

Higher National Graded Unit Specification

General Information for Centres

This Graded Unit has been validated as part of the HNC Aircraft Engineering. 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: Aircraft Engineering: Graded Unit 1

Graded Unit Code: DR01 34

Type of Graded Unit: Examination

Assessment Instrument: Examination

Credit points and level: 1 HN Credit(s) 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 Award in Aircraft Engineering:

- ◆ Develop knowledge, understanding and skills in a range of core Aircraft principles, Physics and Mathematics for Aviation, Aerodynamics, Aircraft Structures and Materials and Introduction to Propulsion at Higher National level.
- ◆ Reinforce the learning and further develop candidates' ability to apply analysis and synthesis skills to the solution of Aircraft engineering problems.
- ◆ Reinforce the learning and further develop learning and transferable skills.

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 these specific aims prior to undertaking this Graded Unit:

- ◆ Physics and Mathematics for Aviation
- ◆ Aerodynamics
- ◆ Aircraft Structures and Materials
- ◆ Introduction to Aircraft Propulsion Systems

Core Skills: There are no Core Skills embedded in this Graded Unit specification.

General Information for Centres (cont)

Assessment: This examination-based Graded Unit is Aircraft Engineering: Graded Unit 1. It is an examination that comprises two written question papers each of one and a half hours duration.

An exemplar instrument of assessment and marking guidelines will be produced to indicate the national standard of achievement required at SCQF level 7.

Administrative Information

Graded Unit Code: DR01 34

Graded Unit Title: Aircraft Engineering: Graded Unit 1

Date of publication: August 2005

Source: SQA

Special Needs: This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

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

Graded Unit Title: Aircraft Engineering: Graded Unit 1

Conditions of Assessment

The assessment is based on two written examination papers (Paper 1 and Paper 2) each of one and a half hours duration. Paper 1 will consist of 30 multiple-choice questions and 10 restricted response questions from the unit Physics and Mathematics for Aviation. In Paper 2, candidates will choose to answer three questions, one from each section (*Aerodynamics, Aircraft Structures and Materials and Introduction to Aircraft Propulsion Systems*). Each section is worth 20 marks.

The examination should be conducted under closed book conditions but with candidates being allowed access to standard formulae and appropriate data sheets where required.

The grade given will reflect the candidate's achievement on the first assessment event. A candidate may wish to retake the group award Graded Unit but this should be based on a significantly different examination.

The examination papers should be unseen prior to the assessment event which should be conducted under controlled and invigilated conditions.

If a candidate does not achieve a pass or if a candidate wishes to retake the Graded Unit examination, this must be based on a significantly different examination from that given originally. A candidate's grade will be based on his/her achievement on the new event using a significantly different examination.

The examination should be unseen and the assessment should be conducted in controlled and invigilated conditions.

At all times, the security, integrity and confidentiality of examinations must be ensured.

Instructions for designing the assessment task:

The examination should be designed to assess the candidate's critical knowledge and understanding of the topics relating to the specific aims which this Graded Unit is designed to cover. The questions and corresponding marks should be designed in accordance with the ranges indicated in the table that follows. However, the overall total mark for the examination is 100.

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
Physics and Mathematics	Apply skills and knowledge in arithmetic, algebra, geometry and trigonometry Demonstrate knowledge and understanding related to the theoretical fundamentals of statics, kinetics and dynamics	40%

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

Graded Unit Title: Aircraft Engineering: Graded Unit 1

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
	<p>Demonstrate knowledge and understanding of the theoretical fundamentals of matter, thermodynamics and fluid dynamics.</p> <p>Demonstrate knowledge and understanding of optics, wave motion and sound.</p>	
Aerodynamics	<p>Physics of the atmosphere and the international standards atmosphere (ISA).</p> <p>Principles of basic aerodynamics in relation to an aircraft in flight.</p> <p>Principles of the theory of flight of an aircraft.</p> <p>Flight stability and dynamics of an aircraft during flight.</p> <p>High speed flight.</p>	20%
Aircraft Structures and Materials	<p>Characteristics and properties of materials and fabrics used in aircraft construction.</p> <p>Types and causes of corrosion that can occur in aircraft materials.</p> <p>Types of locking devices, fasteners and rivets used in aircraft construction.</p> <p>General concepts of aircraft structure, its classification and structural strength requirements necessary to meet air worthiness requirements.</p>	20%

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

Graded Unit Title: Aircraft Engineering: Graded Unit 1

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
	Construction methods of major components in an aircraft structure.	
Aircraft Propulsion Systems	Describe the principles of operation of piston and gas turbine engines. Describe a multi engine aircraft fuel system. Describe aircraft fuel types and characteristics	20%

The structure of the paper should comply with the following format:

- ◆ two written examination papers (Paper 1 and Paper 2) each of one and a half hours duration

Paper 1: will consist of two parts majoring on the unit Physics and Mathematics for Aviation:

- ◆ 30 multiple choice questions
- ◆ 10 restricted response questions from the Physics and Maths Unit

Paper 2: will consist of three sections. There will be two questions in each section and candidates will require to choose one question from each of these sections:

- ◆ Section (a) — Aerodynamics
- ◆ Section (b) — Aircraft Structures and Materials
- ◆ Section (c) — Introduction to Aircraft Propulsion

The examination will be marked out of 100. Assessors will aggregate the marks achieved by the candidate to arrive at an overall mark for the examination. Assessors will then assign a grade to the candidate for this Graded Unit based on the following grade boundaries:

- ◆ A = 70% – 100%
- ◆ B = 60% – 69%
- ◆ C = 50% – 59%

Guidance to Centres

Centres are encouraged to study this Aircraft Engineering: Graded Unit 1 specification and the associated specimen paper carefully before embarking on the writing of any HNC Aircraft Engineering Examination papers.

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

Graded Unit Title: Aircraft Engineering: Graded Unit 1

The main purpose of the Aircraft Engineering: Graded Unit 1 specification is to assess the candidate's ability to solve problems which involve the integration of some knowledge and skills from one of the four main Aircraft Engineering areas of Physics and Maths for Aviation, Aerodynamics, Aircraft Structures and Materials and Introduction to Propulsion. In addition to this, limited opportunities are also provided to assess some Communications skills although such assessment of these skills should be set within the context of Aircraft Engineering.

The Aircraft Engineering: Graded Unit 1 examination should avoid duplicating areas that are assessed in individual Units so far as is possible.

In addition to the two one and a half hour examinations, the Unit requires a notional study time of 37 hours to allow candidates to revise key themes and to allow lecturers to prepare candidates for the examinations. Centres should use a range of formative assessment to support the preparation of the candidate for examinations.

Candidates with Additional Support Needs

This Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special 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 the SQA website www.sqa.org.uk.