



Higher
Course
Specification



Higher Design and Manufacture Course Specification (C719 76)

Valid from August 2014

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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).

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Course outline

Course title: Higher Design and Manufacture

SCQF: level 6 (24 SCQF credit points)

Course code: C719 76

Mandatory Units

H22T 76 Design and Manufacture: Design (Higher) 9 SCQF credit points

**H22V 76 Design and Manufacture: Materials and Manufacturing (Higher)
9 SCQF credit points**

Course assessment 6 SCQF credit points

This Course includes six SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course. Further information on the Course assessment 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, knowledge and understanding required by the following or by equivalent qualifications and/or experience:

- ◆ National 5 Design and Manufacture Course

Progression

This Course or its Units may provide progression to:

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

Further details are provided in the Rationale section.

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 the 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 and fit for purpose and they 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 Higher Design and Manufacture Course allows learners to explore the multi-faceted world of product design and manufacturing¹. 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 manufacture creativity and innovation. It is at this that the course demonstrates broad options, possibilities and flexibilities in supporting educational growth.

In the Course, learners are encouraged to exercise imagination, creativity and logical thinking. 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.

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 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.

The Course provides progression from the Design and Manufacture (National 5) Course.

Purpose and aims of the Course

The Course provides a broad and practical experience in product design and manufacture. It provides opportunities for learners to gain skills in designing and communicating design proposals and opportunities for learners to refine and resolve their design ideas effectively.

The Course stresses the integration of designing and making. It confirms that design is an iterative process. The Course highlights the close relationship between designing, making, testing, and refining design ideas.

The Course provides opportunities for learners to apply practical skills and an understanding of the properties and uses of materials and manufacturing processes. It does so in a way that allows learners to inform and refine their own design proposals. It offers them opportunities to explore design alternatives and to consider the manufacturing practicalities that these design alternatives bring to light.

The Course combines elements of creativity and designing for aesthetic or visual impact with elements of designing for the practicalities of manufacturing. It helps the learner appreciate the importance to a product of form, function, and performance. It helps them develop strategies for the evaluation of these attributes and to refine and resolve their designs accordingly.

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

The Course provides learners with opportunities to develop:

- ◆ research skills
- ◆ idea generation techniques
- ◆ the ability to read drawings and diagrams
- ◆ the ability to communicate design ideas and practical details
- ◆ the ability to evaluate and apply both tangible and subjective feedback
- ◆ the ability to devise, plan and develop practical solutions to design opportunities

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

The Higher Design and Manufacture Course differs in purpose and aim from the equivalent Courses at National 4 and National 5. It does so most obviously by requiring learners to give greater priority to evaluating design proposals and arriving at a resolved design. Of necessity, this may reduce time spent on crafting quality prototypes. Subsequently it is likely to increase the time spent on making practical models in order to inform and refine design proposals.

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

- ◆ skills in design and in refining design proposals
- ◆ practical skills in the planning and development of models and prototypes
- ◆ skills in evaluation and research
- ◆ 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 an interest in design and technology generally. It is suitable for learners with a keen general or specific interest in product design and manufacturing. 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 and allow scope for personalisation and choice for each learner.

On completing the Course, learners will be able to: initiate, develop and communicate design proposals; solve design problems in applied contexts; and evaluate, refine and resolve design proposals and manufacturing practicalities.

In addition, learners will have developed: design skills, including creativity; skills in planning and making models and prototypes of their design ideas; knowledge and understanding of a range of materials and manufacturing processes; a critical 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

The Course is practical, exploratory and experiential in nature. It combines elements of creativity and designing for visual impact with elements of practicalities and an appreciation of functionality.

On completing the Course, the learners will have developed: design skills in the context of products; practical skills in planning and making or manufacturing models and prototypes, including the selection and use of equipment, materials and/or software; and skills in the evaluation of design proposals, including form and function, leading to a refinement of their design ideas.

Learners will also have developed: skills in building and testing in order to prove and resolve their design ideas; knowledge and understanding of manufacturing processes and materials; and an understanding of the impact of design and manufacturing technologies on our environment and society, the world of work and industry.

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

As well as the Course assessment, the Course includes two mandatory Units.

Design and Manufacture: Design (Higher)

This Unit covers the processes of product design from brief to resolved design proposals and specification. It helps learners develop skills in initiating, developing, articulating and communicating design proposals for products. It allows them to gain skills and experience in evaluating design proposals in order to refine, improve and resolve them. It allows them to develop an appreciation of design concepts and the various factors that influence the design and manufacture of products.

Design and Manufacture: Materials and Manufacturing (Higher)

This Unit covers the processes of product design from design proposals to prototype. It allows learners to gain skills in planning and making models and prototypes. It helps learners to 'close the design loop' by manufacturing a set of design ideas. It allows them to develop an appreciation of manufacturing practicalities. It allows them to strengthen an appreciation of the various factors that influence the design and manufacture of products. It allows learners to consider the manufacturing techniques and processes that would apply to a design proposal in an industrial/commercial context.

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

Conditions of award

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. The required Units are shown in the Course outline section. Course assessment will provide the basis for grading attainment in the Course award.

Skills, knowledge and understanding

Further information on the assessment of the skills, knowledge and understanding for the Course is given in the *Course Assessment Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course is given in this section.

This covers:

- ◆ researching and evaluating existing product types
- ◆ selecting and using a range of research techniques and evaluating their usefulness
- ◆ selecting and applying a range of idea generation techniques
- ◆ writing a detailed specification based on function and performance
- ◆ applying a range of creative design skills when refining and resolving product design tasks which encompass a range of key design factors
- ◆ selecting and using graphic techniques to visually represent design solutions, justifying the chosen selection of techniques
- ◆ selecting, using and evaluating a range of simple modelling and manufacturing techniques to represent design ideas in three dimensions
- ◆ planning a manufacturing process and analysing its effectiveness
- ◆ selecting and using a range of tools, equipment, software and materials in designing, making and testing models and prototypes
- ◆ evaluating their own design proposals and associated manufacturing practicalities, and applying suggestions for improvement
- ◆ a broad understanding of the impact of a range of design and manufacturing technologies on our environment and society
- ◆ critically evaluating a range of factors that influence the design and manufacture of products
- ◆ understanding of a broad range of industrial and commercial manufacturing processes and the properties and uses of materials

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

Information about assessment for the Course is included in the *Course Assessment Specification*, which provides full details including advice on how a learner's overall attainment for the Course will be determined.

Unit assessment

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

They can be assessed on a Unit-by-Unit basis or by combined assessment.

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 (Higher)

In this Unit, evidence will be provided by the development, production, evaluation and justification of design proposals, including a specification, in response to a brief which covers a range of key design factors. Knowledge and understanding will also be assessed.

Design and Manufacture: Materials and Manufacturing (Higher)

In this Unit, evidence will be provided by the production and evaluation of a prototype. This will be done in response to a brief which covers a range of key requirements. Knowledge and understanding will also be assessed.

Exemplification of possible assessment approaches for these Units is provided in the *National Assessment Resource*.

Course assessment

Courses from National 4 to Advanced Higher include assessment of [added value](#)². At National 5, Higher and Advanced Higher, the added value will be assessed in the Course assessment. The added value for the Course must 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 or application.

In the Higher Design and Manufacture Course, added value will focus on:

- ◆ breadth
- ◆ challenge
- ◆ application

² Definitions can be found here: www.sqa.org.uk/sqa/45528.html

The learner will draw on, extend and apply the skills, knowledge and understanding they have developed during the Course. These will be assessed through a combination of an [assignment](#)³ and a [question paper](#)⁴.

The Design and Manufacture assignment adds value by introducing challenge and application. Learners will draw on their range of design skills, knowledge of materials, and practical skills, in order to produce an effective overall response to the brief.

The response to the brief will include a folio and model and/or a prototype. The brief for the assignment, which will cover a range of key design factors, will be sufficiently open and flexible to allow for personalisation and choice.

The question paper introduces breadth to the assessment. It requires depth of understanding and application of knowledge from the Units.

³ Definitions can be found here: www.sqa.org.uk/sqa/45528.html

⁴ See link above for definition.

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

5.3 Applying

5.4 Analysing and evaluating

5.5 Creating

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

Course details	Version	Description of change	Authorised by	Date

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