



Arrangements for:

**HNC Measurement and Control
Engineering**

Group Award Code: G88N 15

**HND Measurement and Control
Engineering**

Group Award Code: G88P 16

Validation date: June 2006

Date of original publication: August 2006

Version: 10 (February 2020)

Acknowledgement

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

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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
10	Addition of Units: DW8W 34 Robotics and Animatronics: An Introduction. DT9Y 35 Robotic Systems and DW8N 34 Engineering Systems Interfaced with Programmable Logic Controllers has been added to both HNC/HND Framework DW8V 35 Robotic Systems has been added to the HND framework only	19/02/20
09	Addition of Units: J0HA 34 Computer Programming and J0H9 34 Data Security added as Optional units to HNC and HND frameworks	29/03/19
08	Unit Process Instrumentation: Practical Skills H93P 34 added to optional section of the HNC Framework.	31/01/17
07	Unit Process Instrumentation: Practical Skills H93P 34 added to optional section of the HND Framework.	07/05/15
06	Removal of finish date from unit DG4P 35 <i>Mathematics for Engineering 3</i> . Addition of Credit Transfer Table <i>see Page 30</i>	16/01/15
05	Revision of Units: DE3N 34 <i>Communication: Analysing and Presenting Complex Communication</i> revised by H7TK 34 <i>Communication: Business Communication</i> . DG4H 33 <i>Mathematics for Engineering 1: Electronics and Electrical</i> revised by H7K0 33 <i>Engineering Mathematics 1</i> . DG4L 34 <i>Mathematics for Engineering 2</i> revised by H7K1 34 <i>Engineering Mathematics 2</i> on HNC and HND frameworks finishing 31/07/2016.	21/10/14
04	<i>Engineering Mathematics 3</i> (H7K2 34), <i>Engineering Mathematics 4</i> (H7K3 35) and <i>Engineering Mathematics 5</i> (H7K4 35) added as optional Units to HND framework.	20/08/14
03	Amendment to credit transfer for Communications Unit.	17/06/09
02	Core Skills information amended following audit — level 5 Problem Solving embedded.	01/12/06

1 Introduction

This is the Arrangements document for the revised Group Awards in HNC/HND Measurement and Control Engineering, which were validated in June 2006. This document includes background information on the development of the Group Award, its aims (both general and specific), guidance on access, details of the Group Award structure, and guidance on delivery and assessment.

This Arrangements document has been written in order to assist centres in preparing for approval of the new HNC and HND Measurement and Control Engineering awards and maintaining them thereafter. These two awards were developed under the current SQA Design Principles, were validated in June 2006 and replace the existing HNC/HND Measurement and Control Engineering, HNC Process Control and HNC Process Operations awards.

Historical Perspective

During the late 1980s and early 1990s the HNC/HND qualifications were adopted by the Process Engineering Industries as the defacto standard for the underpinning knowledge of its vocational technicians. Previous to this vocational qualifications had not been developed by centres beyond single Units and HN level in other Engineering Group Award structures. The developing process sector experienced a period of rapid, dynamic growth from the 1990s.

Over the lifespan of the current HN awards, it has become evident to centres involved in the delivery of the awards that the needs of industry had evolved and the education and training requirements had become more prescriptive, with the consequence that a significant number of the Units had become dated.

2 Rationale for the development of the award

Stakeholders were consulted to check their requirements for the awards. This consultation consisted of the following:

- ◆ a questionnaire survey with stakeholders
- ◆ a series of meetings with interested stakeholders
- ◆ desk-based research
- ◆ a questionnaire survey with colleges
- ◆ a questionnaire survey of past and present students

This consultation exercise proved that there was a strong market for the awards. This market includes the Oil, Chemical and Gas industry and other process industries such as Power Generation. Feedback from industrial stakeholders provided the basis for the range of Units and for the content of each Unit. This feedback was analysed and integrated into the proposed Units for the awards.

Reports from Futureskills Scotland indicate that there is a demand for this award. Skills gaps affect a greater proportion of employees and workplaces than in other sectors. There are more hard-to-fill vacancies as a result of skill shortages, and more skilled employees than other sectors. The age profile of the workforce is also of concern, with only 30% under the age of 35. There is a need to replace an aging workforce with employees who have the necessary skills and knowledge for the industry to remain viable. This award provides the required knowledge for industry.

The rationale for the awards follows two main premises:

- ◆ Employment and career progression.
- ◆ Articulation and progression.

The employment prospects for successful candidates are wide ranging including working as a technician in the Oil, Chemical and Gas industry working both off-shore and shore-based. Candidates may also be employed in power generation plants, refineries and process plants, water treatment plants, etc.

It is anticipated that the new structures will provide a strong pathway of progression for candidates who have successfully completed a programme of National Qualification Units in a related area and also for those who wish to articulate Higher Education. The progression is as follows:

- ◆ Related NC level awards to HNC Measurement and Control Engineering, HNC Measurement and Control Engineering to HND Measurement and Control Engineering.
- ◆ HND Measurement and Control Engineering to related Degree level courses.

The use of SCQF levels embeds the arrangements into the whole of the Scottish educational provision.

There is a long standing Chartered Engineering Professional Body, The Institute of Measurement and Control, who has supported these developments. The HNC/HND Measurement and Control Engineering Qualification Design Team (QDT) and the SQA have consulted with the professional body and we hope to seek its approval for the validated awards.

Revalidation of the current HN awards offers the opportunity to reflect and gather further empirical evidence on the fitness for purpose of this Group Award.

The QDT involved in the development of these Group Awards were actively involved in discussion with the Institute of Measurement and Control so as to ensure the currency and validity of the proposed Group Awards.

Summary

The title Measurement and Control Engineering is intended to provide candidates, lecturers, Higher Education, employers and professional bodies with a clear, unambiguous title.

Data on Previous HNC/D Awards

Product Details			2000/01	2001/02	2002/03	2003/04	2004/05
Code	Level	Title	Cands	Cands	Cands	Cands	Cands
G0EL	15	Process Control	11	13	16	34	17
G0EN	15	Process Control	3	6	1	0	0
G0EW	15	Process Control	80	51	22	34	32
G0EP	15	Process Operations	1	0	0	1	0
G5KF	15	Process Operations	0	11	0	9	13
G0B2	15	Measurement and Control Engineering	18	22	34	22	27
G1PF	16	Measurement and Control Engineering	14	16	20	6	20

Year	Employment	Higher Education
2001/2001	127	0
2001/2002	119	0
2002/2003	93	0
2003/2004	106	0
2004/2005	109	0

Main Points to Emerge from Stakeholder Consultation

- ◆ Strong support for HNC/HND Award with updated technical content.
- ◆ Strong support for mandatory/option structure for the awards.
- ◆ Essential for HNC/HND to have professional body approval.
- ◆ Recognition of importance of Core Skills but not at the expense of the technical Units.

Taking all stakeholders comments into consideration it is evident there is still a demand for and support of the HNC/D Measurement and Control Engineering awards.

The tables below show the proposed framework for the HNC/D Measurement and Control Engineering awards following arbitration from stakeholder group.

HNC Measurement and Control Engineering	SCQF credit points
Mandatory Core Units (including the Graded Unit)	56
Optional Units	40

HND Measurement and Control Engineering	SCQF credit points
Mandatory Core Units (including the Graded Units)	160
Optional Units	80

The table below details the SCQF level structure for the HNC/HND Measurement and Control Engineering awards.

HNC Measurement and Control Engineering	Number of credits	SCQF points
Level 6 (mandatory)	1	8
Level 7 (mandatory)	6	48
AND		
Level 7 (options)	5	40
OR		
Level 7 (options)	4	32
Level 8 (options)	1	8
HND Measurement and Control Engineering	Number of Credits	SCQF points
Level 6 (mandatory)	1	8
Level 7 (mandatory)	11	88
Level 8 (mandatory)	8	64
AND		
10 Credits (80 SCQF points) at levels 7 and/or 8 from the optional list		

3 Aims of the awards

The HNC and HND awards are designed to allow candidates with an interest in Measurement and Control Engineering to gain a recognised qualification which in itself may gain them access to employment in the industry or progress to Higher Education. They are designed to build on National Units and/or prior experience of the candidate who may have worked in the occupational area and to prepare for employment or Higher Education on completion.

Candidates may already be in employment within the Measurement and Control Engineering sector and are undertaking the HNC and HND courses on a part time basis. The courses are designed to provide these candidates with the necessary underpinning knowledge to support the SVQ level 3 awards they may be undertaking in the workplace.

The HNC and HND courses have been designed with both the general and specific aims in mind throughout. The awards comply with the Design Principles which incorporates SCQF levels for all Units. This process itself will ensure that a route to progression will exist. The selection of the Units within the mandatory sections for both the HNC and HND awards will ensure that the skills proposed have been selected to meet the needs of industry and expectations of candidates.

3.1 General aims of the award

The HNC and HND awards have a range of broad aims which are generally applicable to all equivalent Higher Education qualifications. The general aims of the awards are to:

- 1 Develop learning and transferable skills including Core Skills.
- 2 Develop study and research skills.
- 3 Develop knowledge and skills such as planning, analysing and synthesizing.
- 4 Develop employment skills and enhance candidates employment prospects.
- 5 Enable progression within the Scottish Credit and Qualifications Framework.
- 6 Provide academic stimulus and challenge, and foster an enjoyment of the subject.

3.2 Specific aims of the award

Specific Aims for the HNC

The following additional specific aims of the HNC award are to:

- 7 Provide the opportunity for further study at HND or degree level.
- 8 Provide the underpinning knowledge for SVQ level 3 awards in the field of Measurement and Control.
- 9 Develop a range of integrated competences in Measurement and Control Engineering in one or more of the following areas: maintenance, servicing, installation, testing, commissioning and operation.

Specific Aims for the HND

The following additional specific aims of the HND award are to:

- 10 Provide the opportunity for further study at degree level.
- 11 Further develop a range of integrated competences in Measurement and Control Engineering in one or more of the following areas: maintenance, servicing, installation, testing, operation, commissioning, manufacture and design.
- 12 Improve career opportunity and progression in Measurement and Control Engineering through development of performance and personal competence.

See Section 5.2 for Mapping of Aims to Units.

3.3 Target groups

The HNC/HND Measurement and Control Engineering courses are delivered primarily by part time day release or evening courses. The current HNC course is integrated into the HND course and candidates normally study for the HNC first and then extend their studies via a top up course by part time day/evening to qualify for the HND award. The majority of the candidate population is in employment at the start of the HNC programme being registered as Engineering modern apprentices and are normally still in employment when the courses are completed. In redesigning the awards the Qualification Design Team has taken this into account and has designed awards with a balance of vocational needs and academic content.

3.4 Employment opportunities

These awards are popular and result in candidates being in satisfying and well paid employment eg Oil, Gas, Petro/Chemical, Pharmaceutical and Electrical Generation Utilities. This can be as a result of holding a recognised Certificate/Diploma although it is also because of the value added by the acquisition of relevant skills and knowledge. Over the last few years there has been an international candidate population enrolled on the courses.

Due to the high level of employed status among candidates, the recent progression to Higher Education is more on an individual basis where candidates seek a part time Higher Education course while continuing in employment. Some candidates have been successful in getting support from their employers to study part time at Higher Education Institutions.

4 Access to awards

General access requirements to the Group Awards

The awards may be accessed on a full-time or part-time basis. This will be at the discretion of the delivering centre. Some candidates may enter the award directly from mainstream education while others may be 'returnees' or adults who wish a change of career. The profile of a typical HN candidate is that of a Modern Apprentice undergoing training in the work place and attending a College of Further Education.

It is recognised that Measurement and Control Engineering attracts applicants mainly from trainees undertaking Modern Apprenticeships, although some applicants do come from different backgrounds and experiences without formal qualifications and who may have experienced social exclusion. Delivering centres are encouraged to fully support the requirement of social inclusion to provide opportunities for applicants with non-traditional entry profiles. In such cases, centres are encouraged to take into account experience, life skills and potential ability. The award is designed to allow for this difference in entry level and experience. Mature candidates can be accepted onto the course at the discretion of the delivering centre.

Given the demands of the course, it is advisable that candidates demonstrate competence in Mathematics at SCQF level 5 **AND** in one of the following:

- ◆ Two Highers with one in a science or technology area
- ◆ Occupationally relevant skills and experience eg relevant S/NVQ level 3
- ◆ NC Measurement and Control Engineering
- ◆ NC Multidisciplinary Engineering

Part-time students

The access statements for individual Units are different and less rigorous than those for the Group Award. Consideration of access to an individual Unit should be based on the interest and ability of a candidate to undertake the particular Unit. A candidate may be involved in a relevant activity and wishes some type of formal certificate. The demands of undertaking individual Units are different from those of undertaking the total credits

required to achieve the HNC/HND Group Award. Delivering centres wishing to 'infill' candidates should refer to the distinguishing criteria between access to individual Units and access to the Group Award.

The HNC/HND will continue to provide opportunities for part-time students and contribute to the life-long learning and social inclusion agendas. Occupational relevant skills and experience will be accredited where appropriate.

Examples of part-time provision include:

- ◆ Individualised programmes with candidates building up credits over a number of years and working towards the Group Award. Usually 'in-fill' into full-time classes.
- ◆ Discrete part-time course run over 3–4 years for HND.
- ◆ Discrete part-time course run over 2 years for HNC.

Core Skills

Following on from the Scottish Group Award and other initiatives in Higher Education, all HNC/Ds will incorporate opportunities for the candidates to develop Core Skills.

The national Core Skills identified are:

- ◆ Problem solving
- ◆ Communication
- ◆ Numeracy
- ◆ Information Technology
- ◆ Working with Others

All HNC/HNDs are required to signpost Core Skills which identify both an entry level and an exit level and demonstrate some development of the candidate's Core Skills.

This profile should reflect levels supplied through market research in the occupational sector.

The Core Skill profile for the HNC/HND Measurement and Control Engineering Awards is an interpretation of the response to the market research process undertaken by the QDT, relevant Sector Skills occupational competencies and professional standards where they exist.

Recommended Core Skills Entry Profile

Research activities undertaken for the review of the HNC/HND in Measurement and Control Engineering suggests that employers and Higher Education recognise a range of key skills as critical for workers in this vocational area, including professional and personal qualities which enable and enhance communication with a wide range of people and settings. Achieving targets and effective time and resource management are attributes essential to success in Measurement and Control Engineering. Critical, analytical thinking and on-going evaluation of professional developments are also

essential. The ability to calculate and work with relevant data and to interpret numerical and graphical information is part of a Measurement and Control Engineer's job profile.

The table below details the proposed SCQF level structure for the HNC Measurement and Control Engineering Group Award

Core Skill	Entry Core Skills level	Exit Core Skills level
Communication	4	5
IT	4	5
Problem Solving	4	5
Working with others	4	5
Numeracy	4	5

The table below details the proposed SCQF level structure for the HND Measurement and Control Engineering Group Award.

Core Skill	Entry Core Skills level	Exit Core Skills level
Communication	5	6
IT	5	6
Problem Solving	5	6
Working with others	5	5
Numeracy	5	6

Recommended Core Skills Exit Profile

An exit profile is also identified which demonstrates that, in keeping with the SQA new design principles, the award provides opportunities to signpost Core Skills.

The market research exercise demonstrated conclusively the value of Core Skills in this vocational award, but not to the extent of certificated Core Skills at the expense of mandatory Unit content. A common response from the market research was the recognition of the presence of the Core Skills within the unitised design of the Group Award.

Core Skills Mapping of Individual Units

Some Core Skills will receive formal certification in these awards. Many opportunities exist to develop Core Skills within these awards.

Signposting refers to the identification of opportunities for developing Core Skills or components that lie out with those that can be summatively assessed and certificated. This allows a range of opportunities to develop Core Skills through teaching and learning to be utilised and highlights these opportunities to those delivering and managing the Units. Core Skills are developed naturally and contextualised but the candidate does not receive formal certification of attainment.

All activities in this award will provide a context for developing and tailoring relevant elements of the Core Skills in Communication, Working with Others, Problem Solving and Numeracy to meet the specific demands of the vocational area. Skills in using Information Technology both in researching current industry intelligence and in producing reports and maintaining records to a professional standard, underpin the award. Practical teaching and learning activities within the course delivery provide a context and opportunities to develop Core Skills. Please note, however, that the achievement of *Measurement and Control Engineering: Graded Unit 2* (F014 35) gives automatic certification of the Core Skill of *Problem Solving* at SCQF level 5.

A grid containing Core Skills mapped to Units on the awards can be seen in Section 5.

Candidates whose first language is not English

Candidates should have a working, technical knowledge of the Measurement and Control Engineering area and an acceptable standard of oral and written communication in English. It is recommended that additional support could be given in the form of an ESOL course in conjunction with the HN programme.

5 Award structure

To address the preceding rationale of the courses, the mandatory and optional Unit structure has been designed to incorporate a range of feedbacks and evaluations relating to the qualifications. These include:

- ◆ Market research responses confirming the appropriateness of the existing mandatory and optional Unit structure as a model for revalidation.
- ◆ Evaluation and feedback from candidates and centres that promote and endorse the opportunity and width contained within the HNC/D level courses.
- ◆ Recognition of candidates' current skills and experience through accreditation of prior learning.
- ◆ As essential key elements, provide mandatory experiential Units requiring candidates to participate in processes and practical activities.
- ◆ Provide access to Higher Education.

5.1 Framework

Condition of Award for the HNC Measurement and Control Engineering

The HNC will be awarded for the successful completion of 96 SCQF credit points which includes the Graded Unit credit points (as detailed below).

The elements of the HNC Measurement and Control Engineering Group Award are as follows:

- ◆ 96 SCQF credit points in total.
- ◆ 48 mandatory credit points at SCQF level 7 including 8 credit points graded A, B or C and 8 credit points at SCQF level 6.
- ◆ 40 Optional credit points at SCQF level 7 or 32 optional credits points at SCQF level 7 and 8 credit points at SCQF level 8
- ◆ Recommended Core Skill entry level of all skill levels at level 4.
- ◆ Recommended Core Skill exit profile of all Core Skills at level 5.

HNC Measurement and Control Engineering

Group Award Code: G88N 15

Unit number	Unit title	Credit value	SCQF level				Mandatory or Optional	
			6	7	8	9	Mandatory	Optional
F013 34	Graded Unit 1 (exam)	1		X			X	
H7TK 34*	Communication: Business Communication	1		X			X	
H7K0 33*	Engineering Mathematics 1	1	X				X	
DX48 34	Distributed Control Systems	2		X			X	
DX4F 34	Measurement Systems 1	2		X			X	
DX4K 34	Process Control	1		X				X
DX45 34	Complex Control Systems	1		X				X
DG31 34	Applications of Programmable Logic Controllers	1		X				X
DX4J 34	Process Analysers: On-Line	1		X				X
DX4D 34	Instrumentation in Hazardous Areas	1		X				X
D75X 34	Information Technology: Applications Software 1	1		X				X
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	1		X				X
DX4A 34	Fire and Gas Detection	1		X				X
DX4C 34	Hazard and Plant Safety Engineering	1		X				X
DX4L 35	Process Control by Computer	1			X			X
DX4E 34	Intelligent Instrumentation and Asset Management Systems	1		X				X
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	1		X				X
DX47 34	Digital Communications in Measurement and Control Engineering	1		X				X
DX4H 34	Meter Systems in Measurement and Control Engineering	1		X				X

HNC Measurement and Control Engineering

Group Award Code: G88N 15

Unit number	Unit title	Credit value	SCQF level				Mandatory or Optional	
			6	7	8	9	Mandatory	Optional
DG3C 34	Combinational Logic	1		X				X
DX49 34	Engineering Science Principles	1		X				X
H7K1 34*	Engineering Mathematics 2	1		X				X
H93P 34*	Process Instrumentation: Practical Skills	2		X				X
J0HA 34*	Computer Programming	1		X				X
J0H9 34*	Data Security	1		X				X
DW8W 34*	Robotics and Animatronics: An Introduction	1		X				X
DT9Y 35*	Robotic Systems	1			X			X
DW8N 34*	Engineering Systems Interfaced with Programmable Logic Controllers	1		X				X
Total		28	1	23	1	0	5	20
Requirements of design principles		12		6				

*Refer to History of Changes for reversion changes.

Conditions of Award for the HND Measurement and Control Engineering

The HND will be awarded on successful completion of 240 SCQF credit points which includes Graded Unit credit points (as detailed below).

The elements of the HND Measurement and Control Engineering Group Award are detailed below:

- ◆ 240 SCQF credit points in total.
- ◆ 64 Mandatory credit points at SCQF level 8 including 16 credit points graded A, B or C and 88 Mandatory credit points at SCQF level 7 including 8 credit points graded A, B or C and 8 Mandatory credit points at SCQF level 6.
- ◆ 80 Optional credit points at SCQF levels 7 or 8.
- ◆ Recommended Core Skill entry profile of all Core Skills at level 5.

- ◆ Recommended Core Skill exit profile of most Core Skills at level 6.

Group Award title — HND Measurement and Control Engineering

Group Award Code: G88P 16

Unit number	Unit title	Credit value	SCQF level				Mandatory or Optional	
			6	7	8	9	Mandatory	Optional
F013 34	Graded Unit 1 (exam)	1		X			X	
H7TK 34*	Communication: Business Communication	1		X			X	
H7K1 34*	Engineering Mathematics 2	1		X			X	
DX48 34	Distributed Control Systems	2		X			X	
DX4F 34	Measurement Systems 1	2		X			X	
DX4K 34	Process Control	1		X			X	
DX45 34	Complex Control Systems	1		X			X	
DX47 34	Digital Communications in Measurement and Control Engineering	1		X			X	
F014 35	Graded Unit 2 (project)	2			X		X	
DX46 35	Continuous and Computer Control of Engineering Systems	2			X		X	
DX4G 35	Measurement Systems 2	1			X		X	
DG4P 35	Mathematics for Engineering 3	2			X			X
DX4T 35	Transmission of Measurement Signals	1			X		X	
DX4M 35	Programmable Logic Controllers: Advanced	1			X		X	
DX4P 35	Safe Instrumentated Systems	1			X		X	
DX4J 34	Process Analysers: On-Line	1		X				X
DX4D 34	Instrumentation in Hazardous Areas	1		X				X
DG31 34	Applications of Programmable Logic Controllers	1		X			X	
D75X 34	Information Technology: Applications Software 1	1		X				X
DX4A 34	Fire and Gas Detection	1		X				X

HND Measurement and Control Engineering

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Unit number	Unit title	Credit value	SCQF level				Mandatory or Optional	
			6	7	8	9	Mandatory	Optional
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	1		X				X
DX4C 34	Hazard and Plant Safety Engineering	1		X				X
DX4L 35	Process Control by Computer	1			X			X
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	1		X				X
DX4E 34	Intelligent Instrumentation and Asset Management Systems	1		X				X
DX4H 34	Meter Systems in Measurement and Control Engineering	1		X				X
DX49 34	Engineering Science Principles	1		X				X
DG3C 34	Combinational Logic	1		X				X
DT8Y 34	Quality Management: An Introduction	1		X				X
DG58 34	High Level Engineering Software	1		X				X
DG5A 34	High Level Language: External I/O Transfer	1			X			X
DN4D 35	Control Systems Behaviour	1			X			X
DG4X 35	Microprocessor and Microcontroller Technology	1			X			X
H7K0 33*	Engineering Mathematics 1	1	X				X	
H7K2 34*	Engineering Mathematics 3	1		X				X
H7K3 35*	Engineering Mathematics 4	1			X			X
J0HA 34*	Computer Programming	1		X				X
J0H9 34*	Data Security	1		X				X
H7K4 35*	Engineering Mathematics 5	1			X			X
H93P 34*	Process Instrumentation:	2		X				X

	Practical Skills						
DW8W 34*	Robotics and Animatronics: An Introduction	1		X			X
DT9Y 35*	Robotic Systems	1			X		X
DW8N 34*	Engineering Systems Interfaced with Programmable Logic Controllers	1		X			X
DW8V 35*	Robotics and Animatronics	1			X		X
Total		39	1	25	16	0	20
Requirements of design principles		30		6	8		

*Refer to History of Changes for reversion changes.

5.2 Mapping information

Mapping of Aims to Units

HNC Measurement and Control Engineering

Group Award Code: G88N 15

Unit No	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7	Aim 8	Aim 9
F013 34	Graded Unit 1 (exam)									
DE3N 34	Communication: Analysing and Presenting Complex Communication	X	X	X	X	X		X		
DG4L 34	Mathematics for Engineering 2	X	X	X		X		X		X
DX48 34	Distributed Control Systems	X			X	X	X		X	X
DX4F 34	Measurement Systems 1	X	X		X	X		X	X	X
DX4K 34	Process Control	X	X		X	X		X	X	X
DX45 34	Complex Control Systems	X			X	X	X	X	X	X
DG31 34	Applications of Programmable Logic Controllers			X	X	X	X		X	X
DX4J 34	Process Analysers: On-Line	X	X		X	X	X	X	X	X
DX4D 34	Instrumentation in Hazardous Areas	X			X	X			X	X
D75X 34	Information Technology: Applications Software 1	X			X	X	X		X	
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	X		X	X	X			X	X
DX4A 34	Fire and Gas Detection				X	X	X		X	X
DX4C 34	Hazard and Plant Safety Engineering		X	X	X	X			X	X
DX4L 35	Process Control by Computer	X		X		X		X	X	X
DX4E 34	Intelligent Instrumentation and Asset Management Systems		X		X	X		X	X	X
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	X			X	X		X	X	X
DX47 34	Digital Communications in Measurement and Control Engineering	X			X		X	X	X	X
DX4H 34	Meter Systems in Measurement and Control Engineering				X	X		X	X	X
DG3C 34	Combinational Logic	X			X	X	X	X	X	X
DX49 34	Engineering Science Principles	X			X	X		X	X	X
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical	X	X	X	X	X				

Mapping of Aims to Units

HND Measurement and Control Engineering

Group Award code: G88P 16

Unit No	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7	Aim 8	Aim 9	Aim 10	Aim 11	Aim 12
F013 34	Graded Unit 1 (exam)												
DE3N 34	Communications: Analysing and Presenting Complex Communication	X	X	X	X	X		X					
DG4L 34	Mathematics for Engineering 2	X	X	X		X		X		X			
DX48 34	Distributed Control Systems	X			X	X	X		X	X			
DX4F 34	Measurement Systems 1	X	X		X	X		X	X	X			
DX4K 34	Process Control	X	X		X	X		X	X	X			
DX45 34	Complex Control Systems	X			X	X	X	X	X	X			
DX47 34	Digital Communications in Measurement and Control Engineering	X			X		X	X	X	X			
F014 35	Graded Unit 2 (project)												
DX46 35	Continuous and Computer Control of Engineering Systems	X	X	X	X	X	X	X			X	X	X
DX4G 35	Measurement Systems 2	X	X		X	X		X	X	X	X	X	X
DG4P 35	Mathematics for Engineering 3	X	X	X		X		X			X		X
DX4T 35	Transmission of Measurement Signals	X			X	X			X	X	X	X	X
DX4M 35	Programmable Logic Controllers : Advanced	X		X	X	X	X			X		X	X
DX4P 35	Safe Instrumentated Systems	X		X	X	X			X	X		X	X
DX4J 34	Process Analysers: On-Line	X	X		X	X	X	X	X	X			
DX4D 34	Instrumentation in Hazardous Areas	X			X	X			X	X			
DG31 34	Applications of Programmable Logic Controllers			X	X	X	X		X	X			
D75X 34	Information Technology: Applications Software 1	X			X	X	X		X				
DX4A 34	Fire and Gas Detection				X	X	X		X	X			
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	X		X	X	X			X	X			
DX4C 34	Hazard and Plant Safety Engineering		X	X	X	X			X	X			
DX4L 35	Process Control by Computer	X		X		X		X	X	X			
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	X			X	X		X	X	X			

Unit No	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7	Aim 8	Aim 9	Aim 10	Aim 11	Aim 12
DX4E 34	Intelligent Instrumentation and Asset Management Systems		X		X	X		X	X	X			
DX4H 34	Meter Systems in Measurement and Control Engineering				X	X		X	X	X			
DX49 34	Engineering Science Principles	X			X	X		X	X	X			
DG3C 34	Combinational Logic	X			X	X	X	X	X	X			
DT8Y 34	Quality Management: An Introduction	X	X	X	X	X		X			X		X
DG58 34	High Level Engineering Software	X		X		X	X	X			X		
DG5A 35	High Level Language: External I/O Transfer	X		X		X	X	X			X	X	
DN4D 35	Control Systems Behaviour	X		X				X			X		X
DG4X 35	Microprocessor and Microcontroller Technology		X			X	X				X		X
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical	X	X	X	X	X							

Core Skills Mapping of a Group Award

HNC Measurement and Control Engineering

Group Award Code: G88N 15

Unit No	Unit title	Written Comms Reading	Written Comms Writing	Oral Comms	Using Graphical Info	Using Number	Using IT	Problem Solving – C T	Problem Solving – P & O	Problem Solving – R & E	Working with others
F013 34	Graded Unit 1 (exam)	5 S	5 S		5 S	5 S	5 S	5 S	5 S	5 S	5 S
DE3N 34	Communication: Analysing and Presenting Complex Communication	6 C	6 C	6 C							
DG4L 34	Mathematics for Engineering 2	5 S	5 S		5 S	6 S		5 S			
DX48 34	Distributed Control Systems	5 S	5 S				5 S	5 S			5 S
DX4F 34	Measurement Systems 1	5 S	5 S		5 S			5 S			5 S
DX4K 34	Process Control	5 S	5 S					5 S	5 S		
DX45 34	Complex Control Systems	5 S	5 S					5 S			
DG31 34	Applications of Programmable Logic Controllers	5 S	5 S			5 S				5 S	
DX4J 34	Process Analysers: On-Line	5 S	5 S								
DX4D 34	Instrumentation in Hazardous Areas	5 S	5 S								5 S
D75X 34	Information Technology : Applications Software 1	5 S	5 S				6 C		5 S		
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	5 S	5 S								
DX4A 34	Fire and Gas Detection	5 S	5 S								
DX4C 34	Hazard and Plant Safety Engineering	5 S	5 S								
DX4L 35	Process Control by Computer	5 S	5 S				6 S				5 S
DX4E 34	Intelligent Instrumentation and Asset Management Systems	5 S	5 S								

Enter level and S for signposted and C for certificated.

HNC Measurement and Control Engineering

Group Award code: G88N 15

Unit No	Unit title	Written Comms - Reading	Written Comms - Writing	Oral Comms	Using Graphical Info	Using Number	Using IT	Problem Solving – C T	Problem Solving – P & O	Problem Solving – R & E	Working with others
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	5 S	5 S								
DX47 34	Digital Communications in Measurement and Control Engineering	5 S	5 S					5 S			
DX4H 34	Meter Systems in Measurement and Control Engineering	5 S	5 S								
DG3C 34	Combinational Logic	5 S	5 S			5 S		5 S	5 S		
DX49 34	Engineering Science Principles	5 S	5 S			6 C					
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical					6 C					

Enter level and S for signposted and C for certificated.

Core Skills Mapping of a Group Award

HND Measurement and Control Engineering

Group Award code: G88P 16

Unit No	Unit title	Written Comms - Reading	Written Comms - Writing	Oral Comms	Using Graphical Info	Using Number	Using IT	Problem Solving – C T	Problem Solving – P & O	Problem Solving – R & E	Working with Others
F013 34	Graded Unit 1 (exam)	5 S	5 S		5 S	5 S	5 S	5 S	5 S	5 S	5 S
DE3N 34	Communication: Analysing and Presenting Complex Communication	6 C	6 C	6 C							
DG4L 34	Mathematics for Engineering 2	5 S	5 S		5 S	6 S		5 S			
DX48 34	Distributed Control Systems	5 S	5 S				5 S	5 S			5 S
DX4F 34	Measurement Systems 1	5 S	5 S		5 S			5 S			5 S
DX4K 34	Process Control	5 S	5 S					5 S	5 S		
DX45 34	Complex Control Systems	5 S	5 S					5 S			
DX47 34	Digital Communications in Measurement and Control Engineering	5 S	5 S								
F014 35	Graded Unit 2 (project)	6 S	6 S	6 S	6 S	6 S	6 S	6 S 5 C	6 S 5 C	6 S 5 C	5 S
DX46 35	Continuous and Computer Control of Engineering Systems	5 S	5 S					5 S			
DX4G 35	Measurement Systems 2	5 S	5 S					5 S			
DG4P 35	Mathematics for Engineering 3										
DX4T 35	Transmission of Measurement Signals	5 S	5 S		6 S			5 S			
DX4M 35	Programmable Logic Controllers : Advanced	5 S	5 S					5 S	6 S		5 S
DX4P 35	Safe Instrumentated Systems	5 S	5 S					5 S			
DX4J 34	Process Analysers: On-Line	5 S	5 S					5 S			
DX4D 34	Instrumentation in Hazardous Areas	5 S	5 S								5 S

Enter level and S for signposted and C for certificated.

Core Skills Mapping of a Group Award
HND Measurement and Control Engineering
Group Award code: G88P 16

Unit No	Unit title	Written Comms - Reading	Written Comms - Writing	Oral Comms	Using Graphical Info	Using Number	Using IT	Problem Solving – C T	Problem Solving – P & O	Problem Solving – R & E	Working with others
DG31 34	Applications of Programmable Logic Controllers	5 S	5 S			5 S				5 S	
D75X 34	Information Technology: Applications Software 1	5 S	5 S				6 C		5 S		
DX4A 34	Fire and Gas Detection	5 S	5 S								
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	5 S	5 S								
DX4C 34	Hazard and Plant Safety Engineering	5 S	5 S								
DX4L 35	Process Control by Computer	5 S	5 S				6 S				5 S
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	5 S	5 S								
DX4E 34	Intelligent Instrumentation and Asset Management Systems	5 S	5 S								
DX4H 34	Meter Systems in Measurement and Control Engineering	5 S	5								
DX49 34	Engineering Science Principles	5 S	5 S			6 C					
DG3C 34	Combinational Logic	5 S	5 S			5 S		5 S	5 S		
DT8Y 34	Quality Management: An Introduction	6 S	6 S			6 S		6 S	6 S		
DG58 34	High Level Engineering Software										
DG5A 35	High Level Language:Ext.I/O Trans.										
DN4D 35	Control Systems Behaviour										
DG4X 35	Microprocessor/Microcont Technology										

Core Skills Mapping of a Group Award
HND Measurement and Control Engineering
Group Award code: G88P 16

Unit No	Unit title	Written Comms - Reading	Written Comms - Writing	Oral Comms	Using Graphical Info	Using Number	Using IT	Problem Solving – C T	Problem Solving – P & O	Problem Solving – R & E	Working with others
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical					6 C					

Enter level and S for signposted and C for certificated.

5.3 Articulation, professional recognition and credit transfer

The occupational standards for the process industries were supplied by OPITO (formerly COGENT) and are mapped against the relevant Units as shown below.

National Occupational Standards

National Occupational Standards were supplied by OPITO.

Reference number		Relevant Standard title
1	I3.4	Prepare equipment required for maintaining instrument and control systems
2	I3.5	Prepare materials required for maintaining instrument and control systems
3	I3.6	Adjust instrument and control systems to meet operational requirements
4	I3.11	Read and extract information from instrument and control engineering drawings and specifications
5	I3.14	Test the performance and condition of instrument and control systems
6	I3.16	Assess the performance and condition of instrument and control systems
7	I3.17	Inspect instrument and control systems
8	C3.3	Minimise risks to life, property and environment
9	C3.4	Work safely, minimise risk and comply with emergency procedures

Mapping of National Occupational Standards to Units

HNC Measurement and Control Engineering

Group Award code: G88N 15

Unit No	Unit title	Reference number								
		1	2	3	4	5	6	7	8	9
F013 34	Graded Unit 1 (exam)									
DE3N 34	Communication: Analysing and Presenting Complex Communication									
DG4L 34	Mathematics for Engineering 2									
DX48 34	Distributed Control Systems	X	X	X	X	X	X	X		
DX4F 34	Measurement Systems 1	X	X	X		X	X	X		
DX4K 34	Process Control			X	X	X	X	X	X	
DX45 34	Complex Control Systems								X	
DG31 34	Applications of Programmable Logic Controllers			X		X	X			
DX4J 34	Process Analysers: On-Line									
DX4D 34	Instrumentation in Hazardous Areas					X	X		X	X
D75X 34	Information Technology: Applications Software 1									
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control								X	
DX4A 34	Fire and Gas Detection	X	X	X		X	X			
DX4C 34	Hazard and Plant Safety Engineering								X	X
DX4L 35	Process Control by Computer			X		X	X			
DX4E 34	Intelligent Instrumentation and Asset Management Systems	X	X	X		X	X			

Mapping of National Occupational Standards to Units

HNC Measurement and Control Engineering

Group Award code: G88N 15

Unit No	Unit title	Reference number								
		1	2	3	4	5	6	7	8	9
DX4R 34	Supervisory Control and Data Acquisition (SCADA)			X		X	X			
DX47 34	Digital Communications in Measurement and Control Engineering									
DX4H 34	Meter Systems in Measurement and Control								X	
DG3C 34	Combinational Logic									
DX49 34	Engineering Science Principles									
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical									

Mapping of National Occupational Standards to Units

HND Measurement and Control Engineering

Group Award code: G88P 16

Unit No	Unit title	Reference number								
		1	2	3	4	5	6	7	8	9
F013 34	Graded Unit 1 (exam)									
DE3N 34	Communication: Analysing and Presenting Complex Communication									
DG4L 34	Mathematics for Engineering 2									
DX48 34	Distributed Control Systems	X	X	X	X	X	X	X		
DX4F 34	Measurement Systems 1	X	X	X		X	X	X		
DX4K 34	Process Control			X	X	X	X	X	X	
DX45 34	Complex Control Systems								X	
DX47 34	Digital Communications in Measurement and Control Engineering									
F014 35	Graded Unit 2 (project)									
DX46 35	Continuous and Computer Control of Engineering Systems			X		X	X			
DX4G 35	Measurement Systems 2									
DG4P 35	Mathematics for Engineering 3									
DX4T 35	Transmission of Measurement Signals									
DX4M 35	Programmable Logic Controllers : Advanced			X		X	X			
DX4P 35	Safe Instrumentated Systems									
DX4J 34	Process Analysers: On-Line									
DX4D 34	Instrumentation in Hazardous Areas					X	X		X	X
DG31 34	Applications of Programmable Logic Controllers			X		X	X			
D75X 34	Information Technology: Applications Software 1									
DX4A 34	Fire and Gas Detection	X	X	X		X	X			

Mapping of National Occupational Standards to Units

HND Measurement and Control Engineering

Group Award code: G88P 16

Unit No	Unit title	Reference number								
		1	2	3	4	5	6	7	8	9
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering								X	
DX4C 34	Hazard and Plant Safety Engineering								X	X
DX4L 35	Process Control by Computer			X		X	X			
DX4R 34	Supervisory Control and Data Acquisition (SCADA)			X		X	X			
DX4E 34	Intelligent Instrumentation and Asset Management Systems	X	X	X		X	X			
DX4H 34	Meter Systems in Measurement and Control							X		
DX49 34	Engineering Science Principles									
DG3C 34	Combinational Logic									
DT8Y 34	Quality Management : An Introduction									
DG58 34	High Level Engineering Software									
DG5A 35	High Level Language: External I/O Transfer									
DN4D 35	Control System Behaviour									
DG4X 35	Microprocessor and Microcontroller Technology									

Professional Recognition

There is a long standing Chartered Engineering Professional Body, The Institute of Measurement and Control, which has supported these developments. The HNC/HND Measurement and Control Engineering Qualification Design Team (QDT) and the SQA have consulted with the professional body and we hope to seek its approval for the validated awards.

Revalidation of the current HN awards offers the opportunity to reflect and gather further empirical evidence on the fitness for purpose of this Group Award.

The QDT involved in the development of these Group Awards were actively involved in discussion with the Institute of Measurement and Control so as to ensure the currency and validity of the proposed Group Awards.

Credit Transfer

Proposed Unit credit transfers from the current courses to the new course proposals is shown below.

The QDT carried out a mapping exercise to compare the Units in the old awards with the new awards and the following credit transfers were agreed.

NB: The credit transfers listed are for full Units only.

Old No.	Old title	Credit value	New Unit No.	New title	CT Status
D4JH 04	Maths for Engineering AND Introductory Mathematics for Engineering	1	DG4H 33	Mathematics for Engineering 1: Electronics & Electrical	Full
D4JB 04		1			
D4JB 04	Introductory Mathematics for Engineering AND Maths for Engineering AND Calculus 1 for Engineering AND Calculus 2 for Engineering	1	DG4L 34	Mathematics for Engineering 2	Full
		1			
D4JH 04		1			
A5NK 04		1			
A5P2 04					
D5P3 04	Communication	1	DE3N 34	Communication	Partial
A6AM 04	IT Applications 1	1	D75X 34	IT Applications Software 1	Full

Old No.	Old title	Credit value	New Unit No.	New title	CT Status
A6AN 04	IT Applications 2	1	D75X 34	IT Applications Software 1	Full
A6C5 04	Process Control by Microcomputer	1	DX4L 35	Process Control by Computer	Full
D51V 04	Microcomputer Based Systems in Control	1	DX4L 35	Process Control by Computer	Full
3450663	Microprocessor Based Systems in Control	2	DX4L 35	Process Control by Computer	Full
A4C6 04 3450683	Instrumentation In Hazardous Areas	1	DX4D 34	Instrumentation Hazardous Areas	Full
D4FJ04	Application of Programmable Logic Controllers	1	DG31 34	Applications of Programmable Logic Controllers	Full
D51W 04 3450693	Fire and Gas Detection Systems	1	DX4A 34	Fire and Gas Detection	Full
D3PH 04	Analysis Instrumentation	1	DX4J 34	Process Analysers: On-Line	Full
A198 04	Engineering Science Principles	1	DX49 34	Engineering Science Principles	Full
A3M3 04	Continuous and Computer-Controlled Engineering Systems: Electronic and Electrical	2	DX46 35	Continuous and Computer Control of Engineering Systems	Full
A6C3 04	Advanced PLC's	1	DX4M 35	Programmable Logic Controllers: Advanced	Full
A27F 04	Transmission of Measurement Signals	1	DX4T 35	Transmission of Measurement Signals	Full
A6CA 04	Supervisory Control and Data Acquisition (SCADA)	1	DX4R 34	Supervisory Control and Data Acquisition (SCADA)	Full

6 Approaches to delivery and assessment

Open Learning

The Units in the HNC/D course could be delivered by distance learning however it would require the following:

- 1 Suitably prepared course material.
- 2 Planning by the centre to ensure sufficiency and authenticity of candidate evidence.
- 3 Arrangements would have to be made to ensure that assessments were delivered in a supervised environment under controlled conditions.

- 4 Arrangements are made to attend the centre for completion of practical evidence. Alternatively, special arrangements could be made for the candidate to demonstrate the practical work to a designated, responsible person local to the candidate.

To manage the situation an attempt should be made to keep the administration burden to a minimum.

For information on open learning, please refer to *SQA guide on assessment and quality assurance of open and distance learning (A1030, Feb 2001)*.

Delivery Planner

The purpose of the Graded Units is to assess that the candidate has met the main aims of the awards.

It should be challenging enough to determine the candidate's ability to retain and contextualise knowledge and skills gained from the individual Units which form the mandatory sections of the awards.

A candidate may be graded A, B or C for each of the Graded Units. The grading is for these Units only and not the Group Award. When planning delivery of the course the following points should be taken into consideration:

- ◆ Appropriate teaching and learning underpinning the elements of the Graded Unit has been delivered.
- ◆ Any external moderation requirements has been arranged with the SQA.
- ◆ Impact on overall assessment loading on candidates.
- ◆ HNC (first year HND) to include Graded Unit 1 of 8 SCQF credit points at SCQF level 7.
- ◆ HND to include one Graded Unit 1 of 8 SCQF credit points at level 7 plus 16 SCQF credit points of Graded Unit 2 at SCQF level 8.

The current level grade criteria for individual HN Units ie Merit, is being phased out, therefore all the Units for these awards have been re-written and all Unit specifications are in accordance with the revised design principles i.e. these within the HNC/HND Measurement and Control Engineering portfolio do not contain merit statements.

A proposed Unit delivery planner for part-time and full-time provision is shown below.

Programme delivery planner for HNC Measurement and Control Engineering

HNC Measurement and Control Engineering

Mode of study full-time

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
F013 34	Graded Unit 1 (exam)	7	M	1		40					
DE3N 34	Communication; Analysing and Presenting Complex Communication	7	M	1	40						
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical	6	M	1	40						
DX48 34	Distributed Control Systems	7	M	2	40	40					
DX4F 34	Measurement Systems 1	7	M	2	40	40					
DX4K 34	Process Control	7	O	1		40					
DX45 34	Complex Control Systems	7	O	1		40					
DG31 34	Applications of Programmable Logic Controllers	7	O	1	40						plc lab
DX4J 34	Process Analysers: On- Line	7	O	1		40					

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
DX4D 34	Instrumentation in Hazardous Areas	7	O	1		40					
D75X 34	Information Technology: Applications Software 1	7	O	1	40						
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	7	O	1		40					
DX4A 34	Fire and Gas Detection	7	O	1	40						
DX4C 34	Hazard and Plant Safety Engineering	7	O	1		40					
DX4L 35	Process Control by Computer	8	O	1		40					
DX4E 34	Intelligent Instrumentation and Asset Management Systems	7	O	1		40					
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	7	O	1	40						
DX47 34	Digital Communications in Measurement and Control Engineering	7	O	1	40						

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
DX4H 34	Meter Systems in Measurement and Control Engineering	7	O	1		40					
DG3C 34	Combinational Logic	7	O	1	40						
DX49 34	Engineering Science Principles	7	O	1	40						
DG4L 34	Mathematics for Engineering 2	7	O	1	40						

NOTE: All candidates do all five Mandatory Units (7 credits) then pick Optional Units from the list to make 12 credits (minimum).

Programme delivery planner for HNC Measurement and Control Engineering

HNC Measurement and Control Engineering

Mode of study Day Release (2 year programme)

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
F013 34	Graded Unit 1 (exam)	7	M	1				40			
DG3N 34	Communication: Analysing and Presenting Complex Communication	7	M	1	40						
DG4H 33	Mathematics for Engineering 1:Electronics and Electrical	6	M	1	40						
DX48 34	Distributed Control Systems	7	M	2			40	40			
DX4F 34	Measurement Systems 1	7	M	2	40	40					
DX4K 34	Process Control	7	O	1		40					
DX45 34	Complex Control Systems	7	O	1				40			
DG31 34	Applications of Programmable Logic Controllers	7	O	1			40				plc lab
DX4J 34	Process Analysers: On- Line	7	O	1		40					

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
DX4D 34	Instrumentation in Hazardous Areas	7	O	1		40					
D75X 34	Information Technology: Applications Software 1	7	O	1	40						
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	7	O	1				40			
DX4A 34	Fire and Gas Detection	7	O	1			40				
DX4C 34	Hazard and Plant Safety Engineering	7	O	1				40			
DX4L 35	Process Control by Computer	8	O	1				40			
DX4E 34	Intelligent Instrumentation and Asset Management Systems	7	O	1		40					
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	7	O	1			40				

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
DX47 34	Digital Communications in Measurement and Control Engineering	7	O	1		40					
DX4H 34	Meter Systems in Measurement and Control Engineering	7	O	1				40			
DG3C 34	Combinational Logic	7	O	1			40				
DX49 34	Engineering Science Principles	7	O	1	40						
DG4L 34	Mathematics for Engineering 2	7	O	1			40				

NOTE: All candidates do all five Mandatory Units (7 credits) then pick Optional Units from the list to make 12 credits (minimum).

Programme delivery planner for HND Measurement and Control Engineering

HND Measurement and Control Engineering

Mode of study full-time

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
F013 34	Graded Unit 1 (exam)	7	M	1		40					
DE3N 34	Communication: Analysing and Presenting Complex Communication	7	M	1	40						
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical	6	M	1	40						
DX48 34	Distributed Control Systems	7	M	2	40	40					
DX4F 34	Measurement Systems 1	7	M	2	40	40					
DX4K 34	Process Control	7	M	1		40					
DX45 34	Complex Control Systems	7	M	1		40					
DX47 34	Digital Communications in Measurement and Control Engineering	7	M	1	40						

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
F014 35	Graded Unit 2 (Project)	8	M	2			40	40			
DX46 35	Continuous and Computer Control of Engineering Systems	8	M	2			40	40			
DX4G 35	Measurement Systems 2	8	M	1			40				
DG4L 34	Mathematics for Engineering 2	7	M	1		40					
DX4T 35	Transmission of Measurement Signals	8	M	1				40			
DG31 34	Applications of Programmable Logic Controllers	7	M	1	40						plc lab
DX4P 35	Safe Instrumentated Systems	8	M	1			40				
DX4M 35	Programmable Logic Controllers: Advanced	8	M	1				40			plc lab
DX4J 34	Process Analysers: On-Line	7	O	1		40					
DX4D 34	Instrumentation in Hazardous Areas	7	O	1		40					

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
D75X 34	Information Technology: Applications Software 1	7	O	1	40						
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	7	O	1		40					
DX4A 34	Fire and Gas Detection	7	O	1	40						
DX4C 34	Hazard and Plant Safety Engineering	7	O	1		40					
DX4L 35	Process Control by Computer	8	O	1		40					
DX4E 34	Intelligent Instrumentation and Asset Management Systems	7	O	1		40					
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	7	O	1	40						
DX4H 34	Meter Systems in Measurement and Control Engineering	7	O	1		40					

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester				Member of staff	Preferred room	Special resources
					Year 1		Year 2				
					Semester						
					1	2	1	2			
DG3C 34	Combinational Logic	7	O	1	40						
DX49 34	Engineering Science Principles	7	O	1	40						
DT8Y 34	Quality Management: An Introduction	7	O	1				40			
DN4D 35	Control Systems Behaviour	8	O	1			40				
DG4X 35	Microprocessor and Microcontroller Technology	8	O	1			40				
DG5A 35	High Level Language: External I/O Transfer	8	O	1				40			
DG58 34	High Level Engineering Software	7	O	1			40				
DG4P 35	Mathematics for Engineering 3	8	O	2			40	40			

NOTE: All candidates do all 16 Mandatory Units (20 credits) then pick Optional Units from the list to make 30 credits (minimum).

Programme delivery planner for HND Measurement and Control Engineering

HND Measurement and Control Engineering

Mode of study Day Release (4 year programme)

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester								Member of staff	Preferred room	Special resources
					Year 1		Year 2		Year 3		Year 4				
					Semester										
					1	2	1	2	1	2	1	2			
F013 34	Graded Unit 1 (exam)	7	M	1				40							
DG3N 34	Communication: Analysing and Presenting Complex Communication	7	M	1	40										
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical	6	M	1	40										
DX48 34	Distributed Control Systems	7	M	2			40	40							
DX4F 34	Measurement Systems 1	7	M	2	40	40									
DX4K 34	Process Control	7	M	1		40									
DX45 34	Complex Control Systems	7	M	1				40							
DX47 34	Digital Communications in Measurement and Control Engineering	7	M	1			40								

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester								Member of staff	Preferred room	Special resources
					Year 1		Year 2		Year 3		Year 4				
					Semester										
					1	2	1	2	1	2	1	2			
F014 35	Graded Unit 2 (Project)	8	M	2							40	40			
DX46 35	Continuous and Computer Control of Engineering Systems	8	M	2							40	40			
DX4G 35	Measurement Systems 2	8	M	1					40						
DG4L 34	Mathematics for Engineering 2	7	M	1		40									
DX4T 35	Transmission of Measurement Signals	8	M	1		40									
DG31 34	Applications Programmable Logic Controllers	7	M	1					40						plc lab
DX4P 35	Safe Instrumentated Systems	8	M	1					40						
DX4M 35	Programmable Logic Controllers: Advanced	8	M	1						40					plc lab
DX4J 34	Process Analysers: On-Line	7	O	1						40					
DX4D 34	Instrumentation in Hazardous Areas	7	O	1						40					

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester								Member of staff	Preferred room	Special resources
					Year 1		Year 2		Year 3		Year 4				
					Semester										
					1	2	1	2	1	2	1	2			
D75X 34	Information Technology: Applications Software 1	7	O	1	40										
DX4N 34	Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	7	O	1								40			
DX4A 34	Fire and Gas Detection	7	O	1							40				
DX4C 34	Hazard and Plant Safety Engineering	7	O	1						40					
DX4L 35	Process Control by Computer	8	O	1						40					
DX4E 34	Intelligent Instrumentation and Asset Management Systems	7	O	1		40									
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	7	O	1					40						
DX4H 34	Meter Systems in Measurement and Control Engineering	7	O	1		40									
DG3C 34	Combinational Logic	7	O	1			40								

Unit No	Unit title	Level	Mandatory/ Optional	No of credits	Hours per Semester								Member of staff	Preferred room	Special resources
					Year 1		Year 2		Year 3		Year 4				
					Semester										
					1	2	1	2	1	2	1	2			
DX49 34	Engineering Science Principles	7	O	1	40										
DT8Y 34	Quality Management: An Introduction	7	O	1								40			
DN4D 35	Control Systems Behaviour	8	O	1							40				
DG4X 35	Microprocessor and Microcontroller Technology	8	O	1							40				
DG5A 35	High Level Language: External I/O Transfer	8	O	1				40							
DG58 34	High Level Engineering Software	7	O	1			40								
DG4P 35	Mathematics for Engineering 3	8	O	2			40	40							

NOTE: All candidates do all 16 Mandatory Units (20 credits) then pick Optional Units from the list to make 30 credits (minimum).

Assessment Plan

A proposed Unit assessment planner for part-time and full-time provision is shown below

Proposed Assessment planner HNC Measurement and Control Engineering — Full-Time

		WEEKS IN SEMESTER 1																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Graded Unit 1 (exam)	M																		
Communication: Analysing and Presenting Complex Communication	M			OB	AS										OB				
Mathematics for Engineering 1: Electronics and Electrical	M																CB		
Distributed Control Systems	M			CB					CB					CB					CB
Measurement Systems 1	M					CB						AS							AS
Process Control	O																		
Complex Control Systems	O																		
Digital Communications in Measurement and Control Engineering	O																CB		
Applications of Programmable Logic Controllers	O											CB	AS						
Process Analysers: On-Line	O																		
Instrumentation in Hazardous Areas	O																		
Information Technology: Applications Software 1	O												CS						

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 1																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O																		
Fire and Gas Detection	O																CB		
Hazard and Plant Safety Engineering	O																		
Process Control by Computer	O																		
Intelligent Instrumentation and Asset Management Systems	O																		
Supervisory Control and Data Acquisition (SCADA)	O											CB		AS					
Meter Systems in Measurement and Control Engineering	O																		
Combinational Logic	O													CB		AS			
Engineering Science Principles	O														CB				
Mathematics for Engineering 2	O															CB			

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 2																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Graded Unit (exam)	M																EX		
Communication: Analysing and Presenting Complex Communication	M																		
Mathematics for Engineering 1: Electronics and Electrical	M																		
Distributed Control Systems	M			CB				CB					CB					CB	
Measurement Systems 1	M				AS							AS					AS		
Process Control	O													CB	AS				
Complex Control Systems	O															CB			
Digital Communications in Measurement and Control Engineering	O																		
Applications of Programmable Logic Controllers	O																		
Process Analysers: On-Line	O															CB			
Instrumentation in Hazardous Areas	O											CB			AS				
Information Technology: Applications Software 1	O																		

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		WEEKS IN SEMESTER 2																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O											CB			AS				
Fire and Gas Detection	O																		
Hazard and Plant Safety Engineering	O																CB		
Process Control by Computer	O				AS						AS					AS			
Intelligent Instrumentation and Asset Management Systems	O				AS					AS						CB			
Supervisory Control and Data Acquisition (SCADA)	O																		
Meter Systems in Measurement and Control Engineering	O															CB			
Combinational Logic	O																		
Engineering Science Principles	O																		
Mathematics for Engineering 2	O																		

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Assessment planner HNC Measurement and Control Engineering — Day Release

		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Graded Unit 1 (exam)	M																		
Communication: Analysing and Presenting Complex Communication	M			OB	AS										OB				
Mathematics for Engineering 1: Electronics and Electrical	M																CB		
Distributed Control Systems	M			CB					CB					CB					CB
Measurement Systems 1	M					CB						AS							AS
Process Control	O																		
Complex Control Systems	O																		
Digital Communications in Measurement and Control Engineering	O																		
Applications of Programmable Logic Controllers	O											CB	AS						
Process Analysers: On- Line	O																		
Instrumentation in Hazardous Areas	O																		
Information Technology: Applications Software 1	O												CS						
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O																		

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		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fire and Gas Detection	O																CB		
Hazard and Plant Safety Engineering	O																		
Process Control by Computer	O																		
Intelligent Instrumentation and Asset Management Systems	O																		
Supervisory Control and Data Acquisition (SCADA)	O											CB		AS					
Meter Systems in Measurement and Control Engineering	O																		
Combinational Logic	O													CB		AS			
Engineering Science Principles	O														CB				
Mathematics for Engineering 2	O															CB			

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		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Graded Unit 1 (exam)	M																EX		
Communication: Analysing and Presenting Complex Communication	M																		
Mathematics for Engineering 1:Electronics and Electrical	M																		
Distributed Control Systems	M			CB				CB					CB					CB	
Measurement Systems 1	M				AS							AS					AS		
Process Control	O													CB	AS				
Complex Control Systems	O															CB			
Digital Communications in Measurement and Control Engineering	O																	CB	
Applications of Programmable Logic Controllers	O																		
Process Analysers: On- Line	O																CB		
Instrumentation in Hazardous Areas	O											CB			AS				
Information Technology: Applications Software 1	O																		

		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O											CB			AS				

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		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Fire and Gas Detection	O																		
Hazard and Plant Safety Engineering	O																CB		
Process Control by Computer	O				AS						AS					AS			
Intelligent Instrumentation and Asset Management Systems	O				AS					AS						CB			
Supervisory Control and Data Acquisition (SCADA)	O																		
Meter Systems in Measurement and Control Engineering	O															CB			
Combinational Logic	O																		
Engineering Science Principles	O																		
Mathematics for Engineering 2	O																		

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Assessment planner HND Measurement and Control Engineering — Full-Time

		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Graded Unit 1 (exam)	M																		
Communication: Analysing and Presenting Complex Communication	M			OB	AS										OB				
Mathematics for Engineering 1:Electronics and Electrical	M																CB		
Distributed Control Systems	M			CB					CB					CB					CB
Measurement Systems 1	M					CB						AS							AS
Process Control	M																		
Complex Control Systems	M																		
Digital Communications in Measurement and Control Engineering	M																CB		
Graded Unit 2 (Project)	M	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ
Continuous and Computer Control of Engineering Systems	M																		
Measurement Systems 2	M						AS									CB			
Mathematics for Engineering 2	M																		
Transmission of Measurement Signals	M																		
Applications of Programmable Logic Controllers	M											CB	AS						

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		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Safe Instrumentated Systems	M																CB		
Programmable Logic Controllers: Advanced	M																		
Process Analysers: On-Line	O																		
Instrumentation in Hazardous Areas	O																		
Information Technology: Applications Software 1	O												CS						
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O																		
Fire and Gas Detection	O																CB		
Hazard and Plant Safety Engineering	O																		
Process Control by Computer	O																		
Intelligent Instrumentation and Asset Management Systems	O																		
Supervisory Control and Data Acquisition (SCADA)	O										CB			AS					
Meter Systems in Measurement and Control Engineering	O																		
Combinational Logic	O													CB		AS			

		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Engineering Science Principles	O														CB				
Quality Management: An Introduction	O																		

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		WEEKS IN SEMESTER 1 (Year 1 & 2)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Control Systems Behaviour	O				CB											OB			
Microprocessor and Microcontroller Technology	O														CB		AS		
High Level Language: External I/O Transfer	O																		
High Level Engineering Software	O			AS				AS				AS				AS			
Maths for Engineering 3	O																		

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		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Graded Unit 1 (exam)	M																EX		
Communication: Analysing and Presenting Complex Communication	M																		
Mathematics for Engineering 1:Electronics and Electrical	M																		
Distributed Control Systems	M			CB				CB					CB					CB	
Measurement Systems 1	M				AS							AS					AS		
Process Control	M													CB	AS				
Complex Control Systems	M															CB			
Digital Communications in Measurement and Control Engineering	M																		
Graded Unit 2 (Project)	M	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ			
Continuous and Computer Control of Engineering Systems	M															CB			
Measurement Systems 2	M																		
Mathematics for Engineering 2	M																CB		
Transmission of Measurement Signals	M			CB					CB					CB				CB	

		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Applications of Programmable Logic Controllers	M																		

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		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Safe Instrumentated Systems	M																		
Programmable Logic Controllers: Advanced	M		AS					AS					CB			AS			
Process Analysers: On-Line	O															CB			
Instrumentation in Hazardous Areas	O											CB			AS				
Information Technology: Applications Software 1	O																		
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O											CB			AS				
Fire and Gas Detection	O																		
Hazard and Plant Safety Engineering	O																CB		
Process Control by Computer	O				AS						AS					AS			
Intelligent Instrumentation and Asset Management Systems	O				AS					AS						CB			
Supervisory Control and Data Acquisition (SCADA)	O																		
Meter Systems in Measurement and Control Engineering	O															CB			
Combinational Logic	O																		

		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Engineering Science Principles	O																		
Quality Management: An Introduction	O				CB					CS							CS		

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		WEEKS IN SEMESTER 2 (Year 1 & 2)																	
Unit title	Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Control Systems Behaviour	O																		
Microprocessor and Microcontroller Technology	O																		
High Level Language: External I/O Transfer	O			AS					AS						AS				
High Level Engineering Software	O																		
Maths for Engineering 3	O															CB			

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Assessment planner HND Measurement and Control Engineering — Day Release

		WEEKS IN SEMESTER 1 (Year 1, 2, 3 & 4)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Graded Unit 1 (exam)	M																		
Communication: Analysing and Presenting Complex Communication	M			OB	AS										OB				
Mathematics for Engineering 1:Electronics and Electrical	M																CB		
Distributed Control Systems	M			CB					CB					CB					CB
Measurement Systems 1	M					CB						AS							AS
Process Control	M																		
Complex Control Systems	M																		
Digital Communications in Measurement and Control Engineering	M																CB		
Graded Unit 2 (Project)	M	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ
Continuous and Computer Control of Engineering Systems	M																		
Measurement Systems 2	M						AS										CB		
Mathematics for Engineering 2	M																		
Transmission of Measurement Signals	M																		

		WEEKS IN SEMESTER 1 (Year 1, 2, 3 & 4)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Applications of Programmable Logic Controllers	M											CB	AS						

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 1 (Year 1, 2, 3 & 4)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Safe Instrumentated Systems	M																CB		
Programmable Logic Controllers: Advanced	M																		
Process Analysers: On-Line	O																		
Instrumentation in Hazardous Areas	O																		
Information Technology: Applications Software 1	O												CS						
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O																		
Fire and Gas Detection	O																CB		
Hazard and Plant Safety Engineering	O																		
Process Control by Computer	O																		
Intelligent Instrumentation and Asset Management Systems	O																		
Supervisory Control and Data Acquisition (SCADA)	O										CB			AS					
Meter Systems in Measurement and Control Engineering	O																		
Combinational Logic	O													CB		AS			

		WEEKS IN SEMESTER 1 (Year 1, 2, 3 & 4)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Engineering Science Principles	O														CB				
Quality Management: An Introduction	O																		

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 1 (Year 1, 2, 3 & 4)																	
Unit title	Type	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Control Systems Behaviour	O				CB											OB			
Microprocessor and Microcontroller Technology	O														CB		AS		
High Level Language: External I/O Transfer	O																		
High Level Engineering Software	O			AS				AS				AS				AS			
Mathematics for Engineering 3	O																		

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 2 (Year 1, 2, 3 & 4)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Graded Unit 1 (exam)	M																EX		
Communication: Analysing and Presenting Complex Communication	M																		
Mathematics for Engineering 1: Electronics and Electrical	M																		
Distributed Control Systems	M			CB				CB					CB					CB	
Measurement Systems 1	M				AS							AS					AS		
Process Control	M													CB	AS				
Complex Control Systems	M															CB			
Digital Communications in Measurement and Control Engineering	M																		
Graded Unit 2 (Project)	M	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ	PJ			
Continuous and Computer Control of Engineering Systems	M															CB			
Measurement Systems 2	M																		
Mathematics for Engineering 2	M																CB		

		WEEKS IN SEMESTER 2 (Year 1, 2, 3 & 4)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Transmission of Measurement Signals	M			CB					CB					CB				CB	
Applications of Programmable Logic Controllers	M																		

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CB – Closed-book Assessment AS – Assignment

		WEEKS IN SEMESTER 2 (Year 1, 2, 3 & 4)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Safe Instrumentated Systems	M																		
Programmable Logic Controllers: Advanced	M		AS					AS					CB			AS			
Process Analysers: On-Line	O															CB			
Instrumentation in Hazardous Areas	O											CB			AS				
Information Technology: Applications Software 1	O																		
Risk Analysis, Reliability and Loss Prevention in Measurement and Control Engineering	O											CB			AS				
Fire and Gas Detection	O																		
Hazard and Plant Safety Engineering	O																CB		
Process Control by Computer	O				AS						AS					AS			
Intelligent Instrumentation and Asset Management Systems	O				AS					AS						CB			
Supervisory Control and Data Acquisition (SCADA)	O																		
Meter Systems in Measurement and Control Engineering	O															CB			
Combinational Logic	O																		
Engineering Science Principles	O																		

		WEEKS IN SEMESTER 2 (Year 1, 2, 3 & 4)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Quality Management: An Introduction	O				CB					CS							CS		

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		WEEKS IN SEMESTER 2 (Year 1, 2, 3 & 4)																	
Unit title	Type	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Control Systems Behaviour	O																		
Microprocessor and Microcontroller Technology	O																		
High Level Language: External I/O Transfer	O			AS					AS						AS				
High Level Engineering Software	O																		
Mathematics for Engineering 3	O															CB			

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CB – Closed-book Assessment AS – Assignment

Credit Transfer

New Unit Title	New Unit Code	Old Unit Title	Old Unit Code	Credit Transfer Conditions
Engineering Mathematics 1	H7K0 33	Mathematics for Engineering 1:Electronics and Electrical	DG4H 33	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to functions as specified in the Evidence requirements in respect of the first three knowledge/skills in Outcome 1 and relating to vectors as specified in the first three knowledge/skills in outcome 3.
Engineering Mathematics 1	H7K0 33	Mathematics for Engineering 1:Mechanical and Manufacturing	DT5X 33	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to functions as specified in the Evidence requirements in respect of the first three knowledge/skills in Outcome 1 and relating to 3D vectors and complex numbers as specified in the knowledge/skills in outcome 3.
Engineering Mathematics 2	H7K1 34	Mathematics for Engineering 2	DG4L 34	To gain credit transfer to the new unit candidates will have to provide additional evidence relating to trigonometric and hyperbolic functions as specified in the Evidence requirements in respect of Outcome 1.

7 General information for centres

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

Internal and external moderation

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

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

Further information on internal and external moderation can be found in SQA's *Guide to Assessment and Quality Assurance for Colleges of Further Education* (www.sqa.org.uk).

8 General information for candidates

These awards provide the underpinning knowledge for SVQ level 3/4 awards in the field of Measurement and Control Engineering and helps the candidate to develop a range of competences in Measurement and Control Engineering.

It is anticipated that these awards will provide a strong pathway of progression for candidates who have successfully completed a programme of National Qualification Units in a related area and also for those who wish to access Higher Education. The awards result in candidates being in satisfying and well paid employment eg Oil, Gas, Petro/Chemical, Pharmaceutical and Electrical Generation Utilities.

The HN Measurement and Control Engineering QDT does not wish to place any artificial barriers in the way of potential candidates wanting to study these awards. However, it would be unfair to enroll a candidate into the HNC and HND who did not have a realistic chance of successfully achieving either or both awards. The QDT would therefore recommend that a candidate had Mathematics at SCQF level 5 **AND** one of the following qualifications:

- ◆ Two Highers with one in a science or technology area.
- ◆ Occupationally relevant skills and experience eg relevant S/NVQ level 3.
- ◆ NC Measurement and Control Engineering.
- ◆ NC Multidisciplinary Engineering.

The Graded Units assess the knowledge and skills at the level of the Group Award. For the HNC Measurement and Control Engineering an exam based approach to the Graded Unit will assess the candidate's knowledge over a range of Units but must not duplicate the assessments required to achieve the individual Units.

For the HND Measurement and Control Engineering a project based approach to the Graded Unit better reflects the requirements in this vocational area. The project based Graded Unit tests the application of knowledge and skills required to carry out and evaluate tasks in which the candidate does significant work without supervision.

In principle candidates can be given credit transfer. Specific credit transfer can only be given on a Unit by Unit basis. Credit transfer can only be given where the level of demand on the candidate is the same. Credit transfer can be given where there is broad equivalence between the subject related content of Units, i.e. the knowledge and skills have not changed significantly. Any such credit transfer must be approved by the external moderator.

The Units contain a number of Outcomes which require candidates to produce assessment evidence. Assessments can be closed-book, open-book, short answer or extended response. Some assessments are of a practical nature and will be completed in centre laboratories at an appropriate time within the course. When all Outcomes within a Unit are achieved satisfactorily the candidate is credited with achieving the Unit.

Candidates will normally have the opportunity to resit the assessment for any Outcome at a time arranged with teaching staff. The course delivery and assessment planners will be managed to ensure the opportunity for reassessment is available for all Units including the Graded Units.

9 Glossary of terms

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

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

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

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

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

Dedicated Core Skill Unit: This is a Unit that is written to cover one or more particular Core Skills, eg HN Units in Information Technology or Communications.

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

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

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

Consortium-devised HNCs and HNDs are those developments or revisions undertaken by a group of centres in partnership with SQA.

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