Higher National Graded Unit specification

General information for centres

This Graded Unit has been validated as part of the Chemical Process Technology HNC. 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: Chemical Process Technology: Graded Unit 1

Graded Unit code: F4CH 34

Type of Graded Unit: Project

Assessment Instrument: Investigation

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

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

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the Chemical Process Technology HNC:

- develop candidates' knowledge and skills such as planning, developing and evaluating
- develop employment skills and enhancing candidates' employment prospects
- enable progression within the SCQF
- develop transferable skills including Core Skills
- develop candidates' IT skills which are important in the chemicals industry to operate processes, complete handover documentation, and produce technical reports
- prepare candidates for an appropriate level of employment in the chemicals industry such as a process operator or laboratory technician, within the wide variety of areas that are encompassed by the chemical and life science industries
- develop a range of vocational skills relating to the use, support and development of systems appropriate to employment at operator or technician level. This may include operating simple process equipment, preparing chemicals for use in analytical testing, and completing log books

General information for centres (cont)

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:

DH2K 34	*Fundamental Chemistry: Theory and Practice*
DP2P 34	*Fundamental Concepts of Organic Chemistry*
DP2R 34	*Fundamental Concepts of Physical Chemistry*
DN8D 33	*Maths for Science 1*
F3X8 34	*Chemical Engineering Principles*
F3XC 34	*Heat Transfer: Theory and Practice*
or	
F3XB 34	*Fluid Mechanics Theory and Practice*

Core Skills: There are opportunities to develop the Core Skill of *Problem Solving* and *Communication* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Assessment: This Graded Unit will be assessed by the use of an investigation. The developed investigation 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.

Administrative Information

Graded Unit code: F4CH 34

Graded Unit title: Chemical Process Technology: Graded Unit 1

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History of changes:

Version	Description of change	Date
02	Correcting typographical errors.	02/02/09

Source: SQA

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

Graded Unit title: Chemical Process Technology: Graded Unit 1

Conditions of assessment

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

The evidence for the project is generated over time and involves three distinct stages. The planning stage of the assessment task should be assessed before the other two stages are undertaken. Thus any re-assessment of the planning stage must be undertaken before proceeding to the next stage. The assessment evidence should be marked as soon as possible after the completion date. The final grade given should reflect the quality and quantity of the candidate's evidence at the time of the completion date.

If a candidate fails the project overall or wishes to upgrade, then this must be done using a *substantially different* project, ie all stages are undertaken using a new project, assignment, case study, etc. In this case, a candidate's grade will be based on the achievement in the re-assessment, if this results in a higher grade.

Instructions for designing the assessment task

The assessment task is a project. This will take the form of an investigation on a topic relevant to the subject areas covered by the Units forming the Chemical Process Technology HNC. Assessment tasks could require candidates to investigate a chosen chemical or process technology situation. This is a vast subject area so there is a wide range of potential topics that could be investigated. Some examples of investigation topics are given in the support notes. Candidates are expected to draw upon the taught theories in the key Units of the Chemical Process Technology HNC and demonstrate through their research how their understanding of these theories contributes to their understanding of certain areas of the chemicals industry.

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

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

The assessment task must require the candidate to:

- analyse the task and decide on a course of action for undertaking the project
- 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

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 a co-ordinated piece of work which:
♦ has sufficient evidence of the three essential phases of the project that is produced to a high standard, and is clearly related	♦ has sufficient evidence of the three essential phases of the project, that is produced to an adequate standard
♦ demonstrates an accurate and insightful interpretation of the project brief	♦ demonstrates an acceptable interpretation of the project brief
♦ is highly focussed and relevant to tasks associated with the project brief	♦ is focussed and relevant to tasks associated with the project brief
♦ provides the initial project timetable containing a comprehensive list of project activities and timings	♦ provides the initial project timetable containing all the essential project activities and timings
♦ is clear and well structured throughout with language of a high standard in terms of level, accuracy and technical content used	♦ is satisfactorily structured with adequate language in terms of level, accuracy and technical content
♦ effectively consolidates and integrates required knowledge and skills	♦ consolidates and integrates knowledge and skills but this may lack some continuity and consistency
♦ identifies clear and full details of the new knowledge and skills she/he has developed as a result of doing the project such as deadlines, researching sources	♦ provides at least three examples of new knowledge and skills she/he has developed as a result of doing the project
♦ is undertaken with the minimum of supervision, and meets the project timetable deadlines without intervention from the project supervisor.	♦ is undertaken with necessary interventions from the project supervisor to ensure the project remains on track
♦ demonstrates a high level of self motivation throughout	♦ demonstrates an acceptable level of motivation
♦ includes additional research well beyond that demanded by the project	♦ includes little or no additional research, undertaken by the candidate.

The project will be marked out of 200. 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	A clear and concise plan of the project must be produced. This must: (a) state the main aims and objectives of the project (b) provide realistic timescales for achieving the aims and objectives (c) identify the main area of the project (d) identify the necessary methods required to achieve the project (e) identify the sources that will be used to carry out project (f) identify the method that will be used to present the project findings eg report *The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage. This will account for 20 % of the assessment.*
Stage 2 — Developing	**An investigation report must be produced,** including evidence of: (a) the research carried out (b) the collection and collation of data, which: I. uses different resources types II. contains accurate details of investigation/project III. applies knowledge and skills from any four Units in the recommended prior knowledge and skills IV. gathers appropriate evidence (c) a coherent line of thought, including: V. interpretation/analysis of relevant pieces of information/data VI. application of problem solving techniques (d) how the project developed as research was carried out (e) summary of findings and conclusions drawn. This report must: ♦ contain a contents page ♦ contain a list of acknowledgments of the sources and references ♦ be well structured with suitable levels of language in terms of level, accuracy and technical content ♦ integrate and consolidate knowledge and skills A diary or log of activities must be maintained throughout the duration of the project.

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

Project stage	Minimum Evidence Requirements
	The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage. This will account for 60 % of the assessment.
Stage 3 — Evaluating	**An evaluation report** which must**:** (a) give a brief outline of the investigation (b) evaluate the extent to which the main aims and objectives identified in the project plan were met (c) evaluate and justify the extent to which the investigation covers the topic (d) assess the effectiveness of the research methods (e) assess the strengths and weaknesses of the output of the investigation (f) summarise (where necessary) any unforeseen events that occurred during the project and how they were dealt with (g) identify the knowledge and skills which have been gained and/or developed *The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage. This will account for 20 % of the assessment.*

To pass the Graded Unit the candidate must achieve 50 % of the total marks and all of the minimum evidence specified for each of the three stages of the project.

Support notes

The assessment task

The assessment task can cover any aspect within any branch of the chemical industry which has been covered in the HNC Chemical Process Technology award. The various branches of the chemical industry may be covered in this investigation. For example the pharmaceutical industry, the agrochemical industry, the fine chemical industry or the petrochemical industry could be included. Any aspects within these industries may be researched including processes within them, analytical techniques utilised within them, health and safety requirements associated with each. Contrasts and comparisons between the different braches of the chemical industry may also be investigated. Examples of suitable investigation topics are:

- new developments within a specific branch of the chemicals industry
- use of certain techniques within the chemicals industry, eg synthesis, yield optimisation, purification of compounds, analytical sampling
- comparison of two different synthetic routes to make one particular product
- optimisation of a process
- health and safety within the chemicals industry
- environmental consequences of the chemicals industry

These examples are given for guidance only. A student can investigate any relevant topic they wish, providing it meets the criteria needed to pass the Graded Unit

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

Grading Checklist

Centres may provide additional comments to support their grading decisions. A candidate may be awarded less than the mark allocation for a grade C in appropriate circumstances.

Stage 1: Planning stage — The Project Plan

Evidence Requirements	Maximum Mark	Mark Grade C	Mark Awarded
1 The aims and objectives of the project: a. Research b. Development c. Evaluation	 4 4 4	 2 2 2	
2 Timescales for achieving these aims and objectives	4	2	
3 The evidence is a concise, structured plan	4	2	
4 Identification of main issues	10	5	
5 Identification and description of the methods of research and sources to use	10	5	
	40	20	

Stage 2: Developing stage — The investigation/Project Report

Evidence Requirements	Maximum Mark	Mark Grade C	Mark Awarded
1 Collection of data: a. Uses different resource types b. Contains accurate details of investigation/project c. Applies knowledge and skills from any four recommended Units d. Gathers appropriate evidence e. Develops a coherent line of thought	 3 5 8 12 12	20	
2 Interpretation/analysis of information/data: f. interpretation/analysis of relevant pieces of information/data g. applies problem solving techniques	 25 25	25	
3 Summary of conclusions drawn from investigation	10	5	
4 A contents page	1	1	
5 A list of acknowledgments of sources and references including any references within the report	4	2	
6 Clear well structured report with suitable levels of language in terms of level, accuracy and technical content	8	4	
7 Knowledge and skills effectively integrated and consolidated	4	2	
8 Works well with little supervision and high motivation level	2	1	
9 Additional research well above that required by the project	1		
	120	60	

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

Stage 3: Evaluation stage — The evaluation report

Evidence Requirements	Maximum Mark	Mark Grade C	Mark Awarded
1 Brief summary of the investigation/project (remit, research methods and resources used)	6	3	
2 The extent to which the investigation covers the topic and is evaluated and justified	6	3	
3 Evaluation and justification of the extent to which the aims and objectives of the action plan have been covered	6	3	
4 Assessment of effectiveness of the research methods	8	4	
5 Assessment of strengths and weaknesses of the output of the investigation	4	2	
6 Summary of any difficulties encountered and how they were overcome	2	1	
7 Identification of knowledge and skills which have been gained and/or developed	8	4	
	40	20	

Oral presentation

The candidate may elect to use an oral presentation to fulfil the Evidence Requirements of stage 3 – evaluation stage. Evidence of such a presentation must be recorded.

Should a candidate choose to give an oral presentation, it is important to note that the presentation should only be graded on the content and extent to which it satisfies the Evidence Requirements. The presentation skills of the candidate must not be considered in the grade awarded.

Where a candidate has elected to use an oral presentation to fulfil the Evidence Requirements of stage 3 — evaluation stage the Evidence Requirements must be recorded in the following manner:

(a) A hard copy of the slides presented by the candidates must be retained.
(b) A checklist comprising of the Evidence Requirements for stage 3 (as stated above) must be completed during the presentation.
(c) Any presentation given may be taped or video recorded and a copy retained to satisfy the Evidence Requirements.

Centres are advised to give candidates adequate time to choose their topic and carry out the planning stage. Careful planning enables the candidate to complete the following tasks of developing and evaluating more effectively.

The task briefing given to candidates should have clear instructions on how the investigation will be assessed so that the candidate can provide all the required evidence for the Unit.

It is preferable that the candidates have completed and have been assessed on the planning stage before proceeding to the developing stage. However, candidates may return to and alter the plans if required, should the developing stage not progress as expected.

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

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on SQA's website: **www.sqa.org.uk**.

General information for candidates

In order to successfully complete the Chemical Process Technology HNC programme of study, you must complete a Graded Unit. This is a single credit, project based Unit and will be assessed by an investigation that you will carry out. You will use a variety of sources and research methods to complete your investigation. You will have advice on a suitable topic from your tutor but the final selection of the topic will be your own. You will be awarded either an A, B or C on completion of the Graded Unit.

This Graded Unit gives you the opportunity to pursue an area of interest from the programme and develop your skills and knowledge further in that area. The area of choice may be related to your workplace or an area of interest to you personally. However, you must agree the project area with your tutor to ensure that it meets the requirements of the Graded Unit. You will also develop your skills in planning the project, identifying the project aims and objectives, working to a deadline (time management), evaluating the project as you carry out the work and after you have completed the task, being innovative and motivated, communicating effectively with your project supervisor.

The project will be broken down into three stages: planning, developing and evaluating. You will be required to produce a project plan, keep a logbook or diary, complete a project report and then evaluate the process and your project.

The project will be marked out of 200 which will then be converted into a percentage mark. To pass the Graded Unit you must achieve 50% of the total as well as achieving the minimum Evidence Requirements for each of the three sections.

A percentage of 50–59% will be awarded a C
A percentage of 60–69% will be awarded a B
A percentage of 70–100% will be awarded an A