

# Higher National Graded Unit Specification

## General Information for Centres

This Graded Unit has been validated as part of the HNC Computer Aided Draughting and Design (CADD) award. 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:** Computer Aided Draughting and Design: Graded Unit 1

**Graded Unit Code:** DW15 34

**Type of Graded Unit:** Project

**Assessment Instrument:** Practical Assignment

**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 HNC Computer Aided Draughting and Design award:

- ◆ develop an ability to apply analysis and synthesis skills to the solution of CAD related problems
- ◆ develop learning and transferable skills (including Core Skills)
- ◆ enhance candidates' employment prospects
- ◆ support candidates' Continuing Professional Development and career development
- ◆ develop a range of Communication and Information Technology knowledge and skills relevant to the needs of CAD users
- ◆ develop knowledge, understanding and skills in a range of core CAD principles and technologies at Higher National level
- ◆ develop knowledge, understanding and skills to apply a structured approach to more advanced CAD principles towards creating complex drawings
- ◆ allow a degree of specialisation within subject specific disciplines: Visualisation, Feature Based Modelling, Architectural CAD, Graphical Design

**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:

- ◆ Communication: Practical Skills
- ◆ CAD: 2D I
- ◆ CAD: 2D II
- ◆ CAD: 3D Modelling
- ◆ CAD: User Systems

## General Information for Centres (cont)

- ◆ CAD: Principles
- ◆ Design Methodology

Additionally, it would be of benefit to acquire specialist skills by undertaking the following Units:

- ◆ CAD: Visualisation, Rendering and Presentation
- ◆ CAD: Systems Management
- ◆ One of the Optional CAD Units within a design discipline:
  - CAD: Architectural 1
  - Design for Manufacture
  - CAD: Graphical Design
  - CAD: Feature Based Modelling 1
  - Computer Aided Engineering (CAE) and Prototyping

The nature of the project activity detailed in this specification is such that it is likely that centres will wish their candidates to embark on it towards the end of the first year of the HNC Computer Aided Draughting and Design.

In principle, the project can draw on any discipline in the HNC Computer Aided Draughting and Design framework, although the majority of any units should be at SCQF level 7. The Project can be taken from one design discipline (eg Architectural). However, its principal purpose is to integrate learned CAD concepts using a specialised CAD application showing such practical basic knowledge and skills as planning, layout, evaluation and reporting.

**Core Skills:** The achievement of this Unit gives automatic certification of the following:

Problem Solving at SCQF level 6

There are also opportunities to develop the Core Skills of Information Technology and Communication at SCQF level 6 in this Unit.

**Assessment:** This Graded Unit will be assessed by the use of a practical assignment (CAD project within a relevant discipline). The developed practical assignment 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:** DW15 34

**Graded Unit Title:** Computer Aided Draughting and Design: Graded Unit 1

**Original date of publication:** August 2006

**Version:** 01

### History of Changes:

Version	Description of change	Date

**Source:** SQA

© Scottish Qualifications Authority 2006

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Graded Unit specification if sourced by the Scottish Qualifications Authority can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

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

**Graded Unit Title:** Computer Aided Draughting and Design: Graded Unit 1

## Conditions of Assessment

The candidate should be given a date for completion of the CAD 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, where each stage has to be achieved before the next is undertaken. Thus any reassessment of stages must be undertaken before proceeding to the next stage.

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 *reassessment*.

## Instructions for designing the assessment task

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

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

The assessment task must require the candidate to:

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

### Typical projects could be:

- ◆ suspension forks for a bicycle
- ◆ in car cup holder
- ◆ an extension to an existing building

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

**Graded Unit Title:** Computer Aided Draughting and Design: Graded Unit 1

### **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.

It should be noted that in the following table the term 'product' means a range of objects which comprise a working 3D CAD assembly or structure for which a group of related 2D CAD drawings and information and images which satisfy requirements for presentation within a given discipline, are created.

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

Grade A (70–100%)	Grade C (50%–59%)
<ul style="list-style-type: none"> <li>◆ Is a seamless, coherent piece of work, which has many more strengths than weaknesses.</li> <li>◆ Provides considerably more than the minimum evidence for each of the three essential phases of the project.</li> <li>◆ Evidence is produced to a high standard, and is clearly inter-related.</li> <li>◆ Demonstrates an accurate and particularly insightful interpretation of the project brief.</li> <li>◆ Has continuously accessed available guidance in arriving at the outcomes submitted.</li> <li>◆ Embodies non-traditional and innovative solutions.</li> <li>◆ Has accessed a wide range of available data and design guidance.</li> <li>◆ Drawings and language used are of a high standard in terms of level, accuracy and technical content.</li> <li>◆ Effectively consolidates and integrates required knowledge and skills</li> <li>◆ Considers possible conflicts in integrating proposed solutions with constraints.</li> <li>◆ Includes rationale and justification for proposed solutions.</li> <li>◆ Clearly addresses a ‘fit for purpose’ objective in arriving at proposed solutions.</li> <li>◆ Clearly identifies key areas for improvement when undertaking the work to the defined time line action plan.</li> <li>◆ Clearly identifies key areas for improvement when reflecting on the technical solutions chosen compared with the initial objectives.</li> </ul>	<ul style="list-style-type: none"> <li>◆ Is a co-ordinated piece of work which has a balance of strengths and weaknesses.</li> <li>◆ Provides the minimum evidence for each of the three essential phases of the project.</li> <li>◆ Evidence is produced to an acceptable standard.</li> <li>◆ Demonstrates an acceptable interpretation of the project brief.</li> <li>◆ Has not amplified the initial project brief in arriving at the outcomes submitted.</li> <li>◆ Embodies only routine and traditional solutions.</li> <li>◆ Has accessed a minimum range of available data and technical content.</li> <li>◆ Drawings and language used are adequate in terms of level, accuracy and technical content.</li> <li>◆ Consolidates and integrates knowledge and skills but this may lack some continuity and consistency.</li> <li>◆ Treats proposed system solutions with justification.</li> <li>◆ Presents proposed solutions with justification.</li> <li>◆ Has not considered cost or quality issues.</li> <li>◆ Achieves outcomes with minimal evaluation against the time line plan.</li> <li>◆ Assumes the technical solutions chosen as the ‘most appropriate’ with minimal retrospective comparison within the initial object.</li> <li>◆ Where a better grade would be applicable, but the word count is excessively outwith the 10% tolerance.</li> </ul>

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)

### Important note

Centres **must** complete the following Grading Checklist for each CAD Project. Completed checklists will be used as part of the external moderation process to ensure the accuracy and consistency of grading between candidates in a centre and across centres.

### 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	<ul style="list-style-type: none"><li>◆ A project brief identifying customer requirements</li><li>◆ A project specification that the customer has agreed</li><li>◆ A set of project objectives</li><li>◆ A project schedule</li><li>◆ Information about different solutions</li><li>◆ Justification of chosen solution</li><li>◆ Verification Strategy</li><li>◆ Maintenance of log book</li><li>◆ A word count of 750 words (+/- 10%)</li></ul> <p>Maximum of 20 marks</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.</i></p>

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

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing	<ul style="list-style-type: none"> <li>◆ Practical output from the project (eg Report, 3D model, 3D support drawings (Elevations, Sections, Detail drawings and 2D support drawings, eg Orthographic Plan drawings, extraction data and schedules/tables)</li> <li>◆ Written records of processes underpinning the project such as:               <ul style="list-style-type: none"> <li>— log book</li> <li>— progress reports</li> </ul> </li> <li>◆ A word count of 500 words (+/- 10%)</li> </ul> <p>Maximum of 60 marks (40 from practical, 20 from written)</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage.</i></p>
Stage 3 — Evaluating	<ul style="list-style-type: none"> <li>◆ Review of project specification as the project progresses</li> <li>◆ Review of project schedule as the project progresses</li> <li>◆ Analysis used to decide project option</li> <li>◆ Progress reporting and goal setting as part of project implementation</li> <li>◆ Actions taken to overcome unforeseen circumstances</li> <li>◆ An assessment of the strengths and weaknesses of the practical output of the project</li> <li>◆ An evaluation of the extent to which the project brief and objectives have been overtaken</li> <li>◆ Reflective part of oral presentation</li> <li>◆ Identification of any knowledge and skills which have been gained by the candidate</li> <li>◆ A word count of 750 words (+/- 10%)</li> </ul> <p>Maximum of 20 marks</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.</i></p>

**Scottish Qualifications Authority**

**Computer Aided Draughting & Design:  
Graded Unit 1**

**Grading Unit Checklist**

Centre Name: \_\_\_\_\_

Centre Number: \_\_\_\_\_

Candidate Name: \_\_\_\_\_

Candidate Number: \_\_\_\_\_

No.	No Grade	Grade C Criteria	Grade C	Grade B	Grade A	Grade A Criteria
<b>Stage 1 — Planning</b>						
1	Yes	The project brief includes sufficient information to identify the customer's main requirements	Yes	Yes	Yes	The project brief includes all relevant information, is written clearly and concisely and has been agreed fully with the customer
2	Yes	The project specification contains the essential information required to proceed with the project	Yes	Yes	Yes	The project specification is well structured, contains relevant, accurate information and any revisions made have been agreed with the customer
3	Yes	The project objectives identify the key long term project targets	Yes	Yes	Yes	The project objectives accurately and fully reflect the long term project targets
4	Yes	The initial project schedule (probably in the form of a Gantt chart) shows all essential project activities. Some evidence of monitoring the schedule to inform project development is available.	Yes	Yes	Yes	The initial project schedule (probably in the form of a Gantt chart) contains a comprehensive list of project activities and timings. The information in the initial schedule is used to assess if the project can be completed within timescales. The schedule is monitored on a regular basis to inform on-going project planning and development.
5	Yes	The candidate develops an adequate knowledge base to support the demands of the project	Yes	Yes	Yes	The candidate develops a substantial knowledge base to support the demands of the project
6	Yes	A reasonable case is presented to justify the choice of the selected solution	Yes	Yes	Yes	The selected solution is justified in terms of a thorough evaluation of a range of options
7	Yes	A verification strategy is developed to test the essential parts of the product	Yes	Yes	Yes	A comprehensive verification strategy is developed to ensure the product is completely tested

No.	No Grade	Grade C Criteria	Grade C	Grade B	Grade A	Grade A Criteria
<b>Stage 2 — Development</b>						
8	Yes	The candidate feeds back to her/his supervisor on at least three occasions providing an indication of progress made	Yes	Yes	Yes	The candidate feeds back to her/his supervisor on a regular basis, updating the supervisor on progress made and actions for the next stage of the project
9	Yes	The candidate accesses components and/or software and/or materials of the correct specification from a range of sources	Yes	Yes	Yes	The candidate accesses component and/or, software and/or materials of the correct specification from a range of sources at the most economic price
10	Yes	The product is designed to an acceptable standard of quality	Yes	Yes	Yes	The product is designed to a high standard and functions correctly
11	Yes	Practical activities are carried out to an acceptable level of health and safety	Yes	Yes	Yes	Practical activities are carried out in a totally safe and healthy manner
12	Yes	The log book contains essential details of project development and there is evidence that it has been maintained	Yes	Yes	Yes	The log book is regularly maintained and provides a detailed, informal record of the candidate's thinking as the project develops including reflective comments
13	Yes	The project report meets acceptable standards in terms of structure, use of English and clarity, and has accurate conclusions and recommendations.  <b>Double weight</b>	Yes	Yes	Yes	The project report is well structured, contains only relevant information, has clear and accurate conclusions and recommendations and is written in clear and correct English  <b>Double weight</b>

No.	No Grade	Grade C Criteria	Grade C	Grade B	Grade A	Grade A Criteria
<b>Stage 3 — Evaluation</b>						
14	Yes	The project includes an evaluation of the project strategy and activities and includes an evaluation of what the candidate has learnt from undertaking the project	Yes	Yes	Yes	The project report includes a clear and comprehensive evaluation of the project strategy and activities and includes clear evaluation of what the candidate has learnt from undertaking the project
15	Yes	The oral presentation is acceptably structured, contains largely relevant information and is to time  <b>Double weight</b>	Yes	Yes	Yes	The oral presentation is well structured, contains only relevant information, is to time and includes the use of appropriate aids  <b>Double weight</b>
16	Yes	The candidate gives technically correct answers to questions raised as part of the oral presentation	Yes	Yes	Yes	The candidate gives clear, concise and technically accurate answers to questions raised during the oral presentation
17	Yes	The candidate includes some reflection of the success, or otherwise, of the project in the oral presentation	Yes	Yes	Yes	The candidate includes a clear, reflective account of the success, or otherwise, of project activities against project objectives in the oral presentation
18	Yes	The candidate undertakes the project with an acceptable level of supervision	Yes	Yes	Yes	The candidate undertakes the project with the minimum of supervision
19	Yes	The candidate provides some details of the new knowledge and skills she/he has developed as a result of doing the project	Yes	Yes	Yes	The candidate identifies clear and full details of the new knowledge and skills she/he has developed as a result of doing the project

No.	No Grade	Grade C Criteria	Grade C	Grade B	Grade A	
20	Yes	None	Yes	Yes	Yes	The candidate introduces a significant novel feature into the project
21	Yes	The candidate demonstrates an acceptable level of motivation throughout the project	Yes	Yes	Yes	The candidate demonstrates a high level of self-motivation throughout the project
22	Yes	None	Yes	Yes	Yes	The candidate undertakes additional research well beyond that demanded by the project

## Guidance on the Completion of the Grading Checklist

Centre staff are asked to read the following guidance notes before completing the Grading Checklist.

The checklist has been designed to help assessor(s) decide what Grade should be awarded to a candidate doing the CAD Project. It will also be used by external moderators as part of the external moderation of project work. **A Grading Checklist form should be completed for each candidate who has been entered for the Computer Aided Draughting & Design: Graded Unit1 (CAD Project).**

In completing the checklist assessor(s) should take note of the following points:

- 1 For each item shown in the checklist, the 'Yes', which most closely reflects the candidate's performance, should be circled. It can be seen from the checklist that the grade criteria for Grade C and Grade A have been included in the checklist and items 13 and 15 are double weighted.
- 2 A Grade B should be awarded where the candidate's performance lies approximately mid-way between a Grade C and a Grade A (i.e. better than a Grade C (competent) but not good enough to be a Grade A (highly competent)).
- 3 No Grade should be awarded where a candidate's performance is not good enough to satisfy a Grade C pass (i.e. a competent level of performance).
- 4 Once centre assessor(s) have completed the twenty-two items, they should then apply their own professional judgement to decide what Grade to award a candidate.
- 5 In arriving at the Grade, due account should be taken of the distribution of circles around 'Yes'. For example, if 18 out of 22 items have been circled 'Yes' under the Grade B column and the other four have been circled under the Grade C column, then it is likely that the assessor(s) will award the candidate a Grade B. Professional judgement is much more involved where, for example, if 'Yes' is circled 11 times under the Grade A column and 10 times under the Grade B column. The assessor's first hand knowledge of the candidate's performance will influence whether the candidate is awarded a Grade A or Grade B. External moderators are unlikely to overturn the grading awarded by the centre assessor(s) unless they are not happy that grading judgements have been awarded in a fair, consistent and rigorous manner.
- 6 Centres may provide additional comments and/or evidence in support of their grading decisions.