



Design and Manufacture (National 4)

Draft National Course Specification



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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: Design and Manufacture (National 4)

SCQF: level 4 (24 SCQF credit points)

Course code: to be advised

Mandatory Units

Design and Manufacture: Design (National 4) 9 SCQF credit points

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

Added Value Unit

Design and Manufacture Project (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 one or more of the following or by equivalent qualifications and/or experience:

- ◆ Art and Design (National 4) Course or relevant component Units
- ◆ Practical Woodworking (National 4) Course or relevant component Units
- ◆ Practical Metalworking (National 4) 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 will be 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 components 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 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* and the *Course Assessment Specification*.

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 and 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. Creativity is at the heart of this Course — yet it is its combination with technology that makes it so exciting.

The Course combines scientific, mathematical and technological rigour with design creativity and innovation. It is this interface between technology and creativity that makes the Course so full of options, possibilities and of great educational benefit.

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 vocations and careers. It will provide opportunities to further acquire and 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 advanced technological society. It allows them to become not just effective contributors but better informed and discerning consumers.

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 provides a broad practical introduction to design, materials and manufacturing processes. It provides opportunities for learners to gain skills in both designing and in communicating design proposals. It allows learners to explore the properties and uses of materials and to make models and prototypes of products.

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 often exist between factors surrounding 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 — a 'cradle-to-grave' 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. It allows them 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 solid 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 an interest in design and technology generally. It is suitable for learners with an interest in product design in particular. It is suitable for those wanting to progress onto higher levels of study in the subject.

The qualification is largely learner-centred and includes practical and experiential learning opportunities. The world of design and manufacturing covers a vast 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 activities also provide opportunities to build self-confidence and to enhance generic and transferable skills in literacy, numeracy, researching, ICT planning and organising, working independently and in collaboration with others, critical thinking and decision making, enterprise, communication, as well as self- and peer-evaluation.

As learners progress through the suite of Design and Manufacture Courses, they will concentrate more on producing effectively resolved design proposals and less on producing a completed product. At the same time, learners will add to their knowledge and understanding of materials and manufacturing processes, allowing them to articulate, refine and resolve their design proposals through making and testing.

Course structure and conditions of award

Course structure

The Course is practical yet exploratory and experiential in nature. On completing the Course, learners will have developed design skills, as well as skills in making models, prototypes and products. Learners will also 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 resolved design proposals, including a specification. 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 or 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 Project (National 4)

This Unit 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 a project brief. The brief will relate to a straightforward product design scenario. The response will include a prototype or a completed product.

Learners will be able to extend and apply their knowledge and skills through the project. The brief for the project 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 project.

Conditions of award

To achieve this 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 and knowledge

Full skills and knowledge for the Course will be given in the *Course Assessment Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course includes:

- ◆ evaluating, with guidance, existing products
- ◆ using, with guidance, a selected range of research techniques
- ◆ applying, with guidance, a range of basic idea generation techniques
- ◆ writing a simple specification
- ◆ selecting and using, with guidance, a range of tools, equipment, software and materials in designing, making and testing models, prototypes and products
- ◆ applying, with guidance, creative design skills, when refining and resolving simple product design tasks
- ◆ using graphic techniques to visually represent design solutions in simple and straightforward contexts
- ◆ using simple modelling and manufacturing techniques to represent design ideas in three dimensions
- ◆ contributing to the evaluation of their own design proposals and associated manufacturing practicalities, and make suggestions for improvement
- ◆ basic knowledge of the impact of design and manufacturing technologies on our environment and society
- ◆ basic knowledge of the factors that influence the design and manufacture of artefacts and products
- ◆ basic knowledge of manufacturing processes and the properties and uses of materials

Assessment

Information about assessment for the Course will be included in the *Course Assessment Specification*, which will provide 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 Unit Specifications.

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 (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](#)¹. 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 a [project](#)² requiring application of skills and knowledge from the Units to produce an effective overall response to the project brief. The brief for the project will be sufficiently open and flexible to allow for personalisation and choice.

Exemplification of possible approaches for Units will be provided in the *National Assessment Resource*.

¹ Definitions can be found here: www.sqa.org.uk/sqa/45528.html

² See link above for definition.

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

(Note: The information given below reflects the initial thinking on significant opportunities for development of skills for learning, skills for life and skills for work. These may be subject to change as the development process progresses.)

It is expected that learners will also develop broad, generic skills through this Course. The skills that are likely to be appropriate for this 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

5.3 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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Superclass: to be advised

History of changes to National Course Specification

Course details	Version	Description of change	Authorised by	Date

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