National 4 Course Specification

National 4 Design and Manufacture Course Specification (C719 74)

Valid from August 2013

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Please refer to the note of changes at the end of this Course Specification for details of changes from previous version (where applicable).

Course outline

Course title: National 4 Design and Manufacture

SCQF: level 4 (24 SCQF credit points)

Course code: C719 74

Mandatory Units

This Course comprises the following mandatory Units:

H22T 74 Design and Manufacture: Design (National 4) 9 SCQF credit points
H22V 74 Design and Manufacture: Materials and Manufacturing (National 4) 9 SCQF credit points

Added Value Unit
H22W 74 Design and Manufacture Assignment (National 4) 6 SCQF credit points

This Course includes six SCQF credit points for the assessment of added value in the Added Value Unit. Further information on this Unit is provided in the Assessment section.

Recommended entry

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills and knowledge required by the following or equivalent qualifications and/or experience:

- National 3 Design and Technology Course or relevant component Units

In terms of prior learning and experience, relevant experiences and outcomes may also provide an appropriate basis for doing this Course. Further information on relevant experiences and outcomes is given in the *Course Support Notes*.

Other relevant prior learning and experience would be skills in art, design and crafts work. Knowledge and understanding of the properties and uses of materials would also be of value, as would appropriate skills in literacy and numeracy.

Progression

This Course or its Units may provide progression to:

- other SQA qualifications in Design and Manufacture or related areas
- further study, employment or training

Further details are provided in the *Course Support Notes*.

Equality and inclusion

This Course Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Course Support Notes.*

Rationale

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

Relationship between the Course and Curriculum for Excellence values, purposes and principles

The Course introduces learners to the multi-faceted world of product design and manufacturing[1]. Creativity is at the heart of this Course — and its combination with technology makes it exciting and dynamic.

The Course combines scientific, mathematical and technological rigour with design and manufacturing creativity and innovation. It is at this interface that the Course demonstrates broad options, possibilities and flexibilities in supporting educational growth.

In the Course learners are encouraged to use imagination, creativity and logical thinking, and to apply practical skills. The Course thus provides a broad scope for personalisation and choice.

The Course allows learners to broaden and deepen their skills base and to widen their horizons regarding a range of potential vocations and careers. It will provide opportunities to further develop the attributes and capabilities of the four capacities, including: creativity, flexibility and adaptability; enthusiasm and a willingness to learn; perseverance, independence and resilience; responsibility and reliability; and confidence and enterprise.

The Course provides learners with skills that allow them to learn, live, and work more effectively in our advancing technological society. It allows them to become not just effective contributors but better informed and discerning consumers.

[1] In this Course, the words ‘manufacture’ and ‘make’ are generally interchangeable. In this document, both words are to be understood to refer to the production of models, prototypes or products in a school workshop context, and hence either bespoke or low-volume crafts work. The exception to this general rule is where the word ‘manufacture’ definitely refers to large-scale factory or industrial production of multiple units, such as may be understood by the term ‘mass production’. In these cases the context will make this clear.

The Course provides progression from experiences and outcomes in expressive arts, mathematics, science and ICT, as well as in craft, design, engineering and graphics.

Purpose and aims of the Course

The Course is broad, providing opportunities for learners to develop practical/design skills, as well as gaining knowledge and understanding of design, and materials and manufacturing processes.

The Course is practical, exploratory and experiential in nature. It combines elements of creativity and designing for aesthetic or visual impact with a requirement to consider a product's function and performance. It helps the learner appreciate the tensions that exist between factors such as aesthetics, function, economics and the environment.

The Course allows learners to consider the various factors that impact on a product's design. The learner will consider the life cycle of a product from its inception through design, manufacture, and use, including its disposal or re-use— a 'cradle-to-cradle' approach to design.

The Course provides learners with opportunities to develop skills that are of general value for learning, life and work: the ability to read drawings and diagrams; the ability to articulate and communicate design ideas and practical details; the ability to devise and develop practical solutions to design problems, and the ability to manufacture their design ideas.

The Course allows learners to engage with technologies and to consider the impact that design and manufacturing technologies have on our environment and society. It allows them to consider how technologies have impacted on the world of the designer and on manufacturing.

The Course is of broad general benefit to all learners. It also provides a foundation for those considering further study, or a career, in design, manufacturing, engineering, science, marketing, and related disciplines. The Course provides a complementary practical experience for those studying subjects in the technologies and expressive arts.

The aims of the Course are to enable learners to develop:

- skills in the design and manufacturing of models, prototypes and products
- knowledge and understanding of manufacturing processes and materials
- an understanding of the impact of design and manufacturing technologies on our environment and society

Information about typical learners who might do the Course

This Course is a broad-based qualification, suitable for learners with a general or specific interest in design and technology generally. It is suitable for learners with an interest in product design and manufacturing in particular. It is suitable for those wanting to progress onto higher levels of study in the subject.

The Course is largely learner-centred and includes practical and experiential learning opportunities. The world of design and manufacturing covers a broad spectrum of experiences. Some products are designed to create an emotional or visual impact;

others are more functional in their requirements. These facts allow the Course to be flexible in nature and allow scope for personalisation and choice for each learner.

On completing the Course, learners will be able to: create, develop and communicate design proposals; solve design problems in applied contexts; contribute to the evaluation of design proposals and manufacturing practicalities; and manufacture models, prototypes and products of their design ideas.

In addition, learners will have developed: knowledge and understanding of a range of materials and manufacturing processes; an appreciation of the factors that impact on the design and manufacture of products; and an understanding of the impact of design and manufacturing technologies on our environment and society.

Course structure and conditions of award

Course structure

On completing the Course, learners will have developed design skills, as well as skills in making models, prototypes and products. Learners will acquire knowledge and understanding of materials and manufacturing processes.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a number of ways.

The Course consists of three mandatory Units including the Added Value Unit. Each of the component Units of the Course is designed to provide progression to the corresponding Unit at National 5.

Design and Manufacture: Design (National 4)
This Unit covers the product design process from brief to design proposal. It helps learners develop skills in initiating, developing, articulating and communicating simple design proposals. It allows them to develop an appreciation of the design/make/test process and the importance of evaluating and resolving work on an ongoing basis. It allows them to develop an appreciation of design concepts and the various factors that influence the design of products.

Design and Manufacture: Materials and Manufacturing (National 4)
This Unit covers the product design process from design proposals to prototype and product. It allows learners to 'close the design loop' by manufacturing their design ideas. It allows learners to develop practical skills that are invaluable in the design/make/test process. It helps them gain an appreciation of the properties and uses of materials, as well as simple manufacturing processes and techniques. It allows them to refine and resolve design and manufacturing solutions.

In both Units, learners will gain knowledge of design and manufacturing technologies and how these impact on our environment and society.

Added Value Unit: Design and Manufacture Assignment (National 4)
This Unit adds value by introducing challenge and application.

Learners will draw on their range of design knowledge and skills, knowledge of materials and manufacturing and apply their practical skills, in order to produce an effective overall response to a brief. The brief will relate to a straightforward product design scenario. The response will include a folio, a model, or a prototype, or a completed product.

Learners will be able to extend and apply their knowledge and skills through the assignment. The brief will be sufficiently open and flexible to allow for personalisation and choice. Learners will use skills and knowledge acquired through the Units to develop the discrete aspects and overall presentation of the assignment.

Conditions of award

To achieve the National 4 Design and Manufacture Course, learners must pass all of the required Units, including the Added Value Unit. The required Units are shown in the Course outline section.

National 4 Courses are not graded.

Skills, knowledge and understanding

Full skills, knowledge and understanding for the Course may be given in the *Added Value Unit Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course is given in this section. These include:

- applying, with guidance, basic knowledge and understanding of research techniques
- applying, with guidance, basic knowledge and understanding of idea generation techniques
- applying, with guidance, basic knowledge and understanding of design factors
- applying, with guidance, basic knowledge and understanding of graphic techniques
- applying, with guidance, basic knowledge and understanding of modelling techniques
- applying, with guidance, basic knowledge and understanding of planning techniques
- applying, with guidance, basic knowledge and understanding of evaluation techniques
- applying, with guidance, basic knowledge and understanding of tools, materials and processes
- applying, with guidance, basic knowledge and understanding of manufacturing techniques
- basic knowledge and understanding of commercial manufacture
- basic knowledge and understanding of the impact of a range of design and manufacturing technologies on our environment and society

Skills, knowledge and understanding to be included in the Course will be appropriate to the SCQF level of the Course. The SCQF level descriptors give further information on characteristics and expected performance at each SCQF level (www.sqa.org.uk/scqf).

Assessment

Further information about assessment for the Course is included in the *Course Support Notes* and the *Added Value Unit Specification.*

Unit assessment

All Units are internally assessed against the requirements shown in the *Unit Specification.*

They can be assessed on an individual Unit basis or by using other approaches which combine the assessment for more than one Unit.

They will be assessed on a pass/fail basis within centres. SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgments are consistent and meet national standards.

The assessment of the Units in this Course will be as follows:

Design and Manufacture: Design (National 4)
In this Unit, evidence will be provided by the production, evaluation and justification of design proposals, including a simple specification in response to a brief. Knowledge will also be assessed.

Design and Manufacture: Materials and Manufacturing (National 4)
In this Unit, evidence will be provided by the production and evaluation of simple products in response to given instructions. Knowledge will also be assessed.

Added Value Unit

Courses from National 4 to Advanced Higher include assessment of added value[2]. At National 4, added value will be assessed in an Added Value Unit. The Added Value Unit will address the key purposes and aims of the Course as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge and application.

In this Course, the Added Value Unit will focus on challenge and application.

The learner will draw on, extend and apply the skills and knowledge they have developed during the Course. This will be assessed through an assignment[3] requiring application of skills and knowledge from the Units to produce an effective overall response to the brief.

The response to the brief will include a design folio and model, a prototype or a completed product. The brief for the assignment will be sufficiently open and flexible to allow for personalisation and choice.

[2] Definitions can be found here: http://www.sqa.org.uk/sqa/58409.html
[3] Definitions can be found here: http://www.sqa.org.uk/sqa/58409.html

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Course. The skills that learners will be expected to improve on and develop through the Course are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Course where there are appropriate opportunities.

2 Numeracy

2.2 Money, time and measurement

4 Employability, enterprise and citizenship

4.4 Enterprise

5 Thinking skills

5.1 Remembering
5.2 Understanding
5.3 Applying

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the Course. Further information on building in skills for learning, skills for life and skills for work for the Course is given in the *Course Support Notes*.

Administrative information

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History of changes to National Course Specification

Version	Description of change	Authorised by	Date
1.1	Minor changes to wording in first paragraph of 'Purpose and aims of Course' section and to the description of the Design Unit in the 'Course structure' section. No changes to skills, knowledge and understanding requirements, but bullets re-worded for clarity.	Qualifications Manager	April 2015