applying this information to the task. Understanding, analysing and applying diagnostic methods. Developing diagnostic tools. Understanding the types and applicability of considerations to be taken into account when selecting fault remedies. Identifying and specifying suitable alternative remedies. Reviewing organisational fault rectification policy to improve procedures and working practices. Understanding the testing process and the purpose of testing. Which test preparation and conclusion activities are deemed necessary. Knowledge of specialist technical information on a range of products and testing strategies of the organisation. Maintaining and modifying the testing process. Gathering, recording and analysing test information and results. Development of documentation to support the testing process. Developing of testing tools. Providing specialist advice to support testing and contributing to the development of testing strategies. Knowledge of the working process, regulatory requirements, appropriate uses of tools and techniques. Applying knowledge to use of appropriate tools and techniques. Obtaining and allocating required materials. Development of tools. Creating documentation to support the working process. Assessing and minimising risk.	**3,4**

Table 8

Unit Title: Computer Hardware: Desktop Computer Troubleshooting

Unit Code: DM37 35

(All five NOS are utilised to achieve HN Unit outcomes.)

National Occupational Standard AOC	**Elements Knowledge and Understanding Skills and Techniques**	**Outcome(s) in this Unit**
Technical Advice and Guidance (Level 4) Provide and control the provision of, advice and guidance.	Effects of advances in technology. Use of appropriate methods to gather information, analysing that information and applying this information to the task.	**2,3**
Technical Fault Diagnosis (Level 4) Maintain the diagnostic process and provide specialist support to others.	Understanding, analysing and applying diagnostic methods. Developing diagnostic tools.	
Technical Fault Remedy Selection (Level 4) Specify remedies for a range of faults and maintain organisational policy for fault rectification.	Understanding the types and applicability of considerations to be taken into account when selecting fault remedies. Identifying and specifying suitable alternative remedies. Reviewing organisational policy for fault rectification to improve procedures and working practices.	
Testing ICT Systems (Level 4) Maintain the testing process and provide specialist support to others.	Understanding the testing process and the purpose of testing. Which test preparation and conclusion activities are deemed necessary. Knowledge of specialist technical information on a range of products and testing strategies of the organisation. Maintaining and modifying the testing process. Gathering, recording and analysing test information and results. Development of documentation to support the testing process. Developing of testing tools. Providing specialist advice to support testing and contributing to the development of testing strategies.	
Working with ICT Hardware and Equipment (Level 4) Create, implement and manage working processes.	Knowledge of the working process, regulatory requirements, appropriate uses of tools and techniques. Applying knowledge to use of appropriate tools and techniques. Obtaining and allocating required materials. Development of tools. Creating documentation to support the working process. Assessing and minimising risk.	

Table 9

No S/NVQs Qualifications for IT Users at Level 3 were mapped against HN units, as according to Table 1 this would not seem appropriate at this time. However, it may be

appropriate in the future if Level 3 S/NVQs were positioned at Level 7 in the SCQF framework.

Centre recruiting staff may find it beneficial to study the prospective HN candidate's portfolio of work to ascertain levels of achievement incorporated in the said portfolio.

RECOMMENDED ENTRY LEVEL NOS

While it is recognised that the holder of a Level 3 S/NVQ for IT users does not assume that the candidate has achieved all elements of the award at Level 3 (as in addition to higher level tasks, his/her role in the workplace may also include some at lower levels) the mandatory unit value would be Level 3 and at least 50% of the unit value of the optional units at Level 3. (S/NVQ Qualification Structure for IT Users, 27th November 2003). This may be regarded, depending on the centre, as entry qualification to the HND awards.

A group of relevant NOS (practitioner's units) at Level 3, again at the discretion of each centre, may also be considered as entry level to the HND awards.

RECOMMENDED EXIT LEVEL NOS

As the NOSs were designed to be delivered in the workplace, students who had achieved an HND award could be recommended to any of the NOSs detailed above where the NOS possessed a Level 5 AOC.

However depending on the area of work the said student entered he/she may be recommended to undertake the following NOS Imported Unit(s) which are broadly based and common to the more responsible occupations within many types of employment.

Managing People and Resources	Level 5
Managing Quality	Level 5
Project Management	Level 5
Supporting Learning and Development	Level 5

CONCLUSION ON MAPPINGS

Perhaps not surprisingly, it would appear that there are some matches between HN units and both NOSs and SVQs.

To aid student entry to the HN awards it is recommended that staff advising students on entry levels to HN awards take both SVQs and work based NOSs into account to place the student on the level of course where s/he is most likely to make progress.

Especially in the case of candidates who already have occupations in Computing or IT, it would be helpful to students if they were advised of SVQs or NOSs towards which they might focus their ambition.

In short, national standards should be used to help students to enter HN education, and HN Units and awards, once achieved, should where possible be used to help students gain further recognition within national standards.

APPENDIX 5: CREDIT TRANSFER MAPPING – TRANSITIONAL ARRANGEMENTS

*Transitional arrangements apply whenever an award is updated or replaced by another award. These arrangements relate to the various **HN Computing** awards which have been introduced between 1995 and 2005.*

Transitional arrangements assist candidates to transfer between old and new awards. For example, a candidate may have partially completed an old HNC award and now wishes to complete her HNC using the new award; or a candidate may have completed an old HNC award and now wishes to progress to the new HND.

These arrangements relate to the following awards:

- *G176 15 HNC Computing (validated 1995)*
- *G28W 16 HND Computing: Software Development (validated 1995)*
- *G28X 16 HND Computing: Technical Support (validated 1995)*
- *G5VS 15 HNC Computing (validated in 2001)*
- *G5VT 16 HND Computing: Software Development (validated 2001)*
- *G5VV 16 HND Computing: Technical Support (validated 2001)*
- *G7GL 15 HNC Computing (validated 2004)*
- *G7TT 16 HND Computing: Software Development (validated 2005)*
- *G7TR 16 HND Computing: Technical Support (validated 2005)*

Transitional arrangements exist for:

1. *conversion from HNC to HND*
2. *unit-by-unit credit transfer.*

Conversion from HNC Computing to HND Computing

Special arrangements exist for candidates who have completed G176 HNC Computing (1995 framework) and who wish to progress to G7TT/G7TR HND Computing (2005 framework).

Please note that these arrangements **ONLY apply to candidates who have gained the full G176 HNC Computing group award**. These special arrangements **do not apply to candidates who possess G5VS HNC Computing (2001)** since the normal credit transfer arrangements apply to these candidates (see below).

An alternative route exists for candidates who possess G176 HNC Computing. This alternative route does not require candidates to pass DH36 34 Computing: Graded Unit 1.[5] An alternative route exists for each of G7TT HND Computing: Software Development and G7TR HND Computing: Technical Support. The alternative routes are provided in Appendix 1.

Please note that these alternatives routes do not have separate group award codes. They are simply alternative routes to G7TT HND Computing: Software Development and G7TR HND Computing: Technical Support.

Unit by unit conversion

All candidates are eligible for unit-by-unit credit transfer.

Unit by unit conversion permits candidates to convert old units to new units to allow them to gain credit towards the new HNC/HND awards. These arrangements are also known as *credit transfer*.

[5] It is identical to the "standard" route in every other regard.

All decisions relating to credit transfer remain with centres. However, SQA has carried out an initial mapping between old and new units. Appendix 2 relates 1995 units to 2001 units. Appendix 3 relates 2001 units to 2004/5 units. We have not attempted to directly relate 1995 units to 2005 units; although the tables will be helpful in this regard, these decisions should be made on a candidate by candidate basis due to the large time difference between these qualifications.[6]

[6] Decisions on credit transfer between 1995 and 2004/5 units will depend on technologies, techniques and methodologies used.

How does credit transfer work?

Credit transfer is used in lieu of the normal evidence requirements for a unit. Once the equivalence between two units is established, a candidate is not required to produce the normal evidence required for a unit if s/he already possesses an "equivalent" unit. The only evidence that the candidate requires to produce is evidence of completing the equivalent unit (which is normally evidenced by production of his/her Scottish Qualifications Certificate). Centres must retain proof of this (normally a photocopy of the candidate's SQC) for the purposes of internal and external moderation.

How to use the tables

The credit transfer tables (Appendix 2 links 1995 units with 2001 units, Appendix 3 links 2001 units with 2004/5 units) have been designed to permit candidates to convert old units for new units. However, they may be used in both directions (for example, 2001 → 2004 and 2004 → 2001). This might be helpful to candidates who have commenced a new award but subsequently require to complete an old award (this is rare but occasionally arises). **Please note that one way credit transfer applies in some cases** (this is clearly denoted in the tables).

In some cases, groups of units (rather than single units) are deemed to be equivalent. In these cases, candidates are required to possess **all** the units in the group before credit transfer should be awarded.

APPENDIX 1

ALTERNATIVE FRAMEWORK FOR CANDIDATES WHO POSSESS G176 HNC COMPUTING (1995)

G7TR HIGHER NATIONAL DIPLOMA COMPUTING: TECHNICAL SUPPORT

A total of 30 credits must be achieved, comprising 240 SCQF points, to gain an HND Technical Support and this must incorporate at least 64 SCQF points at SCQF level 8.

Total credit value of award: 30 credits of which a minimum of 8 credits must be gained at SCQF Level 8.

Mandatory units

A total of **16** credits must be gained by undertaking the credits from Table 1.

Table 1 – All units must be undertaken (16 credits)

Unit No	Unit Title	Level	Credit
DH2T 34	Computer Architecture 1	7	1
DH33 34	Computer Operating Systems 1	7	1
DH35 34	Computing: Planning	7	1
D75X 34	Information Technology: Applications Software 1	7	1
DH21 34	Working within a Project Team	7	1
DF9M 34	Client Operating Systems	7	1.5
DF9N 34	Network Server Operating System	7	1.5
DM2X 35	Computer Operating Systems 2	8	1
DM30 35	Project Management 1	8	1
D75V 35	Computer Networks: Network Technology and Data Comms	8	2
DN4P 35	Computing: Group Award (Technical Support) Graded Unit 2	8	2
DM3D 35	Professional Issues in Computing	8	2

Optional units

Table 2 – Additional 14 credits must be selected from this table.

Unit No	*UNIT TITLE*	Level	Credit
DG0K 33	Hardware Concepts	6	1
DF9L 33	Operating Systems Concepts	6	1
D77H 34	Employment Experience 2	7	1
DH37 34	Information Technology: Information Systems and Services	7	1
DH39 34	Internet: Introducing e-commerce	7	1
DH38 34	Internet: Internet Client Services	7	1
D76E 34	Mathematics for Computing 1	7	1
DH3A 34	Multi User Operating Systems	7	1
DH2X 34	Providing Support to Users	7	1
DH3J 34	SQL: Introduction	7	1
DM34 34	Supporting Users and Troubleshooting Desktop Applications	7	1
DH3F 34	Systems Development: Introduction	7	1
DH3G 34	Systems Development: Object Oriented Design (Introduction)	7	1
DH3H 34	Systems Development: Structured Design Methods (Introduction)	7	1
DH2Y 34	Computer Hardware: Hardware Installation and Maintenance	7	2
DH31 34	Computer Networks: Building Local Area Networks	7	2
DH2R 34	Multimedia: Developing Multimedia Applications	7	2
DM35 34	Supporting Users and Troubleshooting a Desktop Operating System	7	2
DF9R 35	Network Infrastructure 1: Implementation and Management	8	2

Unit No	*UNIT TITLE*	Level	Credit
DH2V 35	Computer Architecture 2	8	1
D7JW 35	Computer Networks: Internet Network Connectivity	8	1
D7JV 35	Enhancing Network Security and Configuring Remote Access Methods	8	1
DM39 35	Internet: Client Side Web Scripting	8	1
D7CY 35	Information Technology: Applications Software 2	8	1
D76F 35	Mathematics for Computing 2	8	1
DM2Y 35	Project Management 2	8	1
DM3E 35	Software Development: Advanced Programming	8	1
DM3G 35	Software Development: Assembly Language and Interface Programming	8	1
DM31 35	Software Development: Array Data Structures	8	1
DM2W 35	Wireless and Mobile Technology	8	1
DH2W 35	Computer Hardware: Building a Network PC	8	1
DM37 35	Computer Hardware: Desktop Computer Troubleshooting	8	2
D75S 35	Computer Networks: Administering Network Systems	8	2
DM38 35	Computer System Security and Data Assurance	8	2
DM3A 35	Internet: Configuration and Administration of Internet Services	8	2
DM3C 35	Internet: Web Server Management	8	2
DM3J 35	Internet: Web Technology and Security	8	2
DF9X 35	Networking Technology	8	2
DF9Y 35	Routing Technology	8	2
DG09 35	Switching Technology	8	2
DG0A 35	Internetworking Technology	8	2
DH30 35	Software Development: Applications Development	8	2
DH32 35	Software Development: Developing for the World Wide Web	8	2
DH34 35	Software Development: Event Driven Programming	8	2
D76S 35	Software Development: Fourth Generation Environment	8	2
DM32 35	Software Development: Linked Data Structures	8	2
DM33 35	Software Development: Object Oriented Collections	8	2
DH3C 35	Software Development: Object Oriented Programming	8	2
DM3F 35	Software Development: Rapid Applications Development & Prototyping	8	2
DH3D 35	Software Development: Relational Database Systems	8	2
DH3E 35	Software Development: Structured Programming	8	2
DM3H 35	Systems Development: Object Oriented Design	8	2
D77F 35	Systems Development: Structured Design Methods	8	2
Local option – unit(s) must be levelled by SQA – (Up to 4 credits)			4 max

G7TT HIGHER NATIONAL DIPLOMA COMPUTING: SOFTWARE DEVELOPMENT

A total of 30 credits must be achieved, comprising 240 SCQF points, to gain an HND Software Development and this must incorporate at least 64 SCQF points at SCQF level 8.

Total credit value of award: 30 credits of which a minimum of 10 credits must be gained at SCQF Level 8.

Mandatory units

A total of **12** credits must be selected from Table SD1, 1 credit from Table SD2, a minimum of **4** credits from Table SD 3.

Table 1 – All 12 units must be undertaken

Unit No	Title	Level	Credit
DH2T 34	Computer Architecture 1	7	1
DH33 34	Computer Operating Systems 1	7	1
DH35 34	Computing: Planning	7	1
D75X 34	Information Technology: Applications Software 1	7	1
DH3F 34	Systems Development: Introduction	7	1
DH21 34	Working within a Project Team	7	1
DM30 35	Project Management 1	8	1
DM31 35	Software Development: Array Data Structures	8	1
DN4N 35	Computing: Group Award (Software Development) Graded Unit 2	8	2
DM3D 35	Professional Issues in Computing	8	2

Table 2 – Select a minimum of 1 credit

Unit No	Title	Level	Credit
DH3G 34	Systems Development: Object Oriented Design (Introduction)	7	1
DH3H 34	Systems Development: Structured Design Methods (Introduction)	7	1

Table 3 – Select a minimum of 4 credits

Unit No	Title	Level	Credit
DH32 35	Software Development: Developing for the World Wide Web	8	2
DH34 35	Software Development: Event Driven Programming	8	2
DH3C 35	Software Development: Object Oriented Programming	8	2
DH3E 35	Software Development: Structured Programming	8	2

Optional units

Table 4 – Additional units must be selected from the Table 2, Table 3 or Table 4.

Unit No	Title	Level	Credit
DG0K 33	Hardware Concepts	6	1
DF9L 33	Operating System Concepts	6	1
D77H 34	Employment Experience 2	7	1
DH37 34	Information Technology: Information Systems and Services	7	1
DH39 34	Internet: Introducing e-commerce	7	1
DH38 34	Internet: Internet Client Services	7	1
D76E 34	Mathematics for Computing 1	7	1
DH3A 34	Multi User Operating Systems	7	1
DH2X 34	Providing Support to Users	7	1

Unit No	Title	Level	Credit
DH3J 34	SQL: Introduction	7	1
DM34 34	Supporting Users and Troubleshooting Desktop Applications	7	1
DF9M 34	Client Operating Systems	7	1.5
DF9N 34	Network Server Operating System	7	1.5
DH2Y 34	Computer Hardware: Hardware Installation and Maintenance	7	2
DH31 34	Computer Networks: Building Local Area Networks	7	2
DH2R 34	Multimedia: Developing Multimedia Applications	7	2
DM35 34	Supporting Users and Troubleshooting a Desktop Operating System	7	2
DF9R 35	Network Infrastructure 1: Implementation and Management	8	2
DH2V 35	Computer Architecture 2	8	1
DH2W 35	Computer Hardware: Building a Network PC	8	1
D7JW 35	Computer Networks: Internet Network Connectivity	8	1
DF9X 35	Networking Technology	8	2
DF9Y 35	Routing Technology	8	2
DG09 35	Switching Technology	8	2
DG0A 35	Internetworking Technology	8	2
DM2X 35	Computer Operating Systems 2	8	1
D7JV 35	Enhancing Network Security and Configuring Remote Access Methods	8	1
D7CY 35	Information Technology: Applications Software 2	8	1
DM39 35	Internet: Client Side Web Scripting	8	1
D76F 35	Mathematics for Computing 2	8	1
DM2Y 35	Project Management 2	8	1
DM3E 35	Software Development: Advanced Programming	8	1
DM3G 35	Software Development: Assembly Language and Interface Programming	8	1
DM2W 35	Wireless and Mobile Technology	8	1
DM37 35	Computer Hardware: Desktop Computer Troubleshooting	8	2
D75S 35	Computer Networks: Administering Network Systems	8	2
D75V 35	Computer Networks: Network Technology and Data Communications	8	2
DM38 35	Computer System Security and Data Assurance	8	2
DM3A 35	Internet: Configuration and Administration of Internet Services	8	2
DM3C 35	Internet: Web Server Management	8	2
DM3J 35	Internet: Web Technology and Security	8	2
DM3F 35	Software Development: Rapid Application Development and Prototyping	8	2
DM3H 35	Systems Development: Object Oriented Design	8	2
D77F 35	Systems Development: Structured Design Methods	8	2
DH30 35	Software Development: Applications Development	8	2
D76S 35	Software Development: Fourth Generation Environment	8	2
DM32 35	Software Development: Linked Data Structures	8	2
DM33 35	Software Development: Object Oriented Collections	8	2
DH3D 35	Software Development: Relational Database Systems	8	2
Local options – unit(s) must be levelled by SQA – (up to 4 credits)			4 (max)

APPENDIX 2

CREDIT TRANSFER BETWEEN 1995 AND 2001 UNITS

Full credit transfer exists between the following units. **Please note that in some cases, credit transfer is one way only.**

2001 units		*1995 units*		
New number	**Title (credit value)**	**Original number**	**Revised Number**	**Title (credit value)**
D101 13	Artificial Intelligence (1)	8412455	A6AF 04	Artificial Intelligence (2)[7]
D75R 34	Computer Hardware: Installation and Maintenance (2)	8412485	A6AK 04	Hardware Installation and Maintenance (2)
D75S 35	Computer Networks: Administering Network Systems (2)	8412535	A6AS 04	**Either** Multi User and Network System Administration (3) [7]
		-	D3BX 04	**Or** Multi User and Network System Administration (Microsoft) (3)[7]
D75V 35	Computer Networks: Network Technology and Data Communications (2)	8412565	A6AW 04	**Either** Network Technology (1)
		-	D3BY 04	**Or** Network Technology (Microsoft) (1)
		8560085	A6AJ 04	**And** Data Communications (1)
D77A 34	Computer Operating Systems (2)	8412605	A6B3 04	**Either** Stand Alone Computer System Support (2)
		-	D3C0 04	**Or** Stand Alone Computer System Support (Microsoft) (2)
D75W 34	Multimedia: Developing Multimedia Applications (2)	8412555	A6AV 04	Multimedia Technology (2)
D75Y 34	Information Technology: Information Systems and Services (1)	8560095	A6AL 04	Information Systems and Services (1)
D76B 34	Internet: Internet Client Services (1)	8560257	D4FA 04	Supporting Internet Client Services (2)[7]
D76E 34	Mathematics for Computing: 1 (1)	7481724	A5P0 04	Mathematics for Computing (1)
D76G 34	Multi User Operating Systems (1)	8412545	A6AT 04	Multi User Operating System (1)
D76J 35	Project Management (1)	6412255	A6AX 04	Project Management (1)
D76K 34	Providing Support to Users (2)	8412575	A6AY 04	Providing Support to Users (2)
D76L 35	Software Development: Abstract Data Structures (3)	8520995	A6B1 04	Software Engineering: Abstract Data Structures (3)

[7] 1995 to 2001 only.

2001 units		*1995 units*		
New number	**Title (credit value)**	**Original number**	**Revised Number**	**Title (credit value)**
D76M 35	Software Development: Advanced Programming (1)	8412435	A6AD 04	Advanced Programming (1)
D76N 34	Software Development: Applications Development (2)	8412445	A6AE 04	Applications Development (2)
D76R 35	Software Development: Event Driven Programming (2)	8412625	A6B5 04	Software Development: Event Driven Language (2)
D76S 35	Software Development: Fourth Generation Environment (2)	8412645	A6B7 04	Systems Development: Fourth Generation Environment (2)
D76V 35	Software Development: Object Oriented Programming (2)	8412595	A6B2 04	Software Development: An Object Oriented Approach to Programming (2)
D76W 34	Software Development: Program Planning (1)	8412585	A6B0 04	Software Development Life Cycle (1)
D76X 35	Software Development: Procedural Programming (2)	8412635	A6B6 04	Software Development – Procedural Language (2)
D77D 34	Systems Development: Introduction (2)	8412615	A6B4 04	Systems Development – Introduction (2)
D77F 35	Systems Development: Structured Design Methods (2)	8521005	A6B8 04	Software Engineering: Structured Systems Analysis and Design (3)[7]

The following units are equivalent in terms of vocational content. However, **credit transfer does not exist** since the 2001 units carry specific core skills that the 1995 units do not. Centres therefore require to produce evidence of the missing core skills before credit transfer may be awarded (this may be possession of dedicated core skills units).

2001 units		*1995 units*	
Unit Number	***TITLE***	**Unit Number**	***TITLE***
D77G 34	Communication: Practical Skills	AOX9 04 A2HL	Communication: Selecting and Presenting Complex Information Communication 1: Using Communication Media for Vocational Purposes
D75P 34 D76F 35	Computer Architecture Mathematics for Computing 2	A6AG 04 A5PO 04	Computer Architecture Mathematics for Computing
D75X 34	Information Technology: Applications Software 1	A6AM 04 A6AN 04	IT Applications Software 1 IT Applications Software 2

APPENDIX 3

CREDIT TRANSFER BETWEEN 2001 AND 2004/5 UNITS

Full (two way) credit transfer should be awarded unless otherwise indicated.

2001 FRAMEWORK		2004 FRAMEWORK	
Unit No.	**Unit title**	**Unit No.**	**Unit title**
D77G 34	Communication: Practical Skills*	DH21 34	Working within a Project Team*
D75P 34	Computer Architecture	DH2T 34 DH2V 35	Computer Architecture 1 Computer Architecture 2
D75R 34	Computer Hardware: Installation and Maintenance	DH2Y 34	Computer Hardware: Hardware Installation and Maintenance
D75T 34	Computer Networks: Building LANs*	DH31 35	Computer Networks: Building LANs*
D77K 34	Computing: Integrative Assessment 2	DH36 34	Computing: Group Award Graded Unit 1
D77A 34	Computer Operating Systems	DH33 34 DM2X 35	Computer Operating Systems 1 Computer Operating Systems 2
D75Y 34	Information Technology: Information Systems & Services	DH37 34	Information Technology: Information Systems & Services
D75X 34	Information Technology: Applications Software 1*	D75X 34	Information Technology: Applications Software 1*
D76B 34	Internet: Internet Client Services	DH38 34	Internet: Internet Client Services
D76A 34	Internet: Introducing e-Commerce	DH39 34	Internet: Introducing e-Commerce
D5V4 34	Introduction to SQL	DH3J 34	SQL: Introduction
A5P0 35	Mathematics for Computing*	D76F 35	Mathematics for Computing 2*
D75W 34	Multimedia: Developing Multimedia Applications *	DH2R 34	Multimedia: Developing Multimedia Applications *
D76G 34	Multi User Operating Systems	DH3A 34	Multi User Operating Systems
D76K 34	Providing Support to Users	DH2X 34	Providing Support to Users
D76P 35	Software Development: Developing for the World Wide Web*	DH32 35	Software Development: Developing for the World Wide Web*
D76R 35	Software Development: Event Driven Programming	DH34 35	Software Development: Event Driven Programming
D76V 35	Software Development: Object Oriented Programming	DH3C 35	Software Development: Object Oriented Programming
D76X 35	Software Development: Procedural Programming	DH3E 35	Software Development: Structured Programming

D76W 34	Software Development: Program Planning	DH35 34	Computing: Planning
D77D 34	Systems Development: Introduction	DH3F 34 DH3H 34	Systems Development: Introduction **and** Systems Development: Structured Design Methods (Introduction)
D77C 35	Systems Development: Relational Database Systems	DH3D 35	Software Development: Relational Database Systems

*These units are equivalent in terms of vocational competence but carry different core skills. **Credit transfer may only be awarded where there is additional evidence[8] to demonstrate that candidates possess the required core skills (see appropriate unit specifications).**

[8] Such as possession of an appropriate dedicated core skill unit.