Higher National Graded Unit specification

General information for centres

This Graded Unit has been validated as part of the HND Petroleum Process Technology, Operations and Control. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit title: Petroleum Process Technology, Operations and Control: Graded Unit 2

Graded Unit code: F81W 35

Type of Graded Unit: Project

Assessment Instrument: Practical Assignment

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

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

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HND Petroleum Process Technology, Operations and Control:

General aims

- To develop candidate Knowledge and Skills in planning, analysis and evaluation
- Enable progression within the SCQF
- To develop study and research skills
- To develop employability and transferable skills, including Core Skills, to levels demanded by employers and for progression to further and/or higher education
- Develop a range of contemporary vocational skills relating to the use, support and development of systems appropriate to employment at technician level

General information for centres (cont)

Specific aims

- To prepare candidates for an appropriate level of employment in upstream or downstream sectors of the petroleum process industry
- To develop knowledge, and understanding of the range of products, production process principles and technologies, processing operations and control associated with the petroleum industry
- To provide candidates with a deeper knowledge and understanding of petroleum process technology, operations and control through a wider exposure to specialist knowledge and skills. These include such topics as advanced mathematics and chemistry, chemical engineering, process equipment, project management and environmental management
- To develop a knowledge and understanding of the key issues within the petroleum process industries, including their associated health, safety and environmental aspects

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

- HND mandatory core Units

D77G 34	Communication: Practical Skills
F52Y 34	Petroleum Engineering: Physics, Mathematics and Chemistry
F811 34	Petrochemical Industry: Organisation, Products and Processes
DX4K 34	Process Control
F812 34	Process Measurement and System Monitoring
F43J 34	Process Safety Engineering
A4XK 04	Developing an Environmental Perspective
F81V 34	Petroleum Process Technology: Graded Unit 1

Candidates should also have completed, or be in the process of completing, those Units selected from the restricted core options of the HND framework that are relevant to their Graded Unit 2 assessment task.

Core Skills: There are opportunities to develop Core Skills of *Communication, Numeracy, Information and Communication Technology* and *Problem Solving* at SCQF level 6, although there is no automatic certification of Core Skills or Core Skills components.

Assessment: This Graded Unit will be assessed by the use of a project assignment**.** The developed assessment task should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Graded Unit that it covers.

The developed assessment specification should allow candidates to produce evidence that is clearly identifiable as individual work. However, this not does preclude individual projects being part of a larger group project. Candidates' contribution to a larger group project would present opportunities to develop the Core Skill of *Working with Others*.

Administrative Information

Graded Unit code: F81W 35

Graded Unit title: Petroleum Process Technology, Operations and Control: Graded Unit 2

Original date of publication: August 2009

Version: 02

History of changes:

Version	Description of change	Date
02	Update of Conditions of Assessment	03/08/18

Source: SQA

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

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000.

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

Graded Unit title: Petroleum Process Technology, Operations and Control: Graded Unit 2

Conditions of assessment

The candidate should be given a date for completion of the practical assignment**.** However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions; provide clarification, guidance and reasonable assistance.

Reasonable assistance is the term used by SQA to describe the difference between providing candidates with some direction to generate the required evidence for assessment and providing too much support, which would compromise the integrity of the assessment. Reasonable assistance is part of all learning and teaching processes. In relation to the assessment of Higher National Project-based Graded Units, assessors may provide advice, clarification, and guidance during the time between the distribution of the project instructions and the completion date, ie at each stage of the project.

Remediation allows an assessor to clarify candidate responses, either by requiring a written amendment or by oral questioning, where there is a minor shortfall or omission in evidence requirements. In either case, such instances must be formally noted by the assessor, either in writing or recording, and be made available to the internal and external verifier. In relation to Higher National Project-based Graded Units, candidates must be given the opportunity for remediation at each stage of the project.

The evidence for a Higher National Project-based Graded Unit is generated over time and involves three distinct stages, each of which has to be achieved before the next is undertaken. This means that any re-assessment of stages must be undertaken before proceeding to the next stage. The overall grade is derived from the total number of marks across *all* sections, and should reflect the ability of the candidate to work autonomously and the amount of support required. In relation to Higher National Project-based Graded Units, candidates who have failed any stage of the project and have been unable to provide the necessary evidence through remediation must be given the opportunity for re-assessment of that stage.

Any candidate who has failed their graded unit or wishes to upgrade their award must be given a re-assessment opportunity, or in exceptional circumstances, two re-assessment opportunities. In the case of project-based graded units, this must be done using a substantially different project.

The final grading given must reflect the quality of the candidate's evidence at the time of the completion of the graded unit. Candidates must be awarded the highest grade achieved — whether through first submission or through any re-assessment, remediation, and/or reasonable assistance provided.

Candidates should be allowed to use resources outwith the delivery centre. Centres should ensure, that when project work is undertaken outwith the parent centre, or under the supervision of persons other than the nominated tutor, that the candidate does not receive undue assistance.

To ensure authentication of work it is advisable for candidates to complete a log or diary recording progress and tasks completed. There should be regular meetings between the candidate and project

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

tutor to review progress and assess the candidates developing knowledge and understanding of the case study topic. These meetings should be recorded.

The final evaluation of the candidate's grade should include a viva voce interview and a presentation, at which, where possible, the involvement of an industrial partner should be encouraged.

Instructions for designing the assessment task

This Graded Unit is a project-based assessment task whose purpose is to provide candidates with an opportunity to apply and integrate a range of knowledge and skills within the Petroleum Process Operations and Control disciplines.

The project topic undertaken by the candidate must be a complex task which involves:

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

The project assessment task must require the candidate to:

- analyse the task and decide on a course of action for undertaking the project
- plan and organise work and carry it through to completion
- reflect on what has been done and draw conclusions for the future
- produce evidence of meeting the aims which this Graded Unit has been designed to cover

The assessment tasks should be posed as being comprised of three distinct stages:

Stage 1: Planning

Stage 2: Implementation

Stage 3: Evaluating

The tasks within the project to be undertaken should be defined in relation to the context of a particular realistic petroleum process operations or control problem or development, and to what it is reasonable to expect of candidates with the resources available. Proposals for project topics are entirely the responsibility of the delivery centre but every opportunity should be taken to involve the petroleum process industry in devising projects that are relevant to current issues and development needs.

The project assessment task may be a wholly practical assignment, a wholly theoretical investigation, or a combination of these within the context of a petroleum process and control discipline. A project proposal may focus on a single petroleum process operations or control discipline or may be devised to integrate knowledge and skills across a number of distinct petroleum process operations and/or control disciplines embodied within the mandatory core Units and selected Units from the restricted core options of the HND framework.

The project should allow the candidate to demonstrate valid responses to the current and future issues and development needs of the petroleum process industry including, where appropriate, Health, Safety and Environmental issues. Where relevant, the assessment task should consider safe working practices in accordance with current regulations and codes of practice. Environmental considerations should include reference to criteria affecting, and the impact of not implementing, a sustainability approach.

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

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C — competent, or A — highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Grade A	Grade C
Is a seamless, coherent piece of work which: ♦ is highly focused and relevant to the tasks associated with the project brief ♦ is clear and well-structured throughout and language used is of a high standard in terms of level, accuracy and technical content ♦ demonstrates clear and explicit links between the three stages of the project work ♦ effectively applies, consolidates and integrates required knowledge and skills in petroleum engineering to all stages of the project work ♦ demonstrates the candidate's ability to work autonomously ♦ demonstrates that the candidate has undertaken additional relevant work within the project that is well beyond that required by the project brief ♦ contains a presentation in which the candidate enthusiastically demonstrates a deep understanding of the project work undertaken ♦ demonstrates a comprehensive and imaginative approach to the project brief so that it provides a challenging context within which the candidate can demonstrate a high level of skills in petroleum process technology, operations and control	Is a co-ordinated piece of work which: ♦ is focused and relevant to the tasks associated with the project brief ♦ is satisfactorily structured and language used is adequate in terms of level, accuracy and technical content ♦ Contains sufficient evidence to meet the minimum requirement of each of the three stages of the project work ♦ applies, consolidates and integrates knowledge and skills in petroleum engineering to the project work but this may lack some continuity and consistency ♦ demonstrates independent learning with minimum support and revision during project ♦ demonstrates that the candidate has undertaken an acceptable amount of relevant work within the project that satisfies the project brief ♦ contains a presentation in which the candidate demonstrates an understanding of the project work undertaken ♦ approaches the project brief in a manner which successfully allows the candidate to use a satisfactory level of skills in petroleum engineering

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

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

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

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

Evidence Requirements

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

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

Project stage	**Minimum Evidence Requirements**
Stage 1 — Planning (30%)	***An Action Plan*** that includes: ♦ A project brief identifying customer requirements and project aim ♦ A project specification that the customer has agreed ♦ A set of project objectives ♦ A project schedule identifying the project stages involved and the timescales for completion of each stage ♦ identification of information sources to be used ♦ identification of materials and resources required and how they will be accessed ♦ Information about possible different solution options ♦ Justification of the solution approach to be adopted ♦ Project Outcomes verification strategy ♦ Maintenance of a project activity logbook ♦ Compliance with relevant Health, Safety and Environmental requirements *The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.*

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

Project stage	Minimum Evidence Requirements
Stage 2 — Developing (50%)	♦ Output of the project activity that supports the project objectives and meets the quality necessary to satisfy the customer requirements: — tangible outputs from the project activity, whether these are of an engineering design, analysis, development or investigative nature — written record of the processes underpinning the project activity: 1 Logbook 2 Progress reports 3 Test results or investigative findings as part of the verification strategy — complies with Health, Safety and Environmental requirements *The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage.*
Stage 3 — Evaluating (20%)	***Evaluation Report***, which should: ♦ Review of project specification as the project progresses ♦ Review of project schedule/action plan as the project progresses ♦ Analysis used to decide on project solution option ♦ Progress reporting and goal setting as part of project implementation ♦ Summary of any unforeseen circumstances and how they were handled ♦ Interpretation of test results or investigative findings ♦ Actions taken as a result of test results or investigative findings ♦ Reflective part of the oral presentation ♦ Indication of any knowledge and skills which have been gained and/or developed ♦ Assessment of the strengths and weaknesses of the output of the project assignment ♦ An evaluation of the extent to which the assignment Outcomes met the original brief ♦ Issues of compliance with Health, Safety and Environmental requirements *The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.*

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

Marking tariff

Assessors should adhere to the following appropriate marks distribution between the three stages of the project:

Project stage	Appropriate percentage of marks
Planning	30
Developing	50
Evaluating	20

Support notes

Projects should present a candidate with an unfamiliar and complex problem for solution. They may be college-derived in conjunction with industrial requirements or workplace related for candidates employed within the petroleum process industry.

Projects should be allocated on an individual candidate basis but each project could form a clearly individual contribution to a wider group activity in the area of petroleum process operations. Projects may consist of one of the following:

- An petroleum process system or process design; or component thereof
- Modification design of an existing process system
- Petroleum process system or process prototype development
- Performance Analysis/Simulation study of petroleum process problem
- Feasibility study of a petroleum process issue or proposal
- Laboratory investigation

OR a combination of the any of the above to provide a multi-disciplinary project within the field of petroleum process operations.

Examples of such projects could include:

- Simulation of the characteristics of a process system
- Development of data acquisition and analysis systems for system performance assessment
- Process performance optimisation assessment
- Investigation into technologies influencing process efficiency, safety and environmental sustainability
- Design modification to process operation procedures

The assessment task requires the candidate to:

- Produce a project brief and specification from the customer requirements
- Produce a project aim and define milestone objectives
- Draw-up an initial project activity schedule which should be used to inform on-going project planning and development
- Justify chosen project solution in relation to one or more alternative solutions
- Develop a verification strategy for the project

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

- Feedback to a project supervisor on a regular basis
- Access appropriate hardware, software, documentation and reference materials to support the project development
- implement project solutions
- test product or check investigation data to confirm validity of this data
- analyse test results or investigation data
- maintain an activity logbook throughout the duration of the project
- complete a project report which conforms to appropriate report standards, includes an evaluation of the project strategy and what the candidate has learnt from undertaking this project
- present details of the project including a reflective account of the project Outcomes
- comply with all relevant Health, Safety and Environmental requirements

Equality and inclusion

This graded unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

General information for candidates

Graded Unit title: Petroleum Process Technology, Operations and Control: Graded Unit 2

This Graded Unit forms a mandatory Unit for the HND award in Petroleum Process Technology, Operations and Control. It will normally be delivered to you during the in the second half of your HND programme.

The Unit requires that you undertake a major complex project-based assignment in the field of Petroleum Process Operations and Control.

Process technicians and engineers are frequently involved in project work where a customer is defined as the end-user of the project Outcome. Such project work starts with understanding the customer requirements and translating these into a project brief, aim, specification and objectives. This leads into scheduling project activities to ensure that all objectives will be met in the allocated timescale of the project. It then proceeds to implementation of the project and applying appropriate verification strategies to ensure that the project Outcome is thoroughly tested as being fit-for-purpose. The final phase of a project is the overall evaluation of the Outcome and how it was achieved.

At the start of this Graded Unit, just as in a real-life industrial situation, you will be presented a customer requirement from which you will develop the project brief and a list of tasks to enable completion of the project objectives. You will make plans to undertake the assignment; you will develop the assignment task; you will evaluate the work you have done during the assignment and you will evaluate what you have learned and what you would do differently next time.

During this project you will develop knowledge and skills directly relevant to petroleum process operations and control disciplines. You will also develop knowledge and skills in the none-technical aspects associated with managing a project such as planning and organisation, communication, evaluative skills, time management and many others.

The HND course Units will lay the foundations for this Graded Unit which will prepare you to undertake the tasks necessary to complete your project assignment. Tutors will provide guidance during the Graded Unit and you will have to submit evidence for each stage of the assignment. This evidence will include the maintenance of a project activity logbook, submission of a comprehensive written report and the delivery of a short oral presentation.

On successful completion of the Graded Unit you will be graded A, B or C. Further details of this grading will be given to you by the project tutor at the delivery centre.