



## **Arrangements for:**

**HNC in Petroleum Process Technology,  
Operations and Control at SCQF 7**

**HND in Petroleum Process Technology,  
Operations and Control at SCQF 8**

**Group Award Codes:**

**G9K5 15**

**G9KG 16**

**Validation date: June 2009**

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## **Acknowledgement**

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

## History of changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. This document is the latest version and incorporates the changes summarised below. 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
07	<b>Revision of Unit:</b> F2G8 34 Environmental Awareness (finish date 31/07/2023) has been replaced by J4RC 34 Environmental Awareness (start date 01/08/2020) on HNC framework.	31/10/23
06	Revision of Unit: F5CP 34 Supervision and Management (finish date 31/07/2021) has been replaced by J1BT 34 Supervision and Management (start date 01/08/18) for both HNC and HND frameworks	31/07/18
06	Revision of Unit: F43J 34 Process Safety Engineering (finish date 31/07/2018) has been replaced by HE3F 34 Process Safety Engineering (start date 01/06/16) for both HNC and HND frameworks	01/08/16
05	Revision of Units: DN8D 33 Mathematics for Science 1 has been revised by H8XP 33 and DV9V 34 Mathematics for Science 2 has been revised by H8XR 34. Old units will finish on 31/07/2017.	11/05/15
04	Removal of finish date from unit DG4P 35 <i>Mathematics for Engineering 3</i> . Addition of Credit Transfer Table <i>see Page 47</i> .	16/01/15
03	<b>Revision of Units:</b> D77G 34 <i>Communication: Practical Skills</i> revised by H7MB 34. DG4H 33 <i>Mathematics for Engineering 1: Electronics and Electrical</i> revised by H7K0 33 <i>Engineering Mathematics 1</i> . DT5X 33 <i>Mathematics for Engineering 1: Mechanical and Manufacturing</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 <b>HNC</b> and <b>HND</b> frameworks finishing 31/07/2016.	21/10/14
02	<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.	25/08/14

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# 1 Introduction

This is the Arrangements Document for the *new Group Award(s) in Petroleum Process Technology, Operations and Control, which were validated in June 2009*. This document includes: background information on the development of the Group Award, its aims, guidance on access, details of the Group Award structure, and guidance on delivery.

These awards are designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment within the Oil and Gas Industry and for progression to further academic qualifications.

## 2 Rationale for the development of the Group Award(s)

These are new awards designed to complement the existing suite of SQA qualifications currently available to support the oil and gas industry. In terms of vocational educational qualifications, they bridge the gap between the HNC/D Petroleum Engineering and the HNC/D Chemical Process Technology. The HNC/D Petroleum Process Technology, Operations and Control awards are designed to focus on the knowledge and skill requirements of oil and gas sector process technicians, with a mainly production process focus but with scope to include refinery operations.

## 3 Aims of the Group Award(s)

The Group Award Titles HNC Petroleum Process Technology, Operations and Control and HND Petroleum Process Technology, Operations and Control represent the rationale, aims and programme content of the Awards.

The main aim of course programmes leading to these new awards is to allow candidates to develop their knowledge, understanding and skills to enhance their employability within the oil and gas industry as process operations technicians and measurement and control technicians. A second aim is to support the development of future managers through continued professional development of experienced Technicians in a number of specialist areas related to Process Operations and Control.

The vocational focus of these awards combines the necessary blend of core competences and the understanding of key petrochemical processing related technological principles with knowledge of their industrial process applications in a safety and environmentally critical context. As such, the title 'Petroleum Process Technology, Operations and Control' is deemed to properly reflect the content and industrial relevance of these HNC and HND awards.

Options within the structure of these qualifications allow flexibility for programmes to be devised in a manner to adapt candidate development to meet particular individual or company requirements for candidate specialisation and career progression in a number of production related roles within the Oil and Gas Industry.

### 3.1 General aims of the Group Award(s)

The **general** aims of HNC Petroleum Process Technology, Operations and Control are:

- 1 To develop candidate Knowledge and Skills in planning, analysis and evaluation within Petroleum Process Technology, Operations and Control.
- 2 To develop employment skills related to the Petroleum industries
- 3 To enable progression within the SCQF
- 4 To develop study and research skills within the Petroleum Operations environment
- 5 To facilitate access to HE
- 6 To develop transferable skills, including Core Skills, to levels demanded by employers and for progression to further and/or higher education
- 7 To develop effective team working skills.
- 8 Develop a range of contemporary vocational skills relating to the use, support and development of systems appropriate to employment at technician or professional level.

### 3.2 Specific aims of the Group Award(s)

The **specific** aims of HNC Petroleum Process Technology, Operations and Control are:

- 9 To prepare candidates for an appropriate level of employment in upstream petroleum process operations and appropriate downstream employment areas.
- 10 To develop an understanding of process and production operations involved in hydrocarbon resource exploitation
- 11 To develop an understanding of petroleum production and control technologies and design requirements
- 12
- 13 To develop a sound understanding of the range of products and processes used in the petroleum industry and associated employment opportunities.
- 14 To develop an understanding of the key issues within petroleum process technology, operations and control.
- 15 To introduce the physical and chemical principles utilised within petroleum process operations
- 16 To develop an awareness of environmental issues
- 17 To develop knowledge and understanding to underpin the competence requirements to meet the process operations needs of the oil and gas industry at level 3.
- 18 To develop a Health and Safety culture
- 19 To contribute to the sustainable workforce development of the petroleum process industry through capacity building and assuring capability.

The aims of the HND listed here are **additional** to those at HNC level.

The additional **general** aims of HND Petroleum Process Technology, Operations and Control are:

- 20 To further develop transferable skills to levels demanded by employers, and for progression to higher education
- 21 To enhance employability by developing skills and competences relevant to the petroleum industry
- 22 To develop cultural empathy, flexibility and change assimilation skills.

The additional specific aims of HND Petroleum Process Technology, Operations and Control are:

- 23 To develop skills and knowledge in petroleum production systems and data measurement systems
- 24 To develop an understanding of topside production process techniques, operations and control technology
- 25 To advance existing understanding of equipment and operations involved in oil and gas process and control
- 26 To further develop Core Skills in communications, numeracy and information technology
- 27 To develop skills in mathematics
- 28 To develop competences in line with the regulations and conditions of the UK Oil and Gas industry and their Sector Skills Council, Cogent, and standards setting body, OPITO, as well as the need to have internationally recognised professional qualifications and skills.
- 29 To develop an awareness in stakeholder and societal involvement in environmental issues related to the petroleum industry

### **3.3 Target groups**

There are no unnecessary barriers to entry to these Group Awards. These awards are particularly suited to the following groups:

- ◆ School leavers wishing to pursue a career within the Petroleum Industry.
- ◆ Existing employees wishing to gain or extend their qualifications — either by attending by block release or by distance/open learning.
- ◆ Employees undertaking work-based vocational qualifications (VQs) who wish or are required to acquire relevant and appropriate underpinning knowledge.
- ◆ Candidates wishing to move on to higher education in an appropriate discipline area.

### **3.4 Employment opportunities**

These awards are deemed to provide candidates with qualifications of direct relevance to the modern petroleum processing industry consequently enhancing opportunities for career access and progression within this key industrial sector. They also provide a significant contribution to the development of a sustainable workforce for the petroleum industry.

## **4 Access to Group Award(s)**

Whilst access to HNC Petroleum Process Technology, Operations and Control and HND Petroleum Process Technology, Operations and Control is fully inclusive, centres must use their discretion to ensure that there are no unnecessary barriers to candidate entry.

It is the responsibility of centres to ensure that candidates have the formal qualifications and/or work experience and enthusiasm for the vocational area that would give them a reasonable chance of successfully achieving the awards.

The recommended access criteria given below are not exhaustive but are intended to give guidance to centres.

Candidates desiring entry to **HNC Petroleum Process Technology, Operations and Control** or to the first year **HND Petroleum Process Technology, Operations and Control** should have:

- ◆ One National Course at SCQF level 6 in a relevant subject preferably Mathematics or Physics or Chemistry plus four National Qualification Units at SCQF level 5 or above (eg Standard Grades at Credit level or National Courses at Intermediate 2 at grade 'C' or above)

or

- ◆ A programme of National Units in a suitable subject area eg Engineering, Science at SCQF level 5 and 6

or

- ◆ Awards from other awarding bodies provided the competencies can be identified and matched to the above including S/NVQs in an appropriate occupational area.

In addition, an appropriate combination of the above qualifications may be acceptable.

For candidates where English is not the first language, it is recommended that candidates possess English for Speakers of Other Languages at SCQF level 5.

Entry to Year 2 HND

Those candidates wishing to progress to the second year of the HND and who are not in possession of Mathematics at SCQF level 6 on entry to the first year should undertake one of the Mathematics units at SCQF level 6 from HNC options available to prepare them for a Mandatory Unit at SCQF 7 in the HND.

In order to achieve the HND Petroleum Process Technology, Operations and Control candidates must gain 30 SQA credits. Ideally full-time candidates should be encouraged to achieve 15 credits in each year of the award. Wider access should be provided to cater for the needs of those, for example, who have achieved the HNC at day release or evening classes or in other colleges. Candidates would therefore be expected to have a minimum of 12 credits on entry to Year 2 and these would include the HNC Petroleum Technology, Operations and Control mandatory units.

Candidates who do not possess formal entry qualifications suggested above in may be considered for entry, if they have relevant, current, appropriate work experience in petroleum operations or its related industries. Work experience used as evidence for entry should be current, and candidates may be asked to provide formal references.

## 5 Group Award(s) structure

The structure of these awards is based on a 12-credit programme for the HNC and a 30-credit programme for the HND to be consistent with all other SQA HN awards. Both awards are built upon their respective mandatory common core of credits covering general aspects of oil and gas process operations and associated technologies. In addition, akin to other HN awards in the engineering and science suites, the proposed HNC and HND have a restricted core section that allows some electives within rules that prescribe a minimum number of units of SCQF level 8. A comprehensive selection of optional units allow for the development of candidates along one, or more, of the following particular process and control technology pathways to suit individual candidate or company requirements for the development of process and control technicians:

- ◆ Specialisation within the production oil and gas process sector (upstream)



- ◆ Specialisation within the refinery process sector (downstream)
- ◆ Specialisation in Control Room Operations
- ◆ Preparation for progression to degree level studies in chemical engineering

## 5.1 Framework

To attain the award of HNC Petroleum Process Technology, Operations and Control a candidate must achieve all Mandatory Units totalling 8 HN credits and 4 optional credits.

### HNC Petroleum Process Technology, Operations and Control

HNC Framework: 12 credits required for certification

#### Mandatory Units — 8 SQA HN credits (64 SCQF credit points)

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Communication: Practical Skills	H7MB 34*	8	7	1
Petroleum Engineering: Physics, Mathematics and Chemistry	F52Y 34	8	7	1
Petroleum Industry: Organisation, Products and Processes	F811 34	8	7	1
Process Control	DX4K 34	8	7	1
Process Measurement and System Monitoring	F812 34	8	7	1
Process Safety Engineering	HE3F 34*	8	7	1
Environmental Awareness	J4RC 34*	8	7	1
Petroleum Process Technology, Operations and Control: Graded Unit 1	F81V 34	8	7	1

#### Optional Units (Mandatory) — 4 SQA HN credits (32 SCQF credit points)

##### Group 1 (Mandatory) — Minimum of 2.0 SQA HN credits needed

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Hydrocarbon Extraction and Process	F43V 34	8	7	1
Process Operations: Oil and Gas Separation	F814 34	8	7	1
Process Operations: Natural Gas Processing and Treatments	F813 34	8	7	1
Process Operations: Distillation	F3XF 35	8	8	1
Petroleum Production Processes	F531 35	8	8	1
Petrochemical Process Operations: Plant and Equipment Operating Practices	F80Y 34	8	7	1
Process Operations: Utilities	F815 34	8	7	1

\*Refer to History of Changes for revision changes.

**Group 2 (Optional) — up to 2 SQA HN credits needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Fundamental Chemistry: Theory and Practice	DH2K 34	16	7	2
Engineering Science Principles	DX49 34	8	7	1
Chemical Engineering: Principles	F3X8 34	8	7	1

**Group 3 (Optional) — up to 1.0 SQA HN credit needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Mathematics for Science 2	H8XR 34*	8	7	1
Engineering Mathematics 2	H7K1 34*	8	7	1

**Group 4 (Optional) — up to 1.0 SQA HN credit needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Mathematics for Science 1	H8XP 33*	8	6	1
Engineering Mathematics 1	H7K0 33*	8	6	1

**Group 5 (Optional) — up to 1.0 SQA HN credit needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Information Technology: Applications 1	A6AM 34	8	7	1
Information Technology: Applications 2	A6AN 34	8	7	1
Information Technology: Applications Software 1	D75X 34	8	7	1

**Group 6 (Optional) — up to 2.0 SQA HN credits needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Engineering Science Principles	DX49 34	8	7	1
Chemical Engineering: Principles	F3X8 34	8	7	1
Measurement Systems 1	DX4F 34	16	7	2
Process Analysers: On-line	DX4J 34	8	7	1
Meter Systems in Measurement and Control Engineering	DX4H 34	8	7	1
Applications of Programmable Logic Controllers	DG31 34	8	7	1

\*Refer to History of Changes for revision changes.

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Supervisory Control and Data Acquisition (SCADA)	DX4R 34	8	7	1
Distributed Control Systems	DX48 34	16	7	2
Fire and Gas Detection	DX4A 34	8	7	1
Instrumentation in Hazardous Areas	DX4D 34	8	7	1
Supervision and Management	J1BT 34*	8	7	1
Project Management: An Introduction	F1NH 34	8	7	1
Fundamental Chemistry: An Introduction	DX29 33	8	6	1

To attain the award of HND Petroleum Process Technology, Operations and Control candidates must achieve 30 SQA HN Credits: 10 HN Credits which are gained from the mandatory units. Six SQA HN credits at SCQF level 8 are required from the restricted options. The remaining 12 SQA HN Credits are required from the remaining restricted options or from the general options.

There must be a minimum of 64 SCQF points at level 8 and these can be achieved from the mandatory core and the restricted options.

### **HND Petroleum Process Technology, Operations and Control**

HND Framework: 30 SQA HN credits required for certification

#### **Mandatory Units — total of 10 SQA HN credits needed (80 SCQF Credit Points)**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Communication: Practical Skills	H7MB 34*	8	7	1
Petroleum Engineering: Physics, Mathematics and Chemistry	F52Y 34	8	7	1
Petrochemical Industry: Organisation, Products and Processes	F811 34	8	7	1
Process Control	DX4K 34	8	7	1
Process Measurement and System Monitoring	F812 34	8	7	1
Process Safety Engineering	HE3F 34*	8	7	1
Environmental Awareness	F2G8 34	8	7	1
Petroleum Process Technology, Operations and Control: Graded Unit 1	F81V 34	8	7	1
Petroleum Process Technology, Operations and Control: Graded Unit 2	F81W 35	16	8	2

\*Refer to History of Changes for revision changes.

**Options (Mandatory) — 20 SQA HN credits needed**

**Group 1 (Mandatory) — Candidates must gain 6 SQA HN credits out of a total of 14**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Petroleum Production Processes	F531 35	8	8	1
Petroleum Recovery Techniques	F532 35	8	8	1
Process Operations: Distillation	F3XF 35	8	8	1
Thermodynamics and Kinetics	DP4N 35	8	8	1
Heat Transfer and Fluid Mechanics	DT5T 35	8	8	1
Project Management: Project Justification and Planning	DV5H 35	8	8	1
Process System: Maintenance Routines and Fault Diagnosis	F80X 35	8	8	1
Process Quality: Sampling, Testing and Evaluation	F816 35	8	8	1
Process Control by Computer	DX4L 35	8	8	1
Safe Instrumentated Systems	DX4P 35	8	8	1
Instrumental Techniques: Theory and Practice1	DH54 35	8	8	1
Instrumental Techniques: Theory and Practice 2	DH2N 35	8	8	1
Environmental Sampling and Analysis	DT4X 35	8	8	1
Environmental Management Systems	F6D0 35	8	8	1

**Group 2 (Mandatory) — Candidates must gain 2 SQA HN credits out of a total of 7**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Hydrocarbon Extraction and Process	F43V 34	8	7	1
Process Operations: Oil and Gas Separation	F814 34	8	7	1
Process Operations: Natural Gas Processing and Treatments	F813 34	8	7	1
Process Operations: Distillation	F3XF 35	8	8	1
Petroleum Production Processes	F531 35	8	8	1
Petrochemical Process Operations: Plant and Equipment Operating Practices	F80Y 34	8	7	1
Process Operations: Utilities	F815 34	8	7	1

**Group 3 (Mandatory) — Candidates must gain 2 SQA HN credits out of a total of 4 credits**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Fundamental Chemistry: Theory and Practice	DH2K 34	16	7	2
Engineering Science Principles	DX49 34	8	7	1
Chemical Engineering: Principles	F3X8 34	8	7	1

**Group 4 (Mandatory) — Candidates must gain 1SQA HN credit out of a total of 2 credits**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Mathematics for Science 2	H8XR 34*	8	7	1
Engineering Mathematics 2	H7K1 34*	8	7	1

**Group 5 (Optional) — up to 1.0 SQA HN credit needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Mathematics for Science 1	H8XP 33*	8	6	1
Engineering Mathematics 1	H7K0 33*	8	6	1

**Group 6 (Optional) — up to 1.0 SQA HN credit needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Information Technology: Applications 1	A6AM 34	8	7	1
Information Technology: Applications 2	A6AN 34	8	7	1
Information Technology: Applications Software 1	D75X 34	8	7	1

\*Refer to History of Changes for revision changes.

**Group 7 (Optional) — up to 9.0 SQA HN credits needed**

Unit Title	Code	SCQF Credit points	SCQF level	SQA Credit Value
Mathematics for Engineering 3	DG4P 35	16	8	2
Project Management: Managing the Implementation of a Project	DV5J 35	16	8	2
Petrochemical Process Specification and Equipment Selection	F810 35	16	8	2
Measurement Systems 1	DX4F 34	16	7	2
Process Analysers: On Line	DX4J 34	8	7	1
Meter Systems in Measurement and Control Engineering	DX4H 34	8	7	1
Applications of Programmable Logic Controllers	DG31 34	8	7	1
Supervisory Control and Data Acquisition (SCADA)	DX4R 34	8	7	1
Distributed Control Systems	DX48 34	16	7	2
Fire and Gas Detection	DX4A 34	8	7	1
Instrumentation in Hazardous Areas	DX4D 34	8	7	1
Supervision and Management	J1BT 34*	8	7	1
Project Management: An Introduction	F1NH 34	8	7	1
Fundamental Chemistry: An Introduction	DX29 33	8	6	1
Engineering Mathematics 3	H7K2 34*	8	7	1
Engineering Mathematics 4	H7K3 34*	8	8	1
Engineering Mathematics 5	H7K4 34*	8	8	1

\*Refer to History of Changes for revision changes.

**Petroleum Process Technology, Operations and Control: Graded Unit 1 — Case Study**

Candidates will be given information related to a particular potential oil/gas production and/or control room scenario and will be expected to detail the appropriate steps that should be taken to maximize production from the field. They will produce a report covering the analysis of the data and the recommendations they would make for the extraction and completion of the production facility.

A case study allows candidates to integrate Knowledge and Skills gained in the Mandatory Units. It allows them to:

- ◆ use analytical and problem solving skills
- ◆ set timescales
- ◆ improve self motivation
- ◆ identify main issues
- ◆ propose solutions to the problems encountered.
- ◆ use reporting skills in setting out the aims, data, analysis, summary, evaluation, recommendations and references relevant to their case study.

## **Petroleum Process Technology, Operations and Control: Graded Unit 2 — Practical Assignment (Project)**

Candidates will choose a specific topic related to oil/gas production and be asked to investigate this fully. They will produce an Practical Assignment report covering the

- ◆ planning,
- ◆ developing,
- ◆ evaluation stages of the work.

A Practical Assignment allows candidates to integrate Knowledge and Skills gained in the Mandatory Units. It also allows them to

- ◆ use research skills, identifying main issues, methods and sources
- ◆ set timescales,
- ◆ apply practical skills
- ◆ experience working with others and improve self motivation and

In addition it allows them to use their knowledge of some of the topics associated with:

- ◆ project management
- ◆ process operations
- ◆ control technology
- ◆ petroleum production process,
- ◆ risk assessments and other Health and Safety considerations

To complete a detailed Practical Assignment report into a specific topic associated with oil/gas production. It also allows them to use planning, research, reporting and evaluating skills in order to complete the Practical Assignment within the given timeframe.

## **5.2 Mapping information**

An indication of how the Units map to the aims of the awards, as outlined in Section 3, is given in Appendix 1

Links to National Occupation Standards (NOS)

The HNC and HND link with several S/NVQs/offered in with the Oil and Gas occupational area. Further details are given in Appendix 4 and 5. It is recognised that successful HNC/HND candidates will have demonstrated much of the underpinning knowledge in the NOS in many of these S/NVQs.

### 5.3 Articulation, professional recognition and credit transfer

While it is desirable to have as many progression routes as possible, the specialist nature of these awards, automatically limits the number of articulation arrangements that can be reached. The main progression route to degree level studies will be in the disciplines of Chemical Engineering or Process Engineering.

At this point in the development, a number of progression routes to 4-year Bachelor degrees with Honours have been identified:

Aberdeen University — BEng in Chemical Engineering  
Heriott Watt University — BEng in Chemical Engineering.  
Robert Gordon University — BEng in Engineering  
University of West of Scotland — BSc in Chemical Engineering

With judicious selection of options within the HNC and HND programmes, the following advanced standing articulation arrangements are possible with each of these universities:

- ◆ HNC entry into Year 2
- ◆ HND entry into Year 3

Such articulation routes will likely seek options which include chemistry, engineering science, process technologies and mathematics.

One of the advantages of the HNC and HND award frameworks is that they have scope for centres to select options which could be tailored with different goals in mind. It is therefore envisaged that articulation routes other than chemical engineering may well be possible based upon a different set of prescribed options. For example, candidates wishing to move into life sciences would need to take more of the options in the chemistry and environmental disciplines available within these HNC and HND awards.

## 6 Approaches to delivery and assessment

The HNC/D Petroleum Process Technology, Operations and Control are specialised awards which allow candidates to gain advanced knowledge and technical skills in principles and technologies having a direct application to petroleum production process operations, measurement and control for a safety and environmentally critical industry. Physical, chemical, engineering and mathematical principles are core to these technologies. Softer skills including and a positive approach to health, safety and the environment are key to employability in this industrial sector.

It is anticipated that delivery centres will embed a culture which leads to a raised awareness of the industrial environment within which they are will operate, and the hazards that might ensue from actions taken in operational activities and situations. These will be incorporated in a programme of skills development in a simulated oil and gas environment. It is also envisaged that the culture will also develop ‘softer’ skills demanded by potential employers. Included in this might be continuous quality improvement through evaluation and minimising risk.



Candidates will be encouraged to:

- ◆ Develop a safety culture on a personal and organisational level.
- ◆ Observe, analyse and take action within their surroundings;
- ◆ Take appropriate technical and professional actions avoiding and/or minimising risk and
- ◆ Permeate such an ethos across all areas of the Group Awards.

It is accepted that gaining real work experience whilst studying, will be difficult due to the workplace environmental constraints, particularly for full time candidates. It is therefore recommended that delivery centres utilise where possible simulated environments, visits to operational sites, visits to training sites, meetings and by inviting guest speakers from industry to address candidates. Centres should seek to utilise up-to-date technology and simulation.

By choosing an appropriate range of options candidates can prepare for employment in production processes and control technology in the upstream, downstream oil and gas and petrochemical industries. Alternatively candidates can choose to proceed to degree level courses at a number of universities.

The evidence of support from employers indicates that the structure and content of the awards meet the need of employers. Indeed it is believed that these awards provide much of the underpinning knowledge required in the SVQ levels 1, 2 and 3 in Process Operations: Hydrocarbons.

It is envisaged that the HNC course will be the preferred option for those in employment. It is hoped that this award could be the appropriate course to form part of a Modern Apprenticeship for oil and gas production workers. While some workers in employment may choose to progress to the HND, it is more likely that the HND will be undertaken by full-time students.

While progression to degree level courses is one option open to candidates, it should be remembered that the HND is a vocational qualification. It is therefore important that there is an emphasis on the skills required to work in the industry. All the Units should be delivered with a strong emphasis on current industry practice.

### **Delivery Sequence**

Full-time candidates will study the HNC in year 1, progressing to the HND in year 2. The sequencing of Units is at the discretion of centres, but illustrations are given in Appendix 7 to show a 2-semester model and a 3-block model. Centres should take account of the recommended entry requirements for each Unit when considering the order in which candidates should attempt them.

It is envisaged that many candidates will be part-time students, some of whom may be distance learners. This will require flexibility in the ways in which candidates can undertake the Units. Sequencing may well depend on the delivery mode, with Units that require supervised assessments having to be timed to allow the assessment to coincide with times that the candidates can attend the centre.

## Approaches to Learning and Teaching

Courses leading to the award of the HNC and HND in Petroleum Process Technology, Operations and Control lend themselves to the use of a wide variety of learning and teaching methods such as lectures, tutorials, laboratory exercises, practical assignments, simulation exercises, case studies and project work. Throughout the entire delivery of these awards, these approaches can be integrated to provide varied experiences that will enhance learning. In addition, the majority of the units comprising these awards lend themselves to the use of e-learning, and in some cases, to e-assessment. Units containing essential practical work may still be adaptable, in part, to e-learning opportunities. It is strongly recommended, wherever possible, that delivery centres take advantage of learning materials in electronic format and provide candidate access via centres intranet or through the internet based Virtual Learning Environment. A blended learning approach which weaves e-learning opportunities with other approaches to learning and teaching, will allow students to take more responsibility for their own learning as well as providing them with opportunities for distance learning.

The purpose of the Graded Units is to assess the candidate's ability to integrate and apply the Knowledge and Skills gained in individual Units to demonstrate that they have achieved the specific aims. They also allow grading of candidate achievement.

As part of HNC Petroleum Process Technology, Operations and Control candidates will undertake one Graded Unit (**Petroleum Process Technology: Graded Unit 1**), which is a project based case study, valued at one (1) SQA HN credit (8 SCQF credit points at level 7).

Candidates progressing to year 2 of HND Petroleum Process Technology, Operations and Control will also undertake a further Graded Unit (**Petroleum Process Technology: Graded Unit 2**) which is a project based Practical Assignment, valued at two (2) SQA HN credits (16 SCQF credit points at level 8).

## Delivery of the Graded Units

Given the integrated nature of the Graded Units, it is anticipated that the entire course team will be involved in the development and delivery of the contributing Units. Both Graded Units see the candidates carrying out an individual project over a lengthy period. The delivery involves advice and support to the candidates as they complete the work. Centres may find this easier if the supervision is shared across the course team to ensure candidates have access to a range of curricular experts.

Timing of the assessment is important. For full-time students it is recommended that the Graded Units are scheduled to run during the middle part of the course.

The two main reasons for this are that:

- ◆ Candidates are not completing major pieces of work at the same time as they are preparing for end of Unit tests.
- ◆ Centres have time to mark and grade the projects in before sending them for central moderation

Candidates regard the Graded Units as highly significant and may spend a disproportionate amount of time on them. It is important for centres to offer good advice and not allow candidates to neglect the work of other Units in pursuit of an 'A' grade.

### **Delivery Methods**

It is envisaged that the HNC and the HND will be delivered as both full-time and part-time courses. Indeed it is planned that for those candidates in employment that delivery may be available via a variety of distance learning modes. Although centres can choose the order in which to teach the Units within the awards, guidelines have been produced on timetabling the mandatory Units for full-time provision Appendix 7. These timetables reflect the sequential nature of some of the Units.

The assessment strategy of the design principles, to encourage a more holistic approach to assessment, has been adopted in both awards. The new HN Unit specification places the emphasis on reducing assessment load for candidates and centres by devising assessments which assess the entire content of the Unit where appropriate, and by sampling of knowledge and/or skills. There are a range of assessment strategies with some Units being assessed by end of Unit tests carried out under closed-book, supervised conditions, while others require the completion of case studies or other assignments that candidates can complete in their own time.

Having end-of-Unit tests means that the majority of assessments need to take place toward the end of the teaching blocks. This represents a change from the current system, where assessments could be spread over a longer period of time. Centres should carefully plan the course to offer candidates every opportunity to succeed. If it is possible, introducing staggered starts for some Units may help with reducing the loading on candidates. Also it may help to plan the delivery to ensure that Units which do not require a closed-book test run in conjunction with those that do, hence reducing the possibility that candidates will be faced with a large number of end of Unit tests over a short period of time.

Unit specifications detail exactly the Evidence Requirements and assessment procedures for each assessment event. Should centres wish to use a different mode of assessment from that recommended, they should seek prior verification from SQA.

All assessments must be conducted in line with the SQA 'Guidelines for Assessment'. This in itself will pose issues for distance learners who may well be working at their own pace. Also the requirement to have end of Unit tests under closed-book supervised conditions can be restrictive for distance learners. The presenting centre will have to ensure that candidates can sit such tests in an appropriate environment and that security of the tests is maintained. To maintain the validity of assessments it is expected that all candidates would sit an assessment at the same time.

This again could be an issue for distance learners and centres may require to have a bank of assessments for each Unit if they wish to allow candidates to sit assessments at different times in the year.

## 6.1 Assessment Strategy and Integration Opportunities

Assessment for all units within HNC and HND Petroleum Process Technology, Operations and Control will attempt to address the practical aspects of the units, and assessments will reflect a ‘hands on’ approach wherever possible. The overall strategy for assessment is that wherever possible, and where permissible, assessments will be integrated across Outcomes within units, to reduce the overall amount of assessment load placed on candidates.

*Assessment of these awards is continuous via Unit level assessments which may take a number of formats such as written and numerical tests, assignment exercises, practical laboratory exercises, hands-on practical simulation assignments or case studies. The overall grading of the course is achievement through 1 Graded Unit for the HNC which is a case study and a further Graded Unit for the HND which is a project assignment. Oil and gas process related topics for the Graded Unit assignments may be assigned on the basis of individual candidate interest or on subject areas nominated by a candidate’s sponsoring company.*

If possible and practical, consideration will be given to assessing across units wherever this is feasible. This would add credibility to the claim that assessment was based on ‘real work’ scenarios, and not dealt with in a compartmentalised manner.

### Re-assessment

Guidelines for reassessment should be included in course documentation such as course handbooks and instruments of assessment. Candidates should be allowed reassessment opportunities in line with SQA policy. Guidance should be provided by delivery staff and course team members.

## 7 General information for centres

### Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

### Internal and external verification

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

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

Further information on internal and external verification can be found in *SQA’s Guide to Assessment* ([www.sqa.org.uk](http://www.sqa.org.uk)).

## 8 General information for candidates

The aims of the HNC and HND in Petroleum Process Technology, Operations and Control are devised to develop your knowledge, understanding and skills to enhance your employability within the petroleum industry as a process operations technician or a measurement and control technician as well as supporting your development for future management positions. The vocational focus of these awards combines the necessary blend of key petrochemical processing related technological principles with knowledge of their industrial process applications in a safety and environmentally critical context. Options within these qualifications allow flexibility for courses to be devised in a manner to adapt your development to meet requirements for particular specialisation and career progression in either the production process (upstream) sector or refinery process (downstream) sector of this key industry

The HND award is designed to meet the requirements of professional institutions and to meet the knowledge requirements for registration as a Process/Engineering Technician, while the HNC goes part way to meeting this requirement. This HNC and HND are also designed to provide you with an educational progression route to a university degree. Entry to university would depend on the university course chosen and the grade achieved in your HNC or HND. Normally entry would be on an advanced standing basis with the HNC giving access to year 2 of a degree course and the HND access to year 3. To meet such progression criteria it would be required that you study particular option subjects within the HNC and HND as advised by your course tutors.

Access to these HNC and HND courses is fully inclusive and at the discretion of your SQA approved delivery centre. However, to ensure that you have a realistic potential or success on the course it is recommended that you should have one of the following qualifications before entering the HNC and HND in Petroleum Process Technology, Operations and Control:

- 1 One National Course at SCQF level 6 in a relevant subject preferably Mathematics or Physics or Chemistry plus four National Qualification Units at SCQF level 5 or above (eg Standard Grades at Credit level or National Courses at Intermediate 2 at grade 'C' or above)
- 2 A programme of National Units in a suitable subject area eg Engineering or Science at SCQF level 5 and 6
- 3 Relevant, current, appropriate work experience in petroleum operations or its related industries as evidenced by an appropriate S/NVQ
- 4 Equivalent qualifications or experience to those shown in (1), (2) and (3) above.

This HNC and HND can be delivered on a full-time, block release, open or blending learning, part-time day or part-time evening basis at the discretion of your SQA approved delivery centre. Centres who offer the HND Group Award on a full-time basis may deliver the HNC as the first year of the HND course. You should check with your SQA centre to confirm their own specific arrangements for delivering the HNC and HND awards in Petroleum Process Technology, Operations and Control.

The HNC qualification is a 12 credit course with the majority of Units at SCQF level 7. The Unit content of the qualification is divided into an 8 credit mandatory section plus two further credits from a restricted options section and an additional 2 credits selected from a wide list of options Units. Subjects in the mandatory and restricted section include Petroleum Engineering: Physics, Mathematics and Chemistry; Petroleum Industry: Organisation, Products and Processes; Process Control; Process Measurement and System Monitoring; Process Safety Engineering; Developing an Environmental Perspective; and

Petrochemical Process Operations. The restricted options section and the wholly options section allow the delivery centre to mould your HNC along particular specialist routes such as upstream operations, downstream operations, measure and control or management.

The HND qualification is a 30 credit course with the majority of the constituent Units at SCQF level 7 and 8. The Unit content of the qualification is divided into a 10 credit mandatory section, a minimum of a further 8 credits from a restricted options section of which 6 must be at SCF level 8; and an additional 12 credits selected from a wide range of options Units. Subjects in the mandatory and restricted section include Petroleum Engineering: Physics, Mathematics and Chemistry; Petroleum Industry: Organisation, Products and Processes: Process Control; Process Measurement and System Monitoring; Process Safety Engineering; Environmental Awareness; and Petrochemical Process Operations. The restricted options section and the wholly options section allow the delivery centre to mould your HND along particular advanced specialisations within the upstream operations, downstream operations, measure and control and management as well including those Units specifically to prepare for progression to degree studies.

Process Technology is very much about learning and understanding core principles and applications in a wide range of subject areas such as physics, chemistry, engineering and mathematics while undertaking practical work and project activities. Consequently, a variety of learning and teaching approaches will be employed in delivering this HNC and HND qualification. These may include lectures, tutorials, group work, laboratory assignments, computer-based simulations, process plant simulations, case studies and project work. The use of flexible learning through on-line materials and methodologies may be used to supplement and support the learning that takes place in the delivery centre.

As well as studying petroleum process technology subjects, you will also develop a range of Core Skills. Within the HNC and HND there are many opportunities to develop the full range of transferable Core Skills of Communication, Numeracy, Information Technology, Problem Solving and Working with Others, although all of these might not be separately certificated but embedded in the learning and teaching of the programme units.

The assessment strategy of this HNC and HND has been devised so that sufficient time is available for you to learn the principles of process technology and their applications to the petroleum industry as well as to develop practical aspects relevant to process operations and control. You can expect to undertake assessment at Unit level and at qualification level. Unit level assessments may take a number of different forms such as written and numerical test, laboratory work, simulation exercises, practical exercises and case studies. Graded Units form the basis of assessment at qualification level. SQA approved delivery centres will have assessment plans available for this HNC and HND to inform you of the format that the Unit and Qualification level assessments will take.

The HNC Group Award requires that you undertake a Graded Unit which is based on the Units within the HNC mandatory units section and the restricted options units section of the award. This Graded Unit 1 for Petroleum Process Technology, Operations and Control is a 1 credit case study activity which will normally be undertaken in the later half of the HNC programme.

For the HND Group Award, you will undertake the same Graded Unit 1 as for the HNC Group Award and a further Graded Unit 2. This Graded Unit 2 for Petroleum Process Technology, Operations and Control is a 2 credit project-based activity which builds on the HND mandatory units section and the restricted options units section of the award. Graded Unit 2 will be undertaken during the second year of a 2-year HND course.

## 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](http://www.scqf.org.uk)

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

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

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

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

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

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

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

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

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

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

## 10 Appendices

Appendix 1: Mapping of Aims to units

Appendix 2: Outline structure of the Group Award

Appendix 3: Core Skill mapping

Appendix 4: Mapping of National Occupational Standards to Units

Appendix 5: National Occupational standards relevant to these awards

Appendix 6: Transition arrangements

Appendix 7: Suggested delivery sequence



## Appendix 1: Mapping of Aims to Units

Group Award Title: HNC Petroleum Process Technology Operations and Control

UNIT CODE	UNIT TITLE AIM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
D77G 34	Communication: Practical Skills	✓	✓	✓	✓		✓	✓	✓	✓						✓	✓	✓
F52Y 34	Petroleum Engineering: Physics, Mathematics and Chemistry		✓	✓		✓	✓			✓	✓	✓	✓	✓	✓			✓
F811 34	Petrochemical Industry: Organisation, Products and Processes		✓		✓					✓		✓	✓	✓			✓	✓
DX4K 35	Process Control	✓	✓	✓		✓			✓	✓	✓	✓					✓	✓
F812 34	Process Measurement and System Monitoring		✓	✓	✓	✓			✓	✓	✓	✓		✓			✓	✓
F43J 34	Process Safety Engineering		✓		✓			✓	✓	✓			✓	✓		✓	✓	✓
J4RC 34*	Environmental Awareness	✓	✓	✓	✓	✓	✓		✓	✓							✓	✓
F81V 34	Petroleum Process Operations: Graded Unit 1	✓			✓				✓		✓			✓			✓	✓
DN8D 33	Mathematics for Science 1		✓	✓		✓	✓		✓									✓
DV9V 34	Mathematics for Science 2		✓	✓		✓	✓		✓	✓				✓				✓
DG4H 33	Mathematics for Engineering 1: Electronics and Electrical		✓	✓		✓	✓			✓				✓				✓
DG4L 34	Mathematics for Engineering 2		✓	✓		✓	✓			✓				✓				✓

**Group Award Title: HNC Petroleum Process Technology, Operations and Control**

UNIT CODE	UNIT TITLE AIM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DX49 34	Engineering Science Principles	✓		✓		✓					✓							✓
DX29 33	Fundamental Chemistry: An Introduction	✓	✓		✓	✓					✓			✓	✓			✓
DH2K 34	Fundamental Chemistry: Theory and Practice	✓	✓		✓	✓					✓			✓	✓			✓
D75X 34	Information Technology: Applications Software 1	✓		✓	✓		✓		✓	✓		✓						✓
A6AM 34	Information Technology: Applications 1	✓	✓	✓	✓		✓		✓	✓		✓						✓
A6AN 34	Information Technology: Applications 2	✓	✓	✓	✓		✓		✓	✓		✓						✓
DG4P 35	Petroleum Production Processes		✓		✓				✓	✓	✓	✓	✓	✓				✓
DX4F 34	Measurement Systems 1	✓	✓		✓				✓	✓							✓	✓
DX4J 34	Process Analysers: On-line	✓	✓						✓	✓							✓	✓
F815 34	Process Operations: Utilities	✓	✓						✓	✓		✓	✓					✓
F3FX 35	Process Operations: Distillation	✓	✓						✓	✓		✓	✓			✓		✓
F3X8 34	Chemical Engineering: Principles	✓	✓		✓	✓					✓							✓
F43V 34	Hydrocarbon Extraction and Process		✓													✓	✓	✓

**Group Award Title: HNC Petroleum Process Technology Operations and Control**

UNIT CODE	UNIT TITLE AIM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
F80Y 34	Petrochemical Process Operations: Plant and Equipment Operating Practices	✓	✓				✓	✓		✓	✓		✓				✓	✓
F814 34	Process Operations: Oil and Gas Separation	✓	✓		✓				✓		✓		✓			✓	✓	✓
F813 34	Process Operations: Natural Gas Processing and Treatments	✓	✓		✓				✓		✓		✓			✓	✓	✓
DX4H 34	Meter Systems in Measurement and Control Engineering	✓	✓		✓				✓		✓		✓					✓
DG31 34	Applications of Programmable Logic Controllers	✓	✓	✓		✓	✓		✓	✓		✓					✓	✓
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	✓	✓	✓	✓				✓	✓	✓		✓				✓	✓
DX48 34	Distributed Control Systems		✓						✓	✓	✓	✓						✓
DX4A 34	Fire and Gas Detection	✓	✓						✓	✓	✓	✓						✓
DX4D 34	Instrumentation in Hazardous Areas	✓	✓				✓		✓	✓	✓		✓					✓
F1NH 34	Project Management: An Introduction	✓	✓		✓		✓	✓	✓	✓				✓		✓		✓
DV5J 35	Project Management: Managing the Implementation of a Project	✓	✓		✓		✓	✓	✓	✓				✓		✓		✓

**Group Award Title: HND Petroleum Process Technology, Operations and Control**

UNIT CODE	UNIT TITLE AIMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
D77G 34	Communication: Practical Skills	✓	✓	✓	✓		✓	✓	✓	✓						✓	✓	✓	✓	✓	✓				✓		✓		
F52Y 34	Petroleum Engineering: Physics, Mathematics and Chemistry		✓	✓		✓	✓			✓	✓	✓	✓	✓	✓			✓		✓	✓						✓		✓
F811 34	Petrochemical Industry: Organisation, Products and Processes		✓		✓					✓		✓	✓	✓			✓	✓				✓		✓	✓			✓	✓
DX4K 35	Process Control	✓	✓	✓		✓			✓	✓	✓	✓					✓	✓		✓	✓		✓		✓			✓	✓
F812 34	Process Measurement and System Monitoring		✓	✓	✓	✓			✓	✓	✓	✓		✓			✓	✓		✓	✓		✓	✓	✓			✓	✓
F43J 34	Process Safety Engineering		✓		✓			✓	✓	✓			✓	✓		✓	✓	✓		✓	✓			✓				✓	✓
F2G8 34	Environmental Awareness	✓	✓	✓	✓	✓	✓		✓	✓							✓	✓		✓		✓			✓			✓	✓
F546 34	Petroleum Process Operations: Graded Unit 1	✓			✓				✓		✓			✓			✓	✓		✓	✓	✓				✓		✓	✓
F547 35	Petroleum Process Operations: Graded Unit 2	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓		✓		✓	✓	✓	✓	✓				✓		✓	✓

DX4L 35	Process Control by Computer	✓	✓	✓					✓	✓		✓	✓				✓	✓			✓		✓	✓	✓			✓	✓	
F532 35	Petroleum Production Processes		✓		✓				✓	✓	✓	✓	✓	✓					✓											
DT5T 35	Heat Transfer and Fluid Mechanics	✓		✓		✓	✓		✓			✓			✓			✓	✓	✓			✓				✓			
F3FX 35	Process Operations: Distillation	✓	✓	✓		✓			✓	✓		✓	✓		✓			✓		✓	✓		✓	✓						

**Group Award Title: HND Petroleum Process Technology, Operations and Control**

UNIT CODE	UNIT TITLE AIMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
DV5J 35	Project Management: Managing the Implementation of a Project	✓		✓		✓		✓	✓	✓				✓		✓		✓		✓	✓	✓		✓		✓		✓	✓
F80X 35	Process System: Maintenance Routines and Fault Diagnosis	✓	✓				✓		✓	✓	✓					✓	✓	✓	✓					✓	✓			✓	









**Group Award Title: HND Petroleum Process Technology, Operations and Control**

UNIT CODE	UNIT TITLE AIMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
F3FX 35	Process Operations: Distillation	✓	✓						✓	✓		✓	✓			✓		✓											
DX4H 34	Meter Systems in Measurement and Control Engineering	✓	✓		✓				✓		✓		✓					✓				✓	✓						
DX4F 34	Measurement Systems 1	✓	✓		✓				✓	✓							✓	✓											
DX4J 34	Process Analysers: On-line	✓	✓						✓	✓							✓	✓			✓		✓						
DG31 34	Applications of Programmable Logic Controllers																✓	✓					✓						
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	✓	✓	✓	✓					✓	✓		✓				✓	✓		✓		✓			✓			✓	
DX48 34	Distributed Control Systems		✓						✓	✓	✓	✓						✓					✓						
DX4A 34	Fire and Gas Detection	✓	✓						✓	✓	✓	✓						✓					✓				✓		
DX4D 34	Instrumentation in Hazardous Areas	✓	✓				✓		✓	✓	✓		✓					✓					✓					✓	



## Appendix 2: Outline Structure of the Group Award

Group Award Title: HNC Petroleum Process Technology, Operations and Control

Unit code	Unit title	credit value	SCQF level				mandatory	optional
			6	7	8	9		
D77G	34	Communication: Practical Skills	1		✓			✓
F52Y	34	Petroleum Engineering: Physics, Mathematics and Chemistry	1		✓			✓
F811 34	34	Petrochemical Industry: Organisation, Products and Processes	1		✓			✓
DX4K	35	Process Control	1		✓			✓
F812 34	34	Process Measurement and System Monitoring	1		✓			✓
F43J34	34	Process Safety Engineering	1		✓			✓
A4XK	04	Developing an Environmental Perspective	1		✓			✓
F81V	34	Petroleum Process Operations: Graded Unit 1	1		✓			✓
DN8D	33	Mathematics for Science 1	1	✓				✓
DV9V	34	Mathematics for Science 2	1		✓			✓
DG4H	33	Mathematics for Engineering 1: Electronics and Electrical	1	✓				✓
DG4L	34	Mathematics for Engineering 2	1		✓			✓
DX49	34	Engineering Science Principles	1		✓			✓
DX29	33	Fundamental Chemistry: An Introduction	1			✓		✓
DH2K	34	Fundamental Chemistry: Theory and Practice	1			✓		✓
D75X	34	Information Technology: Applications Software 1	1			✓		✓
A6AM	34	Information Technology: Applications 1	1		✓			✓
A6AN	34	Information Technology: Applications 2	1		✓			✓
DG4P	35	Petroleum Production Processes	1			✓		✓
DX4F	34	Measurement Systems 1	1		✓			✓
DX4J	34	Process Analysers: On-line	1		✓			✓
F815	34	Process Operations: Utilities	1		✓			✓
F3FX	35	Process Operations: Distillation	1		✓			✓
F3X8	34	Chemical Engineering: Principles			✓			✓
F43V	34	Hydrocarbon Extraction and Process			✓			✓
F80Y	34	Petrochemical Process Operations: Plant and Equipment			✓			✓

		Operating Practices							
F814	34	Process Operations: Oil and Gas Separation			✓				✓
F813	34	Process Operations: Natural Gas Processing and Treatments			✓				✓
DX4H	34	Meter Systems in Measurement and Control Engineering			✓				✓
DG31	34	Applications of Programmable Logic Controllers			✓				✓
DX4R	34	Supervisory Control and Data Acquisition (SCADA)			✓				✓
DX48	34	Distributed Control Systems			✓				✓
DX4A	34	Fire and Gas Detection			✓				✓
DX4D	34	Instrumentation in Hazardous Areas			✓				✓
F1NH	34	Project Management: An Introduction			✓				✓
DV5J	35	Project Management: Managing the Implementation of a Project				✓			
Total					2	30	5		
Requirements of design principles					12		6		

**Group Award Title: HND Petroleum Process Technology, Operations and Control**

Unit code	Unit title	credit value	SCQF level				mandatory	optional
			6	7	8	9		
D77G	34	Communication: Practical Skills	1	✓			✓	
F52Y	34	Petroleum Engineering: Physics, Mathematics and Chemistry	1	✓			✓	
F811 34	34	Petrochemical Industry: Organisation, Products and Processes	1	✓			✓	
DX4K	35	Process Control	1	✓			✓	
F43J	34	Process Safety Engineering	1	✓			✓	
A4XK	04	Developing an Environmental Perspective	1	✓			✓	
F546	34	Petroleum Process Operations: Graded Unit 1	1	✓			✓	
F547	35	Petroleum Process Operations: Graded Unit 2	1		✓		✓	
DX4L	35	Process Control by Computer	1		✓			✓ *
F531	35	Petroleum Production Processes	1		✓			✓ *
DT5T	35	Heat Transfer and Fluid Mechanics	1		✓			✓ *
F3FX	35	Process Operations: Distillation	1		✓			✓ *
DV5H	35	Project Management: Project Specification and Planning	1		✓			✓ *
F80X	35	Process System: Maintenance Routines and Fault Diagnosis	1		✓			✓ *
F816	35	Process Quality: Sampling, Testing and Evaluation	1		✓			✓ *
DX4P	35	Safe Instrumentated Systems	1		✓			✓ *
DG4P	35	Mathematics for Engineering 3	1		✓			✓ *
DP4N	35	Thermodynamics and Kinetics	1		✓			✓ *
DH54	35	Instrumental Techniques 1	1		✓			✓ *
DH2N	35	Instrumental Techniques 2	1		✓			✓ *
DT4X	35	Environmental Sampling and Analysis	1		✓			✓ *
DVON	35	Environmental Management Systems	2		✓			✓ *
DT63	35	Production Planning and Control	1		✓			✓ *
DV5J	35	Project Management: Managing the implementation of a project	2		✓			✓ *
DT62	35	Petrochemical Process and Equipment Selection	2		✓			
DG4H	33	Mathematics for Engineering 1: Electronics and Electrical	1	✓				✓
DG4L	34	Mathematics for Engineering 2	1	✓				✓
DX29	33	Fundamental Chemistry: An Introduction	1	✓				✓

DH2K	34	Fundamental Chemistry: Theory and Practice	2		✓				✓
F3X8	34	Chemical Engineering: Principles	1		✓				✓
F43V	34	Hydrocarbon Extraction and Process	1		✓				✓
F80Y	34	Petrochemical Process Operations: Plant and Equipment Operating Processes	1		✓				✓
F814	34	Process Operations: Oil and Gas Separation	1		✓				✓
F813	34	Process Operations: Natural Gas Processing and Treatments	1		✓				✓
DX4H	34	Process Operations: Metering	1		✓				✓
DG31	34	Applications of Programmable Logic Controllers	1		✓				✓
DX4R	34	Supervisory Control and Data	1		✓				✓
DX48	34	Distributed Control Systems	2		✓				✓
DX4A	34	Fire and Gas Detection	1		✓				✓
DX4D	34	Instrumentation in Hazardous Areas	1		✓				✓
DV5J	35	Project Management	1		✓				✓
D75X	34	Information Technology: Applications Software 1	1		✓				✓
A6AM	34	Information Technology: Applications 1			✓				✓
A6AN	34	Information Technology: Applications 2	1		✓				✓
Total									
Requirements of Design Principles			30			8			

\* Restricted Options

### Appendix 3: Core Skills Mapping of a Group Award

Group Award Title: HNC/HND Petroleum Process Operations and Control Technology

Unit Code	Unit title	Comms (Written)	Comms (Oral)	Using Graphical Info.	Using Number	Using IT	Problem Solving — Critical Thinking	Problem Solving — Planning and Organising	Problem Solving — Reviewing and Evaluating	Working with Others
D77G 34	Communication: Practical Skills	✓	✓	✓			✓		✓	✓
F52Y 34	Petroleum Engineering: Physics, Mathematics and Chemistry	✓		✓	✓	✓	✓			
F811 34	Petrochemical Industry: Organisation, Products and Processes	✓			✓				✓	
DX4K 35	Process Control	✓			✓	✓	✓	✓		
F812 34	Process Measurement and System Monitoring	✓		✓	✓	✓	✓	✓		
F43J 34	Process Safety Engineering	✓	✓				✓	✓	✓	✓
J4RC 34*	Environmental Awareness	✓	✓				✓	✓	✓	✓
F81V 34	Graded Unit 1	E	E	E	E	E	E	E	E	E
DN8D 33	Mathematics for Science 1			✓	✓	✓	✓	✓	✓	
DV9V 34	Mathematics for Science 2			✓	✓	✓	✓	✓	✓	
DG4H 33	Mathematics for Engineering 1:			✓	✓	✓	✓	✓	✓	

	Electronics and Electrical									
DG4L 34	Mathematics for Engineering 2			✓	✓	✓	✓	✓	✓	

Enter SCQF level, and ✓ for signposted or E for embedded

Group Award Title: HNC/HND Petroleum Process Operations and Control Technology

Unit Code	Unit Title	Comms (Written)	Comms (Oral)	Using Graphical Info.	Using Number	Using IT	Problem Solving — Critical Thinking	Problem Solving — Planning and Organising	Problem Solving — Reviewing and Evaluating	Working with Others
F3X8 34	Chemical Engineering: Principles	✓		✓			✓	✓	✓	
F80Y 34	Petrochemical Process Operations: Plant and Equipment Operating Practices	✓	✓		✓	✓	✓	✓	✓	✓
F1NH 34	Project Management: An Introduction	✓	✓	✓	✓	✓	✓	✓	✓	✓
DV5J 35	Project Management: Managing the Implementation of a Project	✓	✓	✓	✓	✓	✓	✓	✓	✓
D75X 34	Information Technology: Applications Software 1	✓		✓		✓		✓		



A6AM 34	Information Technology: Application 1	✓		✓	✓	✓	✓	✓	✓	
A6AN 34	Information Technology: Application 2	✓		✓	✓	✓	✓	✓	✓	
DX29 33	Fundamental Chemistry: An Introduction	✓			✓		✓	✓	✓	✓
DH2K 34	Fundamental Chemistry: Theory and Practice	✓			✓		✓	✓	✓	✓
DG4P 35	Mathematics for Engineering 3			✓	✓	✓	✓	✓		
DX49 34	Engineering Science Principles	✓		✓	✓		✓	✓		
F815 34	Process Operations: Utilities	✓				✓	✓	✓		

Enter SCQF level, and ✓ for signposted or E for embedded

**Group Award Title: HNC/HND Petroleum Process Operations and Control Technology**

Unit Code	Unit title	Comms (Written)	Comms (Oral)	Using Graphical Info.	Using Number	Using IT	Problem Solving — Critical Thinking	Problem Solving — Planning and Organising	Problem Solving — Reviewing and Evaluating	Working with Others
F3FX 35	Process Operations: Distillation	✓		✓	✓					✓
F43V 34	Hydrocarbon Extraction and Process	✓		✓			✓	✓		✓
F814 34	Process Operations: Oil and Gas Separation	✓		✓			✓	✓	✓	✓
F813 34	Process Operations: Natural Gas Processing and Treatments	✓		✓			✓	✓	✓	✓
DX4H 34	Meter Systems in Measurement and Control Engineering	✓			✓	✓	✓	✓	✓	
DG31 34	Applications of Programmable Logic Controllers	✓			✓	✓	✓	✓	✓	
DX4R 34	Supervisory Control and Data Acquisition (SCADA)	✓		✓	✓	✓	✓	✓	✓	✓
DX48 34	Distributed Control Systems					✓	✓	✓	✓	✓
DX4A 34	Fire and Gas Detection	✓	✓	✓	✓	✓	✓	✓	✓	
DX4D 34	Instrumentation in Hazardous Areas	✓	✓	✓			✓	✓	✓	✓
F81W 35	Graded Unit 2	E	E	E	E	E	E	E	E	E

**Enter SCQF level, and ✓ for signposted or E for embedded**

**Group Award Title: HNC Petroleum Process Technology, Operations and Control**

Unit Code	Unit title	Comms (Written)	Comms (Oral)	Using Graphical Info.	Using Number	Using IT	Problem Solving — Critical Thinking	Problem Solving — Planning and Organising	Problem Solving — Reviewing and Evaluating	Working with Others
DG4P 35	Mathematics for Engineering 3			✓	✓	✓	✓	✓		
F3X8 34	Engineering Science Principles	✓		✓	✓		✓	✓		
DX29 33	Fundamental Chemistry: An Introduction	✓		✓	✓		✓	✓		
DH2K 34	Fundamental Chemistry: Theory and Practice	✓			✓		✓	✓		✓
D75X 34	Information Technology: Applications Software 1	✓		✓	✓	✓	✓	✓	✓	
A6AM 34	Information Technology: Application 1	✓		✓		✓	✓	✓	✓	
A6AN 34	Information Technology: Application 2	✓		✓		✓	✓	✓	✓	
F811 34	Petrochemical Industry: Organisation, Products and Processes	✓		✓	✓	✓	✓	✓	✓	
F812 34	Process Measurement and System Monitoring	✓		✓			✓		✓	
xxx	Process Analysis			✓	✓	✓		✓		
J1BT 34	Supervision and Management	✓	✓	✓	✓	✓	✓	✓	✓	✓

**Enter SCQF level, and ✓ for signposted or E for embedded**

Mapping of National Occupational Standards to Units — G7RL 23 Process Engineering Maintenance (Instrument and Control)

**Group Award Title: HNC/HND Petroleum Process Technology Operations and Control**

UNIT CODE	UNIT TITLE AIM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
D77G 34	Communication Practical Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DX4K 35	Process Control	✓	✓	✓	✓	✓	✓	✓									
F812 34	Process Measurement and System Monitoring																
F43J 34	Process Safety Engineering	✓	✓	✓	✓	✓	✓		✓				✓			✓	
J4RC 34*	Environmental Awareness																
DX4F 34	Measurement Systems 1		✓	✓	✓	✓	✓	✓	✓	✓	B✓	B✓	B✓	B✓	B✓	B✓	
DX4J 34	Process Analysers Online			✓	✓	✓	✓	✓			B✓	B✓	B✓	B✓	B✓		
DX4H 34	Meter Systems in Measurement and Control Engineering			✓	✓	✓		✓	✓		B✓	B✓	B✓	B✓	B✓		
DG31 34	Applications of Programmable Logic Controllers			✓	✓				✓	✓	B✓	B✓	✓		B✓	B✓	
DX48 34	Distributed Control Systems			✓	✓	✓	✓	✓	✓		B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓	B✓	

✓ = Mandatory Group A B✓ = Mandatory Group B B✓✓ = Mandatory Group A and Group B

Mapping of National Occupational Standards to Units — G7RL 23 Process Engineering Maintenance (Instrument and Control)

**Group Award Title: HNC/HND Petroleum Process Technology, Operations and Control**

UNIT CODE	UNIT TITLE AIM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DX4A 34	Fire and Gas Detection	✓		✓	✓	✓	✓	✓	✓	✓				B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓
DX4D 34	Instrumentation in Hazardous Areas	✓		✓	✓	✓	✓	✓	✓	✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓	B✓	B✓	B✓
DX4L 35	Process Control by Computer	✓		✓	✓	✓	✓	✓	✓	B✓	B✓	B✓	B✓	B✓	B✓	B✓	B✓
F80X 35	Process Systems — Maintenance Routines and Fault Diagnosis	✓	✓	✓	✓					✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓
DX4P 35	Safe Instrumentated Systems	✓	✓	✓	✓					✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	
DH54 35	Instrumental Techniques 1	✓	✓	✓	✓	✓	✓	✓	✓					B✓ ✓	B✓ ✓	B✓ ✓	B✓
DH2N 35	Instrumental Techniques 2	✓	✓	✓	✓	✓	✓	✓	✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓ ✓	B✓	B✓ ✓	B✓ ✓	B✓

✓ = Mandatory Group A B✓ = Mandatory Group B B✓✓ = Mandatory Group A and Group B

## Appendix 4: Mapping of National Occupational Standards to Units — Processing Hydrocarbons 1, 2, 3 and level 3 CRO

Group Award Title: HNC Petroleum Process Technology, Operations and Control

Unit code		Unit title	National Occupational Standard																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
F811	34	Petrochemical Industry: Organisation, Products and Processes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F52Y	34	Petroleum Engineering: Physics, Mathematics and Chemistry	✓	✓	✓	✓					✓	✓	✓										
DX4K	35	Process Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F812	34	Process Measurement and System Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
D77G	34	Communication: Practical Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F43J	34	Process Safety Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DN8D	33	Mathematics for Science 1	✓	✓	✓	✓								✓	✓	✓	✓						
DV9V	34	Mathematics for Science 2	✓	✓	✓	✓								✓	✓	✓	✓						
DG4H	33	Mathematics for Engineering 1: Electronics and Electrical	✓	✓	✓	✓								✓	✓	✓	✓						

**Group Award Title: HNC Petroleum Process Technology, Operations and Control**

Unit code		Unit title	National Occupational Standard																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
D77G	34	Communication: Practical Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DV7J	35	Project Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DG4L	34	Mathematics for Engineering 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F52Y	34	Petroleum Engineering: Physics, Mathematics and Chemistry	✓	✓	✓	✓					✓	✓	✓										
F531	35	Petroleum Production Processes	✓	✓	✓	✓								✓	✓	✓	✓						
F81V	34	Petroleum Operation: Graded Unit 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F81W	35	Petroleum Operation: Graded Unit 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DN8C	33	Mathematics for Science 1	✓	✓	✓	✓								✓	✓	✓	✓						
DG4H	33	Mathematics for Engineering 1: Electronics and Electrical	✓	✓	✓	✓								✓	✓	✓	✓						
DX4F	34	Measurement Systems 1	✓	✓	✓	✓																	
F80Y	34	Petrochemical Process Operations: Plant and Equipment Operating Practices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DX48	34	Distributed Control Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DX4K	35	Process Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							

**Group Award Title: HND Petroleum Process Technology, Operations and Control**

Unit code		Unit title	National Occupational Standard																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
D77G	34	Communication: Practical Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DV7J	35	Project Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F811	34	Petroleum Industry: Organisation Processes and Products	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DG4L	34	Mathematics for Engineering 2	✓	✓	✓	✓					✓	✓	✓										
F52Y	34	Petroleum Engineering: Physics, Mathematics and Chemistry	✓	✓	✓	✓								✓	✓	✓	✓						
F812	34	Process Measurement and Systems Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F43J	34	Process Safety Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DX4K	35	Process Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F531	35	Petroleum Production Processes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F81V	34	Graded Unit: 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
F81W	35	Graded Unit: 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
DN8C	33	Mathematics for Science 1	✓	✓	✓	✓								✓	✓	✓	✓						



## Appendix 5: National Occupational Standards Relevant to these Awards

- 1 Processing Operations Hydrocarbons (levels 1, 2 and 3) — Trainee Process Operator involved with Oil and Gas Production
- 2 Processing Operations Hydrocarbons (levels 1, 2 and 3) — Process Operator involved with Oil and Gas
- 3 Processing Operations Hydrocarbons (levels 1, 2 and 3) — Process Technician involved with Oil and Gas
- 4 Processing Operations Hydrocarbons (levels 1, 2 and 3) — Control Room Operator involved with Oil and Gas Production
- 5 Process Engineering Maintenance (Mechanical)
- 6 Process Engineering Maintenance (Mechanical) — Mechanical Technician
- 7 Process Engineering Maintenance (Instrumentation and Control) — Instrumentation and Control Craftsperson
- 8 Process Engineering Maintenance (Instrumentation and Control) — Instrumentation and Control Technician

A mapping analysis between **Processing Operations: Hydrocarbons (levels 1, 2 and 3)** and course units is provided in Appendix 4.

## Appendix 6: Transition Arrangements

### Group Award Title: HNC/D Petroleum Process Operations and Control Technology

Old Unit		New Units or parts and combinations of Units		Credit Transfer proposed	Audit result
Unit Code	Unit Title	Unit Code	Unit Title		
	Communications 1	D77G 34	Communication: Practical Skills	Full Transfer	
	Information Technology Applications 2	D75X 34	Information Technology Applications 1	Outcome 2 only	
	Intro Maths for Engineering	DN8C 33	Maths for Science 1	Out 1 and 3	
		DT5X 33	Maths for Engineering 1	Out 1	
		DG4H 33	Maths for Engineering 1	Out 1	
	Maths for Engineering	DG4L 34	Maths for Engineering 2	Partial	
	Statics and Dynamics	F52Y 34	Pet Eng: Physics, Mathematics and Chemistry	Outcome 1	
	Hydrocarbon Resource Exploitation and Development		No equivalent Unit		
	Thermofluids	DT9P 34	Thermofluids	Full transfer?	
	Materials Selection and Testing	F810 35	Petrochemical Process and Equipment Selection	Part Transfer	
	Petroleum Production Processes	F531 35	Petroleum Production Processes	Partial — Outcome 1	
	Calculus 1 for Engineering	DG4L 34	Maths for Engineering 2	Partial	
	Petroleum Production Technology	F531 35	Petroleum Production Processes	Outcome 1	
	Electrical Installations in Potentially Explosive and Hazardous Atmospheres	DN3T 34	Electrical Systems in Potentially Explosive and Gas Hazardous Atmospheres	Possible full transfer	
	Calculus 2 for Engineering	DG4P 35	Maths for Engineering 3	Outcome 1 and 2	
	Engineering Measurement and System Monitoring	DV9P 34	Process Measurement and system Monitoring	Partial Outcome 2	
	Safety Engineering and the Environment	DR2D 34	Process Safety Engineering	Outcome 2 and 4	
	Fundamental Concepts of Organic Chemistry	DP2P 34	Fundamental Chemistry Theory and Practice	Partial	
	Applied Industrial Plant Maintenance	DT9W 34	Maintenance Routine and Fault Diagnosis	On Application	

New Unit Title	New Unit Code	Old Unit Title	Old Unit Code	Credit Transfer Conditions
Engineering Mathematics 1	H7K033	Mathematics for Engineering 1:Electronics and Electrical	DG4H33	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	H7K033	Mathematics for Engineering 1:Mechanical and Manufacturing	DT5X33	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	H7K134	Mathematics for Engineering 2	DG4L34	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.

## **Appendix 7: Suggested Delivery Schedule**

### **SEMESTER 1**

Communication: Practical Skills  
Petrochemical Industry: Organisation Products and Processes  
Process Safety Engineering  
Developing an Environmental Perspective  
Petroleum Engineering: Physics, Mathematics and Chemistry  
Process Measurement and System Monitoring

### **SEMESTER 2**

Process Control  
Option 1  
Option 2  
Option 3  
Option 4  
Graded Unit 1

### **3 BLOCK Year**

Suggested Delivery Schedule for HNC and HND Units based on 39 week academic year based on 3 × 13 week teaching blocks and 3 hour class contact per Unit per week.

#### **Block 1**

Communication Practical Skills  
Petrochemical Industry Organisation  
Products and Processes  
Process Safety Engineering  
Developing an Environmental Perspective

#### **Block 2**

Petroleum Engineering: Physics, Mathematics and Chemistry  
Process Control  
Option 1  
Graded Unit 1

#### **Block 3**

Process Measurement and System  
Monitoring  
Option 2  
Option 3  
Option 4