



Arrangements for:

SQA Advanced Certificate in Mechanical Engineering

Group Award Code: GM8L 47

SQA Advanced Diploma in Mechanical Engineering

Group Award Code: GM8J 48

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SQA Advanced Certificate and Diploma

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

Further information

Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000.
Alternatively, complete our [Centre Feedback Form](#).

History of changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. Centres are advised to check SQA Connect 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.

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1 Introduction

This is the Arrangements Document for the SQA Advanced Certificate/Diploma in Mechanical Engineering. This document includes background information on the group awards, their aims, details of the group award structures, and guidance on delivery.

2 Rationale for the awards

The SQA Advanced Certificate/Diploma in Mechanical Engineering are designed to equip candidates with the knowledge, understanding and skills required for success in current and future employment or for progression to further academic and/or professional qualifications.

3 Aims of the award

3.1 General aims of the SQA Advanced Certificate in Mechanical Engineering

The general aims of the award are to:

- 3.1.1 enhance candidates' employment prospects
- 3.1.2 support candidates' Continuing Professional Development and career development
- 3.1.3 enable progression within the SCQF (Scottish Credit and Qualifications Framework)
- 3.1.4 develop candidates' ability to apply analysis and synthesis skills to the solution of mechanical engineering problems
- 3.1.5 develop learning and transferable skills (including Core Skills)

3.2 Specific aims of the SQA Advanced Certificate in Mechanical Engineering

Aims specific to the SQA Advanced Certificate in Mechanical Engineering:

- 3.2.1 provide an award that will allow candidates to work now, or in the future, as mechanical technicians or incorporated engineers
- 3.2.2 provide awards that create a route towards meeting the academic requirements for Incorporated Engineer status
- 3.2.3 develop awards that on successful completion will allow candidates to progress to the SQA Advanced Diploma in Mechanical Engineering or a degree in Mechanical Engineering or related subject discipline area
- 3.2.4 develop a range of communication knowledge and skills relevant to the needs of mechanical incorporated engineers
- 3.2.5 on successful completion of the award, achieve the Core Skill of Communication at SCQF level 6. The candidate will also be provided with opportunities to develop the following Core Skills: Information Technology, Numeracy, Problem Solving and Working with Others at SCQF level 6.
- 3.2.6 develop knowledge, understanding and skills in a range of core principles and technologies by undertaking Units in Mathematics, Quality Systems, Engineering Principles, Materials Selection, Statics and Strength of Materials, Dynamics, Thermofluids and Pneumatics and Hydraulics
- 3.2.7 achieve a degree of specialisation within the following areas: engineering drawing, CNC, CAD, Design for Manufacture, Control Systems, Industrial

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System, PLC, Information Technology Application Software, Economics of Manufacture, Engineering Measurement and Mathematics

3.3 General aims of the SQA Advanced Diploma in Mechanical Engineering

The same as for the SQA Advanced Certificate in Mechanical Engineering but with the addition of the following:

- 3.3.1 develop candidates' knowledge and skills in planning, scheduling and project management
- 3.3.2 develop investigation skills

3.4 Specific aims of the SQA Advanced Diploma in Mechanical Engineering

The same as for the SQA Advanced Certificate in Mechanical Engineering but with the addition of the following:

- 3.4.1 develop an award that on successful completion will allow candidates to progress to a degree in Mechanical Engineering or related subject discipline area
- 3.4.2 develop knowledge and understanding of the external and internal factors that influence the performance of modern companies
- 3.4.3 recognise the important role Continuing Professional Development plays in career development
- 3.4.4 on successful completion of the award, achieve the Core Skills in Communication at SCQF level 6, Information Technology at SCQF level 6, Problem Solving at SCQF level 6 and the Using Number component of Numeracy at SCQF level 6. Candidates will also be provided with opportunities to develop the Core Skill Working with Others at SCQF level 6
- 3.4.5 expand on the range of knowledge, understanding and skills in the core SQA Advanced Certificate in Mechanical Principles and Technologies section by undertaking Units in Information Technology Applications Software, Engineering Skills, Plant Systems, Heat Transfer and Fluid Mechanics, Applied Industrial Plant Maintenance, Strength of Materials Advanced and Mathematics
- 3.4.6 allow for further specialisation within the following subject areas: CNC, CAD, Design for Manufacture, Engineering Measurement, Control Systems, Mathematics, Single Phase AC Circuits, Three Phase Systems, Electrical Motor Principles, Electrical Motor Drive Systems, Analogue and Digital Electronics, PLC, Industrial Systems, Process and Equipment Selection, Metal and Plastic Component Manufacture, Safety Engineering, Robotics, Project Management and HVAC Design and Practice

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3.5 How the general aims are met in the SQA Advanced Certificate and SQA Advanced Diploma structures and content

Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
3.1.1	The SQA Advanced Certificate and SQA Advanced Diploma in Mechanical equip candidates to seek employment in a wide range of manufacturing, service and public sector organisations.
3.1.2	The awards contain a balance of core principles and up-to-date knowledge and skills in Mechanical Engineering which lend themselves to the Continuous Professional Development and career development of candidates working at technician and incorporated engineer levels. Furthermore, the award structures have been designed to allow for easy progression between the SQA Advanced Certificate and the SQA Advanced Diploma.
3.1.3	All Units within the SQA Advanced Certificate/Diploma in Mechanical Engineering have been levelled at SCQF levels 6, 7 or 8. The awards also conform to the SQA levelling requirements for SQA Advanced Certificate and SQA Advanced Diploma awards. Thus, successful completion of any of the awards will allow progression within the SCQF.
3.1.4	The nature of Mechanical Engineering disciplines is such that they lend themselves to both the analysis and synthesis of problems. For example, when a complex mechanical system is analysed (using, say, a block diagram approach) by breaking it down into separate functional parts or alternatively the synthesis of a complex system from simpler mechanical systems. The awards allow these important skills to be developed further both in the technical subjects and in the core Communication, Information Technology and Business Awareness and Continuing Professional Development Units.

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Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
3.1.5	<p>The SQA Advanced Certificate/Diploma in Mechanical Engineering provide centres with an opportunity to enhance learning skills by creating opportunities for candidates to combine theory and practice to achieve a real understanding of a subject. For example, some Units recommend significant use of practical work and/or computer simulation to reinforce learning. It is also anticipated that centres will use innovative delivery approaches that may make use of sophisticated mechanical laboratory equipment and/or on-line delivery and/or Virtual Learning Environments to enhance candidate learning.</p> <p>Engineering courses require the transfer of technical knowledge and skills from one area to another. For example, a significant level of Engineering Principles and Mathematics have been included in the SQA Advanced Certificate/Diploma in Mechanical Engineering because these subjects provide underpinning knowledge, understanding and skills which are used elsewhere in the awards. Candidates will also have an opportunity to use the Communication and Information Technology knowledge and skills developed in the core Units in other parts of the awards to support such activities as report writing, presentation and the application of specialist software packages. Core Skills in general, and problem solving in particular, have been regarded as very important by the Qualification Design Team since it is recognised that a good level of competence in these is essential in the work of an incorporated engineering technician.</p>
3.3.1	<p>The double credit (16 SCQF points) Engineering Project Graded Unit in the SQA Advanced Diploma in Mechanical Engineering provides opportunities for candidates to develop planning, scheduling and project management knowledge and skills. The Project Management Unit in the SQA Advanced Diploma in Mechanical Engineering also provides opportunities for candidates to develop these knowledge and skills.</p>
3.3.2	<p>The Business Awareness and Continuing Professional Development Unit provides candidates with opportunities to develop their investigative skills by exploring the external and internal factors that affect the performance of a modern company and the different ways that people learn. The Engineering Project also requires candidates to undertake some investigations into the background to an engineering project and a range of solutions for the project.</p>

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3.6 How the specific aims are met in the SQA Advanced Certificate and SQA Advanced Diploma structures and content

Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
3.2.1	It is anticipated that those achieving the SQA Advanced Certificate/Diploma in Mechanical Engineering will find employment as engineering technicians and senior engineering technicians in a wide range of small, medium and large companies.
3.2.2 & 3.2.3	The IET has advised that the SQA Advanced Certificate/Diploma in Mechanical Engineering partially meet the academic requirements for registration as an Incorporated Engineer (a degree is required to fully meet the requirements) and fully meets the requirements for registration as an Engineering Technician. The SQA Advanced Certificate/Diploma in Mechanical Engineering will form very important ‘stepping stones’ towards candidates achieving degrees (and, thus, satisfy fully the academic requirements for Incorporated Engineer status). Progression arrangements between SQA Advanced Certificates, SQA Advanced Diplomas and degrees can only be strengthened with the full implementation of the SCQF.
3.2.4	A distinct Communication Unit is included in the mandatory core of the SQA Advanced Certificate and a Communication and Information Technology Unit is included in the mandatory core of the SQA Advanced Diploma in Engineering. The benefit of having separate Communication and Information Technology Units is that it significantly improves the prospect of sufficient attention being given to the teaching of these two key subjects. Separate Units also make it possible to ensure that the Communication and Information Technology Core Skills at SCQF level 6 are fully embedded within the respective Units within the SQA Advanced Diploma. Award designers considered this a more appropriate way to ensure that these Core Skills are included in SQA Advanced Engineering awards than trying to embed such Core Skills across, say, a range of engineering Units, except at SQA Advanced Certificate level where they believe there are considerable opportunities to develop Information Technology Core Skills within Mechanical Units. It should also be noted that opportunities to develop Communication and Information Technology Core Skills are signposted in a number of the Mechanical Units.
3.2.5	The Communication Core Skill at SCQF level 6 has been incorporated into the SQA Advanced Certificate in Mechanical Engineering through the core Unit, Communication: Practical Skills. Opportunities to develop the Core Skills Information Technology, Numeracy, Problem Solving and Working with

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Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
	Others are signposted within individual Unit specifications. Candidates may achieve the Information Technology Core Skill at SCQF level 6 if they take the Units in Information Technology: Applications Software 1 in the SQA Advanced Certificate. Likewise candidates may achieve the Using Number Core Skill component if they take the Unit in Mathematics for Engineering: Mechanical and Manufacturing.
3.2.6	The Principles/Technology section of the SQA Advanced Certificate in Mechanical Engineering reflects a concentration on core principles by providing studies in the key areas of Mechanical Engineering namely: Mathematics, Quality Systems, Engineering Principles, Materials Selection, Statics and Strength of Materials, Dynamics, Thermofluids and Pneumatics and Hydraulics.
3.2.7	In the 2-credit optional section candidates will be able to specialise further in the following areas: Engineering Drawing, CNC, CAD, Design for Manufacture, Control Systems, Industrial Systems, PLC, Information Technology Application Software, Economics of Manufacture, Engineering Measurement and Mathematics. The Qualification Development Team strongly recommend that candidates with little Mathematical skills do the Engineering Mathematics 1 Unit as part of their optional studies.

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Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
3.4.1	See comments under 3.2.2 and 3.2.3.
3.4.2 & 3.4.3	It is important that SQA Advanced Diploma in Engineering candidates are suitably prepared to work in an ever-changing employment environment. The Business Awareness and Continuing Professional Development Unit seeks to do this by allowing candidates to explore the external factors that affect the performance of modern companies and the ways in which companies are responding to these external pressures internally. The Unit also has an Outcome on the important role that continuous learning and Continuing Professional Development will increasingly play in helping candidates to obtain sustainable and rewarding employment.

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Aim No.	How it is met in the SQA Advanced Certificate and SQA Advanced Diploma
3.4.4	The Communication and Information Technology Core Skills at SCQF level 6 have been incorporated into the SQA Advanced Diploma in Mechanical Engineering through the core Unit Communication: Practical Skills and. The Core Skill Problem Solving at SCQF level 6 is embedded within the 2 credit SQA Advanced Diploma in Engineering Project Graded Unit in the SQA Advanced Diploma in Mechanical Engineering. The Using Number Core Skill component at SCQF level 6 is embedded within the Mathematics for Engineering: Mechanical and Manufacturing Unit. Opportunities to develop the Core Skills component Using Graphical Information and the Working with Others Core Skill are signposted within individual Unit specifications in the SQA Advanced Diploma.
3.4.5	The P/T (Principles/Technology) section of the SQA Advanced Diploma in Mechanical Engineering contains all the Units in the P/T section of the SQA Advanced Certificate in Mechanical Engineering. In addition, within the P/T section of the SQA Advanced Diploma in Mechanical Engineering there are Units which allow candidates to expand their knowledge, understanding and skills in the following subject areas: Information Technology Applications Software, Mathematics, Engineering Skills, Plant Systems, Heat Transfer and Fluid Mechanics, Applied Industrial Plant Maintenance and Strength of Materials Advanced.
3.4.6	In the 7-credit optional section of the SQA Advanced Diploma in Mechanical Engineering candidates will be able to specialise further in the following areas: CNC, CAD, Design for Manufacture, Engineering Measurement, Control Systems, Single Phase AC, Three Phase Systems, Electrical Motor Principles, Electrical Motor Drive Systems, Analogue and Digital Electronics, PLC, Process and Equipment Selection, Metal and Plastic Component Manufacture, Robotics, Safety Engineering, Project Management, HVAC Design and Practice and Mathematics.

4 Access to awards

4.1 Access requirements

Admission to the SQA Advanced Certificate/Diploma in Mechanical Engineering should be based on a broad approach to candidate selection but, at the same time, should ensure that candidates are chosen who have the potential and ability to complete the awards successfully. To this end the following are simply recommendations and should not be seen as a definitive or prescriptive list of entry requirements. Their purpose is simply to give guidance on the selection of candidates. It is recommended that candidates should possess the following:

- ◆ One Higher from Physics, Technological Studies, Mechatronics or Mathematics and at least three National 5 passes including Mathematics, Physics/Technological Studies and English.
- ◆ National Certificate Group Award in Engineering.
- ◆ Qualification comparable to the above, gained through other awarding bodies such as City & Guilds, Edexcel etc.
- ◆ At the discretion of the Principal of the presenting centre for applicants with a different experiential background who could benefit from taking the course or Units within the course, eg adult returners, overseas students with relevant work experience.

4.2 Alternative Access Arrangements

The presenting centre may operate alternative access arrangements in cases where the candidate is convinced that he/she already has the required competences in a given area. These arrangements are as follows:

- ◆ Assessment on demand
- ◆ Accreditation of prior learning
- ◆ Relevant work experience

Individual presenting centres will require to outline their systems for each of these as a part of any approval procedure.

5 Award(s) structure

5.1 SQA Advanced Certificate in Mechanical Engineering 12 Unit Credits

Award Number: GM8L 47

Mandatory Units (9 Credits)

Section	Credit Value	SCQF level	Product Code	Product Title
Core	1	7	HP4A 47	Communication: Practical Skills
Principles and Technology (8 Credits)	1	6	HP48 46	Engineering Mathematics 1
	1	7	HT7A 47	Quality Management: An Introduction
	1	7	HT74 47	Engineering Principles
	1	7	HT76 47	Materials Selection
	1	7	HT71 47	Statics and Strength of Materials
	1	7	HT7E 47	Dynamics
	1	7	HT7C 47	Thermofluids
	1	7	HT7F 47	Pneumatics and Hydraulics

Optional Units (max 2 Credits)

Credit Value	SCQF level	Product Code	Product Title
1	7	HT72 47	Engineering Drawing
1	7	HP6L 47	Information Technology: Applications Software 1
1	7	HT77 47	CNC
1	7	HT73 47	Computer Aided Draughting for Engineers
1	8	HT75 48	Design for Manufacture
1	7	HT1R 47	Fundamentals of Control Systems and Transducers
1	8	HT79 48	Industrial Systems
1	7	HT1K 47	Applications of Programmable Logic Controllers
1	7	HP49 47	Engineering Mathematics 2
1	7	HT78 47	Economics of Manufacture
1	7	HT7D 47	Engineering Measurement
1	7	HP6M 47	Personal Development Planning
1	6	HR1C 46	Workplace Communication in English
1	7	HT1Y 47	Energy Overview

Graded Unit (1 Mandatory Credit)

Credit Value	SCQF level	Product Code	Product Title
1	7	HT7G 47	Mechanical Engineering: Graded Unit 1 Examination

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5.2 SQA Advanced Diploma in Mechanical Engineering 30 Unit Credits

Award Number: GM8J 48

Mandatory Units (20 Credits)

Section	Credit Value	SCQF level	Product Code	Product Title
Core (3 Credits)	1	7	HP4A 47	Communication: Practical Skills
	1	7	HP6L 47	Information Technology: Applications Software 1
	1	8	HP3H 48	Business Awareness and Continuing Professional Development
Principles and Technology (17 Credits)	1	6	HP48 46	Engineering Mathematics 1
	1	7	HT7A 47	Quality Management: An Introduction
	1	7	HT74 47	Engineering Principles
	1	7	HT76 47	Materials Selection
	1	7	HT71 47	Statics and Strength of Materials
	1	7	HT7E 47	Dynamics
	1	7	HT7C 47	Thermofluids
	1	7	HT7F 47	Pneumatics and Hydraulics
	1	7	HT72 47	Engineering Drawing
	1	7	HP49 47	Engineering Mathematics 2
	2	7	HT7N 47	Engineering Skills
	2	8	HT7V 48	Plant Systems
	1	8	HT7R 48	Heat Transfer and Fluid Mechanics
	1	8	HT81 48	Strength of Materials: Advanced
1	8	HT7Y 48	Applied Industrial Plant Maintenance	

Optional Units (max 7 Credits)

Credit Value	SCQF level	Product Code	Product Title
1	8	HT79 48	Industrial Systems
1	7	HT1K 47	Application of Programmable Logic Controllers
1	7	HT77 47	CNC
1	7	HT73 47	Computer Aided Draughting for Engineers
1	8	HT75 48	Design for Manufacture
1	7	HT7D 47	Engineering Measurement
1	7	HT1R 47	Fundamentals of Control Systems and Transducers
2	8	HT1E 48	Mathematics for Engineering 3
1	7	HT7P 47	Safety Engineering and the Environment
1	6	HT7J 46	Analogue Electronics: An Introduction
1	7	HT7L 47	Digital Electronics
1	7	HT78 47	Economics of Manufacture
1	7	HP46 47	DC and AC Principles
1	7	HT7K 47	Three Phase Systems*
2	7	HT83 47	Electrical Machine Principles*
1	8	HT7M 48	Electrical Motor Drive Systems*
1	7	HT7T 47	Metal Component Manufacture
1	7	HT7W 47	Plastic Component Manufacture
2	8	HT84 48	Manufacturing: Process and Equipment Selection
1	8	HT80 48	Robotic Systems
1	7	HT7H 47	Project Management or
		HR7J 47	Project Management for IT
1	8	HT7X 48	Heating, Ventilation and Air Conditioning Practice and Design

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1	7	HP6M 47	Personal Development Planning
1	6	HR1C 46	Workplace Communication in English
3	7	HROM 47	Work Role Effectiveness (2003) or
3	8	HROP 48	Work Role Effectiveness (2003)
1	7	HT1Y 47	Energy Overview
1	8	HT1L 48	Energy Technologies
1	7	HT1M 47	Engineering Mathematics 3
1	8	HT03 48	Engineering Mathematics 4
1	8	HT1N 48	Engineering Mathematics 5

Graded Unit (3 Mandatory Credits)

Credit Value	SCQF level	Product Code	Product Title
1	7	HT7G 47	Mechanical Engineering: Graded Unit 1 Examination
2	8	HT82 48	Mechanical Engineering: Graded Unit 2 Project

* These Units have been added to the optional section of the SQA Advanced Diploma in Mechanical Engineering to satisfy Marine Engineering requirements.

5.3 Graded Units

The purpose of the Graded Unit for both the SQA Advanced Certificate and SQA Advanced Diploma is to assess the candidate's ability to apply and integrate knowledge and/or skills gained within individual Units. By this means candidates will demonstrate that they have achieved the specific aims of the awards as detailed in Sections 3.2 and 3.4. The Graded Units also provide the means by which candidate achievement can be graded.

SQA Advanced Certificate in Mechanical Engineering candidates will undertake a **1** Credit Graded Unit at level 7. This will be in the form of a 3-hour written examination.

SQA Advanced Diploma in Mechanical Engineering candidates will also do the SQA Advanced Certificate in Mechanical Engineering Graded Unit but, in addition, will undertake a **2** Credit Graded Unit at level 8. This will take the form of a practical assignment/project.

5.3.1 Types of Graded Units

Mechanical Engineering: Graded Unit 1 — Examination

The Graded Unit draws on Outcomes in the Principles/Technology section of the SQA Advanced Certificate in Mechanical Engineering. These Units are studied by **all** SQA Advanced Certificate in Mechanical Engineering candidates irrespective of which optional Units they select.

It is recommended that candidates do not sit the Graded Unit examination until the end of the SQA Advanced Certificate (1st Year of the SQA Advanced Diploma), given the range of Units that the Graded Unit draws on.

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Mechanical Engineering: Graded Unit 2 — Project

The nature of the project activity detailed in the Specification is such that it is likely that centres will wish their candidates to embark on project work from the start of the second year of the SQA Advanced Diploma in Mechanical Engineering. As it is anticipated that centres will deliver the SQA Advanced Certificate in Mechanical Engineering as part of the first year of the SQA Advanced Diploma, it is recommended that candidates have completed all SQA Advanced Certificate in Mechanical Engineering Units, including the SQA Advanced Certificate Graded Unit, before commencing the project.

In principle, the Mechanical Engineering project can draw on any Units in the SQA Advanced Diploma in Mechanical Engineering framework although the majority of Units should be at SCQF level 8. The project can be taken from one Mechanical Engineering area or it can span more than one technical area. However, its principal purpose is not to integrate technical content (this is covered in the Mechanical Engineering: Graded Unit 1) but rather to combine such knowledge and skills as planning, scheduling, construction, testing, evaluating and reporting.

5.4 Core Skills

The SQA Advanced Certificate/Diploma in Mechanical Engineering have been designed using SQA Design Principles and therefore the importance of Core Skills has been recognised and highlighted, where appropriate, throughout the awards.

5.4.1 Core Skills

SQA Advanced Certificate in Mechanical Engineering

Core Skills Exit Profile

A candidate who successfully achieves an SQA Advanced Certificate in Mechanical Engineering will automatically obtain the following Core Skills exit profile:

- ◆ Communication SCQF level 6 (fully embedded in the Unit Communication: Practical Skills)
- ◆ Using Number SCQF level 6 (fully embedded in the Engineering Mathematics 1 Unit)

Core Skills Entry Profile

The Core Skills Entry profile for the SQA Advanced Certificate in Mechanical Engineering is as follows:

- ◆ Communication SCQF level 5
- ◆ Information Technology SCQF level 5
- ◆ Numeracy SCQF level 5
- ◆ Problem Solving SCQF level 5
- ◆ Working with Others SCQF level 4

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SQA Advanced Diploma in Mechanical Engineering

Core Skills Exit Profile

A candidate who successfully achieves an SQA Advanced Diploma in Mechanical Engineering will automatically obtain the following Core Skills exit profile:

- ◆ Communication SCQF level 6 (fully embedded in the Unit Communication: Practical Skills)
- ◆ Using Number SCQF level 6 (fully embedded in the Engineering Mathematics 1 Unit)
- ◆ Information Technology SCQF level 6 (fully embedded in the Unit Information Technology: Applications Software 1)
- ◆ Problem Solving SCQF level 6 (fully embedded in the Unit Mechanical Engineering: Graded Unit 2)

Core Skills Entry Profile

The recommended Core Skills entry profile for the SQA Advanced Diploma in Mechanical Engineering is as follows:

- ◆ Communication SCQF level 5
- ◆ Information Technology SCQF level 5
- ◆ Numeracy SCQF level 5
- ◆ Problem Solving SCQF level 5
- ◆ Working with Others SCQF level 4

Unit writers have also identified in individual Units opportunities to develop Core Skills. These development opportunities are summarised in Table 5.4.1.

5.5 Conditions of the Award

The conditions of award for the SQA Advanced Certificate and SQA Advanced Diploma in Mechanical Engineering are as follows:

5.5.1 SQA Advanced Certificate in Mechanical Engineering

A candidate will be awarded the SQA Advanced Certificate in Mechanical Engineering on successful completion of 11 Unit credits plus 1 Graded Unit based on the SQA Advanced Certificate in Mechanical Engineering structure shown in Section 5.1. More specifically this structure requires that candidates achieve the following:

- ◆ The 1 Unit credit Communication: Practical Skills
- ◆ 8 Unit credits from the Principles/Technology section
- ◆ 2 Unit credits from the optional section
- ◆ Mechanical Engineering: Graded Unit 1

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5.5.2 SQA Advanced Diploma in Mechanical Engineering

A candidate will be awarded the SQA Advanced Diploma in Mechanical Engineering on successful completion of 27 Unit credits plus 3 Graded Unit Assessment credits based on the SQA Advanced Diploma in Mechanical Engineering structure shown in Section 5.2. More specifically this structure requires that candidates achieve the following:

- ◆ the 3 Unit credits Communication: Practical Skills, Information Technology: Applications Software 1 and Business Awareness and Continuing Professional Development
- ◆ 17 Unit credits from the Principles/Technology section
- ◆ 7 Unit credits from the optional section
- ◆ Mechanical Engineering: Graded Unit 1 and Mechanical Engineering: Graded Unit 2

Figure 5.4.1 SQA Advanced Mechanical Units — Core Skills Development Opportunities

Note: CT = Critical Thinking; P & O = Planning & Organisation and R & E = Reviewing & Evaluating

Unit Title	Communication			Numeracy		Information Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P&O	R&E	Working with Others
Engineering Drawing					SCQF 6					
Quality Management: An Introduction		SCQF 5			SCQF 5		SCQF 6			
Engineering Principles		SCQF 5					SCQF 6			
Robotic Systems		SCQF 6		SCQF 6			SCQF 6		SCQF 6	SCQF 6 Opportunities to work in groups for investigations on robotic systems
Materials Selection		SCQF 6					SCQF 6		SCQF 6	SCQF 6 Opportunities to work in groups for laboratory investigations
Statics and Strength of Materials				SCQF 6			SCQF 6			

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Unit Title	Communication			Numeracy		Information Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P&O	R&E	Working with Others
Dynamics				SCQF 6			SCQF 6			
Fundamentals of Control Systems and Transducers	SCQF 6	SCQF 6			SCQF 6		SCQF 6			SCQF 4 Opportunities to work in groups for laboratory investigations
Thermofluids				SCQF 6			SCQF 6			
Pneumatics and Hydraulics		SCQF 5					SCQF 6			
Economics of Manufacture		SCQF 6		SCQF 5	SCQF 5		SCQF 6			
Manufacturing: Process and Equipment Selection		SCQF 6					SCQF 6	SCQF 6	SCQF 6	SCQF 6 Especially with regard to Outcome 3 Record, analyse and determine set up times
Engineering Measurement					SCQF 6					

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Unit Title	Communication			Numeracy		Information Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P&O	R&E	Working with Others
Heating, Ventilation and Air Conditioning Practice and Design		SCQF 6		SCQF 6			SCQF 6		SCQF 6	SCQF 6 Opportunities to work in groups for laboratory investigations
Engineering Mathematics 1										
CNC		SCQF 5				SCQF 6	SCQF 5			
CAD for Engineers						SCQF 6				
Design for Manufacture		SCQF 6	SCQF 6				SCQF 6	SCQF 6	SCQF 6	SCQF 6 Opportunities to develop these skills as member of Design Team
Industrial Systems		SCQF 6	SCQF 6	SCQF 6			SCQF 6		SCQF 6	SCQF 6

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Unit Title	Communication			Numeracy		Information Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P&O	R&E	Working with Others
Application of Programmable Logic Controllers	SCQF 6	SCQF 6		SCQF 6	SCQF 6	SCQF 5 Opportunities to search on the Internet for manufacturers' information on the Internet	SCQF 6	SCQF 6	SCQF 6	
Engineering Skills							SCQF 6		SCQF 6	
Plant Systems		SCQF 6		SCQF 6	SCQF 6		SCQF 6	SCQF 6		
Heat Transfer and Fluid Mechanics		SCQF 6		SCQF 6	SCQF 6		SCQF 6		SCQF 6	
Metal Component Manufacture		SCQF 6	SCQF 6		SCQF 6		SCQF 6			
Plastic Component Manufacture		SCQF 6			SCQF 6		SCQF 6			
Strength of Materials: Advanced				SCQF 6			SCQF 6			

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Unit Title	Communication			Numeracy		Information Technology	Problem Solving			Working with Others
	Read	Write	Oral	Using Number	Using Graphical Inform.	Using Information Technology	CT	P&O	R&E	Working with Others
Applied Industrial Plant Maintenance						SCQF 6	SCQF 6			
Project Management										
Mechanical Engineering: Graded Unit 1		SCQF 6		SCQF 6			SCQF 6			

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5.6 SCQF levels

Tables 5.6.1 and 5.6.2 show the distribution of SCQF levels in the SQA Advanced Certificate and SQA Advanced Diploma in Mechanical Engineering respectively in the Common Core, Principles/Technology and Graded Unit sections. It can be seen from Table 5.6.1 that all mandatory Units in the SQA Advanced Certificate in Mechanical Engineering are at level 7 except the Engineering Mathematics 1 Unit. This Unit has been designed as a SCQF level 6 Unit to meet the mathematical abilities of the majority of candidates entering the SQA Advanced Certificate programme. The Qualification Design Team used as their benchmarks for levelling Mechanical Units, the Higher in Mechanical Engineering, various NQ Engineering Units and their knowledge of the content of existing degree courses in Mechanical Engineering. Table 5.6.1 shows that the number of SCQF level 7 credit points substantially exceeds the minimum of 48 SCQF credit points required to be in an SQA Advanced Certificate to satisfy the SQA Design Principles.

It can be seen from Table 5.6.2 that the minimum number of SCQF level 8 Units a candidate has to take in the SQA Advanced Certificate in Mechanical Engineering is 64 SCQF credit points which meets the minimum requirement of 64 SCQF credit points as stated in the SQA Design Principles. However, it is anticipated that most candidates will undertake some optional Units at level 8 which will mean that they will comfortably exceed this minimum requirement. A number of the SCQF level 8 Units in the SQA Advanced Diploma follow on from corresponding level 7 Units and are, therefore, appropriately levelled at SCQF level 8. The Qualification Design Team also used their knowledge of existing second year degree courses to level Units in the SQA Advanced Diploma in Mechanical Engineering.

Table 5.6.1

Distribution of SCQF levels in the SQA Advanced Certificate in Mechanical Engineering

Level 6	Level 7	Level 8	Totals	SQA Minimum Requirement for Level 7 Units
8 SCQF cp	72 SCQF cp	0 SCQF cp	80	48 SCQF cp

cp = credit points

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Table 5.6.2

Distribution of SCQF levels in the SQA Advanced Diploma in Mechanical Engineering

Level 6	Level 7	Level 8	Totals	SQA Minimum Requirement for Level 8 Units
8 SCQF cp	112 SCQF cp	64 SCQF cp	184	64 SCQF cp

cp = credit points

6 Approaches to delivery and assessment

6.1 Content and context

Throughout the design and development of the SQA Advanced Certificate/Diploma in Mechanical Engineering, the Qualification Design Team placed a high priority on producing awards that allow candidates to develop appropriate technical and practical skills. Unfortunately, it is not possible to quantify such technical and practical skills in exact detail. However, the Design Team has taken the view that the best way to prepare candidates to meet the changing technical and practical requirements of industry is to ensure candidates have a solid foundation of theory and practice upon which they can build new knowledge, understanding and skills. Thus, the Principles/Technology section of the SQA Advanced Certificate in Mechanical Engineering contains fundamental studies in engineering principles, mathematics, materials selection and quality systems. The SQA Advanced Diploma in Mechanical Engineering Principles/Technology section builds on and extends these studies.

The optional sections of the SQA Advanced Certificate/Diploma in Mechanical Engineering provide candidates with the opportunity to specialise in technical and/or non-technical subjects. In line with normal good practice centres are encouraged to advise candidates to choose those options that best meet their future career and educational aspirations.

The Qualification Design Team also ensured that the awards contain opportunities for candidates to develop a range of related skills which would make the holder of the awards better prepared for employment and/or degree studies. For example, the Communication: Practical Skills Unit has been included within the mandatory cores of the SQA Advanced Certificate and SQA Advanced Diploma to provide candidates with the opportunity to develop their written and group discussion skills about complex vocational issues.

Whilst a discrete Information Technology Unit is no longer included within the mandatory sections of the SQA Advanced Certificate in Mechanical Engineering, centres will still have the opportunity to access this Unit via the optional section of the SQA Advanced Certificate (Information Technology: Applications Software 1). Even where centres choose not to select this Unit from the optional section there are

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a number of opportunities to develop Information Technology knowledge and skills within individual Units. The Information Technology: Applications Software 1 Unit has been included within the core of the SQA Advanced Diploma to allow centres to concentrate on business applications, such as word processing, spreadsheets, databases, or engineering specific applications or a combination of the two.

A new type of Business Studies Unit, entitled Business Awareness and Continuing Professional Development, has been included within the mandatory core of the SQA Advanced Diploma in Mechanical Engineering. This Unit focuses on two areas which the Qualification Design Team considered important to working in the modern industry: namely the external and internal factors that affect business performance and the need for continuing learning and development if candidates are to have sustainable and rewarding employment in the future.

6.2 Delivery and Assessment

Delivery

The SQA Advanced Certificate/Diploma in Mechanical Engineering can be delivered on a full-time, block-release, part-time day or part-time evening basis. With the full integration of the SQA Advanced Certificate in Mechanical Engineering within the SQA Advanced Diploma greater scope exists to offer the SQA Advanced Diploma on a part-time basis. Centres may wish to use APEL or assessment on demand mechanisms to accredit candidates in employment who can evidence knowledge, understanding and skills in certain areas of Mechanical Engineering.

Centres, working on their own or in partnership, might also wish to consider using open and distance and/or e-learning techniques to deliver part or all of the SQA Advanced Certificate/Diploma in Mechanical Engineering. Such delivery approaches may include, but not be limited to, the following:

- ◆ identification and sharing of good candidate learning support materials on the Internet
- ◆ use of the Internet by candidates to undertake more in-depth investigations in given subject areas
- ◆ development or purchase of paper-based and/or electronic candidate learning support and assessment materials for individual Units
- ◆ development of on-line Unit and graded Unit assessment materials
- ◆ use of e-mentoring arrangements to support candidates who study at a distance

In timetabling the two awards, centre staff should take account of information contained in the Recommended Prior Knowledge and Skills statement in Unit specifications in sequencing the delivery of Units. For example, the Engineering Principles Unit would normally be delivered before the Statics and Strength of Materials and Dynamics Units. An example of a 2-year part-time SQA Advanced Certificate in Mechanical Engineering timetable is shown in Appendix 1.

One of the key reasons the Qualification Design Team has sought to reduce the time candidates have to spend on summative Unit assessment is to provide lecturers with more time to deliver Units. Lecturers are encouraged, in particular, to use this additional time to reinforce learning in core mechanical principles and technologies and enhance the development of candidates' practical mechanical and Core Skills.

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Lecturers may use a variety of teaching and learning approaches in delivering the Units in the SQA Advanced Certificate/Diploma in Mechanical Engineering. These may include lecturing, group work, laboratory and practical work, computer simulation (using appropriate software packages), project work and case studies. The use of open and distance learning and online materials may help to supplement and support the learning that takes place in the classroom, laboratory or workshop.

Industrial visits are encouraged wherever possible to provide 'real life' industrial examples of the application of the theory and practice learnt in the classroom, laboratory or workshop.

The Qualification Design Team recognises the very important role computer simulation plays in modern industry. The Team would actively encourage the use of computer simulation wherever appropriate but not at the expense of candidates doing practical work. The Team believe it is very important that candidates get as much exposure as possible to practical hand skills, the use of measuring equipment and other practical mechanical activities if they are to be suitably prepared to work in industry.

Lecturers should also seek opportunities to integrate Core Skills within their teaching and learning programmes. Such opportunities may include the following:

Communication

- ◆ Providing candidates opportunities to develop their oral skills by allowing them to give full answers to questions asked by the lecturer and by giving an oral presentation in the SQA Advanced Diploma in Mechanical Engineering Graded Unit project.
- ◆ Develop complex, vocationally specific reading skills (eg Fundamentals of Control Systems and Transducers, Applications of PLCs.)
- ◆ Develop report writing skills in a number of Units (eg Design for Manufacture, Plant Systems.)
- ◆ Allowing candidates to develop their Communication skills in group work activities (eg Communication: Practical Skills, Material Selection).

Numeracy

- ◆ Reinforcing Numeracy and Mathematical skills when teaching mechanical engineering principles (eg Dynamics, Strength of Materials: Advanced.)
- ◆ Reinforcing Using Graphical information skills by use of a range of graphical representations (eg Engineering Measurement, Metal Component Manufacture.)

Information Technology

- ◆ Develop Information Technology skills through the application of IT within a Mechanical Engineering context (eg CAD for Engineers, Applied Industrial Plant Maintenance.)

Problem Solving Skills

- ◆ Develop Critical Thinking Skills through the application of mechanical engineering principles and technologies to solve mechanical engineering problems.
- ◆ Develop Planning and Organisational skills (eg Design for Manufacture, Plant Systems.)

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- ◆ Develop reviewing and evaluation skills through, for example, the review and evaluation of the Outcomes of assignments and project work (eg Robotic Systems, Heating, Ventilation and Air Conditioning Practice and Design.)

Working with Others

- ◆ Develop Working with Others skills through group discussion on the solution to mechanical engineering problems (eg Material Selection, Robotic Systems.)

Assessment

From the outset of development the Qualification Design Team recognised the need to have an appropriate assessment strategy in place for the SQA Advanced Certificate/Diploma in Mechanical Engineering. Such a strategy was developed and is shown below:

Aims

The aims of the strategy are to ensure that:

- (1) Consistent, rigorous and efficient approaches are adopted to the development and administration of SQA Advanced Engineering assessment instruments at both Unit and graded Unit levels, which satisfy nationally agreed standards.
- (2) The assessment load on candidates and staff is sensible and that assessment does not unduly detract from teaching and learning.
- (3) As far as possible reliable and rigorous verification processes are put in place in order to ensure that consistent national standards are achieved for all SQA Advanced Mechanical Engineering assessments.

Objectives

Listed below are the measures that have been put in place to meet the aims:

- (1) Develop nationally at least one assessment exemplar pack for each mandatory and Principles/Technology Unit, which clearly sets out the standards of assessment expected in the Unit.
- (2) Adopt a holistic approach to Unit assessment. The implications of this are as follows:
 - (i) Assessment instruments will normally be designed only to sample knowledge and skills in a Unit (this is consistent with the SQA Advanced Unit format).
 - (ii) A Unit assessment strategy will be adopted, where possible, to produce a single assessment instrument for the whole Unit. Where this is not possible the assessment strategy will seek to ensure that the minimum number of assessment instruments are required consistent with maintaining agreed national standards.
- (3) Whilst not seeking to be entirely prescriptive with regard to the time spent on assessment in each SQA Advanced Unit, over assessment should be avoided

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if the following guidelines are adopted for the maximum time spent on SQA Advanced Unit assessment:

- (i) One and a half hours per Unit credit for SQA Advanced Units at SCQF levels 6 and level 7.
 - (ii) Two hours per Unit credit for SQA Advanced Units at SCQF level 8.
- (4) Produce assessment exemplar packs for the four graded Units. For each graded Unit examination produce at least one sample exam paper to show the standards expected in such a paper. Likewise, for the 2 credit Graded Unit Mechanical Engineering Project produce sets of materials which clearly set out the standards of candidate response required to achieve a Grade A and Grade C.
 - (5) Actively encourage centres to work in partnership in producing graded Unit assessment materials, which meet nationally agreed standards reducing, in turn, the workload on staff in individual colleges.
 - (6) Ensure that consistent and rigorous internal and external verification procedures operate through both SQA Advanced Unit level and graded Unit assessment processes. This places a clear responsibility on both centres and the SQA.

As far as has been practical the above objectives have been adhered to when developing assessment exemplar and graded Unit materials.

Assessment Exemplar Materials

Assessment exemplar packs have been produced for all Principles/Technology and graded Units in the SQA Advanced Certificate/Diploma in Mechanical Engineering.

Formative Assessment

Formative assessment should be used throughout the delivery of Units to reinforce learning, build candidates' confidence and prepare candidates for summative assessment.

Unit Assessment Information

A table showing details of assessment on an individual Unit basis is shown in Appendix 2. This table has been included to assist centre staff in timetabling, assessment scheduling and controlling assessment loading.

6.3 Open and Distance Learning

Advice on the use of open and distance learning is given in individual Unit specifications. However, where it is used with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that the assessment or assessments were conducted under the conditions specified in the Unit specification. For example, in the case of a Unit which involved a Unit end test a centre would have to make arrangements for the test to be conducted under controlled, supervised conditions. Likewise, where a Unit involves a practical based assessment, a centre would have to make arrangements for candidates to come into

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the centre to undertake the assessment under the conditions specified in the Unit specification.

It should be noted that the same requirements as specified in the previous paragraph apply where part or all of a Unit is delivered on-line.

7 General information for centres

Equality and inclusion

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.

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).

8 General information for candidates

The SQA Advanced Certificate and Diploma in Mechanical Engineering have been designed by an expert team of educators and industrialists with a view to allowing you to meet the educational requirements to work as a mechanical incorporated engineer. The qualifications contain up-to-date and relevant mechanical subject content and skills and have also been designed to satisfy the SQA Design Principles.

The SQA Qualification Design Team has designed the awards so that you will have opportunities to learn and understand the core principles and technologies that underpin Mechanical Engineering. Learning these will be essential in providing you with a platform for tackling many mechanical tasks and in allowing you to develop a more in-depth knowledge of Mechanical Engineering. At the same time studying the SQA Advanced Certificate/Diploma in Mechanical Engineering will provide you with opportunities to develop sound practical mechanical investigation, construction, measurement, testing and project skills which are critical to being a good mechanical technician and/or incorporated engineer.

As well as studying Mechanical subjects you will also take Communication with an option to do Information Technology as part of the SQA Advanced Certificate. Good Communication skills are essential to understanding technical material, and when communicating with others whether on an individual basis or when working as part of a team. Information Technology underpins much of the work in Mechanical Engineering whether this is through computer simulation of mechanical systems or processes or in preparing a written report on the work you have been involved in. Opportunities to develop Information Technology knowledge and skills

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are available in a number of Units in the SQA Advanced Certificate, but an optional Unit on Information Technology Applications is also available if you wish to consolidate your skills in this area.

The Communication and Information Technology Units are mandatory within the SQA Advanced Diploma in Mechanical Engineering although you will not need to study these Units if you have already done so as part of the SQA Advanced Certificate. There is an additional mandatory core Unit in the SQA Advanced Diploma in Mechanical Engineering award entitled Business Awareness and Continuing Professional Development. This Unit will provide you with an awareness of the business pressures on modern engineering companies and what strategies they are adopting to meet these pressures. The Unit will also provide you with the opportunity to develop your own career and education action plan for the next five years or so.

As already mentioned, Mechanical Engineering is very much about learning and understanding core principles and technologies whilst also doing practical work such as assembly and manufacturing skills, measurement and project work. Thus, while taking the SQA Advanced Certificate and SQA Advanced Diploma in Mechanical Engineering you can anticipate that the teaching and learning approaches adopted by your lecturers will include the following: lecturing, group work, practical engineering work, measurement and testing, computer simulation and project work.

The Qualification Design Team has ensured that assessments in the two awards meet national standards. The two awards have been designed to optimise assessment so that sufficient time is available for you to learn the mechanical principles and technologies and the practical skills that are essential to being a good mechanical technician and/or incorporated engineer.

You can expect to do assessment at individual Unit level and at qualification level. At Unit level assessment will consist of some form of written end test, or a combination of short written test and practical exercise, computer simulation or a purely practical exercise. Your lecturer should tell you at the start of the Unit what form the Unit assessment will take. In addition to Unit tests there will also be a 3-hour examination at SQA Advanced Certificate level and a 2-credit project at SQA Advanced Diploma level. Both these assessments have been designed to allow you to demonstrate your ability to integrate knowledge, understanding and skills learnt in the two awards as a whole.

The Qualification Design Team does not wish to place any artificial barriers in the way of potential candidates wanting to study the two awards. However, it would be unfair to enrol a candidate into the SQA Advanced Certificate and SQA Advanced Diploma who did not have a realistic chance of successfully achieving either or both awards. The Qualification Design Team would therefore recommend that a candidate had at least one of the following qualifications before entering the SQA Advanced Certificate and SQA Advanced Diploma in Mechanical Engineering:

- (1) One Higher from Physics, Technological Studies, Mechatronics or Mathematics and at least three National 5 passes including Mathematics, Physics/Technological Studies and English.
- (2) A National Certificate in Engineering.
- (3) Equivalent qualifications or experience to those shown in (1) and (2).

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An SQA Advanced Certificate/Diploma in Mechanical Engineering only partially satisfies the academic requirements to become an incorporated engineer (a degree is now required) although they fully satisfy the requirements to be an engineering technician. The SQA Advanced Certificate and SQA Advanced Diploma in Mechanical Engineering provide a very solid platform for candidates to proceed to the advanced stages of a degree programme in Mechanical Engineering. Ask your lecturer about progression arrangements your college has with any university(ies).

9 Glossary of terms

SCQF: This stands for the Scottish Credit and Qualification Framework, which is a 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

SCQF credits: One SQA Credit is equivalent to 8 SCQF credit points. This applies to all SQA Advanced Units, irrespective of their level.

SCQF levels: The SCQF covers 12 levels of learning. SQA Advanced Units will normally be at levels 6–9. Graded Units will be at level 7 and 8 (see Section 5.8 for further information on this).

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 Core Skill Unit: This is a Unit that is written to cover one or more particular Core Skills, eg SQA Advanced Units in Information Technology or Communications.

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 outside automatic certification.

Qualification Design Team: The QDT works in conjunction with a Qualifications Manager to steer the development of the SQA Advanced Certificate/Diploma 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 SQA Advanced Certificates/Diplomas are those developments or revisions undertaken by a group of centres in partnership with SQA.

Specialist single centre and specialist collaborative devised SQA Advanced Certificates/Diplomas 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 SQA Advanced Certificates/Diplomas, these developments or revisions will also be supported by SQA.

10 Appendices

Appendix 1: Sample Teaching Timetables

Appendix 2: Assessment details on an individual Unit basis

See following pages for appendices.

Appendix 1: Sample Teaching Timetable

2-year Part-Time SQA Advanced Certificate in Mechanical
Engineering

2–Year, Part-Time SQA Advanced Certificate in Mechanical Engineering Timetable

First Year, First Semester

Communication: Practical Skills	Engineering Principles	Engineering Mathematics 1
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First Year, Second Semester

Quality Management: An Introduction	Statics and Strength of Materials	Materials Selection
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Second Year, First Semester

Thermofluids	Dynamics	Pneumatics and Hydraulics
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Second Year, Second Semester

Option	Option	Mechanical: Graded Unit 2
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Appendix 2: Assessment details on an individual Unit basis

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT7Y 48	Applied Industrial Plant Maintenance	O.1 & 2 – assessment paper lasting 1 hour and 30 minutes	O.3 – assignment involving the development of a computerised maintenance schedule plus documentation and report		
HT77 47	CNC	O.1 – assessment paper	O.2 & O.3 – practical assignment culminating in a short report		
HT73 47	Computer Aided Draughting for Engineers	O.1 – assignment involving CAD drawings	O.2 – assignment involving the production and printing of composite drawings, standard parts, external drawing files and custom menus	O.3 – assignment involving the production of 3-D drawings	
HT75 48	Design for Manufacture	O.1 - Assessment paper lasting 1 hour	O.2 - Assignment	O.3 - Portfolio plus presentation	
HT7E 47	Dynamics	All Outcomes – assessment paper lasting 1 hour and 30 minutes			

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT78 47	Economics of Manufacture	O.1 – assessment paper lasting no more than 30 minutes	O.2 & 3 – an assignment, lasting 3 hours, involving the interpretation of given cost data and the application of breakeven analysis. Candidate evidence should be in the form of a report	O.4 – an assignment, lasting 2 hours, involving the evaluation of a project’s viability using financial appraisal techniques. Candidate evidence should be in the form of a report	
HT72 47	Engineering Drawing	O.1 – short answer question paper plus graphical exercise	O.2 & 3 – graphical assignment. Candidate evidence should be in the form of appropriate engineering drawings		

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT7D 47	Engineering Measurement	O.1 & O.3 – measurement assignment plus report	O.2 – using a range of inspection instruments and completing log sheet for each instrument	O.4 – investigation on inspection method or feature that is more specialist plus report	
HT74 47	Engineering Principles	O.1 – laboratory exercise done in 1 hour plus report	O.2 – laboratory exercise done in 1 hour plus report	O.3 – laboratory exercise done in 1 hour plus report	
HT7N 47	Engineering Skills	Production of artefacts plus log book and inspection sheets			
HT7R 48	Heat Transfer and Fluid Mechanics	All Outcomes – assessment paper lasting 2 hours and 30 minutes			
HT7X 48	Heating, Ventilation and Air Conditioning Practice and Design	O.1, 2 & 3 - assessment paper lasting 2 hours	O.4 – laboratory experiment on a refrigeration or HVAC system plus report		
HT79 48	Industrial Systems	All Outcomes – assessment paper lasting 2 hours			

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT76 47	Materials Selection	O.1, 2 & 3 – assessment paper lasting 1 hour and 30 minutes	O4 – two laboratory based assignments plus report		
HT7T 47	Metal Component Manufacture	O.1 – study of a manufacturing company plus report	O.2 – study of a manufacturing company plus report	O.3 – 10 minute presentation on the selection of primary and secondary processes	
HT7V 48	Plant Systems	O.1 to O.5 – assessment paper lasting 3 hours	O.6 – assignment relating to the replacement of one Unit of plant. Assignment should last no longer than 1 hour and should involve the candidate in developing a complete installation and commissioning plan		
HT7W 47	Plastic Component Manufacture	O.1 – short written report covering the material requirements for 5 plastic components	O.2 – short written report describing 4 plastic manufacturing processes	O.3 – assessment paper lasting 30 minutes	O.4 – short written report covering 3 advanced plastic manufacturing techniques

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT7F 47	Pneumatics and Hydraulics	O.1- assessment paper lasting 1 hour	O.2 – assignment in which candidate designs, tests and builds pneumatic or hydraulic power and control circuit. Candidate evidence should be in the form of a functional circuit plus report	O.3 – assignment involving fault finding on a practical or simulated faulty fluid power circuit. Candidate evidence should be provided in the form of a report	
HT84 48	Manufacturing: Process and Equipment Selection	O.1 – preparation of short report plus planning sheets	O.1 – preparation of short report plus planning sheets	O.1 – preparation of short report plus planning sheets	O.1 – preparation of short report plus planning sheets
HT80 48	Robotic Systems	O.1 & O.2 – Case study on a robotic system. Candidates answer questions on the study in 2 hours	O.3 – Practical assignment undertaken in 2 hours. Reports can be written up in the candidate’s own time		
HT71 47	Statics and Strength of Materials	Both Outcomes – assessment paper lasting 1 hour and 30 minutes			

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Unit Number	Unit Title	Assessment 1	Assessment 2	Assessment 3	Assessment 4
HT81 48	Strength of Materials: Advanced	O.1 – assessment paper lasting no more than 1 hour	O.2 – assignment involving candidates in completing a series of tasks within 8 hours. Candidate evidence should be in the form of a report (s) completed in their own time.		
HT7C 47	Thermofluids	All Outcomes – assessment paper lasting 2 hours			