National Unit Specification: general information

UNIT Architectural Technology: Building Design (Higher)

CODE DV3V 12

COURSE Architectural Technology (Higher)

SUMMARY

This Unit is a mandatory Unit of the *Higher Architectural Technology* Course, but may also be taken as a free-standing Unit.

In this Unit, candidates will learn how designers develop clients' briefs into viable designs. Candidates are introduced to the overall process and basic principles of building design. The Unit also examines the functional requirements of buildings and their elements, and the range of inter-related design factors, for example, technical design, aesthetics and sustainability. Candidates will acquire skills in the selection of construction methods and materials, and in the design process for domestic buildings. Candidates will develop a design from client's brief to sketch designs.

The Unit is suitable for candidates who aim for a career in the construction industry as technicians, technologists and other construction professionals. The Unit may be undertaken by both full-time and part-time candidates in further education as well as candidates currently at school. Candidates may use this qualification to progress to further study at Higher National or Degree level.

OUTCOMES

1 Explain the impact of design factors on domestic building projects.
2 Analyse the enclosure, structural elements and materials of domestic buildings.
3 Develop a design for a domestic building project.

Administrative Information

Superclass: TD

Publication date: March 2006

Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

- An Intermediate 2 Course in Product Design, Graphic Communication or Technological Studies, or their Units
- Two Standard Grades at Credit level, one from each of the following groupings:
  - Mathematics, Physics or Technological Studies
  - either Craft and Design or Graphic Communications

No prior knowledge of building drawing or design is required of candidates undertaking this Unit, although drawing and sketching experience will be of benefit. It will also benefit candidates to have previously studied construction technology.

CREDIT VALUE

1 credit at Higher (6 SCQF credit points at SCQF level 6*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill	None
Core Skills component	Using Graphical Information at SCQF level 5 Critical Thinking at SCQF Level 5

National Unit Specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Explain the impact of design factors on domestic building projects.

Performance Criteria

(a) The function and functional requirements of buildings are explained accurately.
(b) The importance of design in building projects is explained clearly.
(c) Design factors relevant to building projects are identified correctly.
(d) Constraints relevant to building projects are identified correctly.
(e) The impact of major design factors on design is explained correctly.

OUTCOME 2

Analyse the enclosure, structural elements and materials requirements of domestic buildings.

Performance Criteria

(a) The main enclosure and structural elements are identified correctly from a given drawing.
(b) The functions of the main enclosure and structural elements are described correctly.
(c) Suitable materials are identified for the main enclosure and structural elements with regard to current practice in the construction industry.
(d) Materials identified are justified in terms of function.

OUTCOME 3

Develop a design for a domestic building project.

Performance Criteria

(a) Domestic building forms are compared in terms of function, buildability and the client's priorities.
(b) The design developed fulfils a given brief.
(c) The selection form is justified in terms of the brief.
(d) The materials selected are justified in terms of the brief.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

Written/oral and product evidence is required which demonstrates that the candidate has achieved all Outcomes and all Performance Criteria within Outcomes.

- a 45 minute closed-book test for Outcomes 1 and 2
- a folio of work for Outcome 3, produced as a natural part of the learning and teaching process

The closed-book test requires candidates to identify and explain the importance of design factors relevant to domestic building projects, to identify and explain the function of enclosure and structural elements of domestic buildings and select typical materials for the main enclosure and structural elements. This must be carried out in controlled conditions: candidates are not permitted to collaborate in their responses.

The folio of work is a collection of evidence including the selection of appropriate forms of construction and materials for a domestic building project and the development of a design for the building. The folio of work should be in two parts: one for the selection of appropriate forms of construction and materials, and the other for the sketch proposals of the design. The production of the folio of work will be carried out in open-book, supervised conditions. During this assessment candidates are free to co-operate with colleagues in the researching of technical information and construction technology details. Candidates may also confer with one another regarding design factors and concepts. Assessors must, nevertheless, satisfy themselves that candidates' folios contain their own work.

The assessment instruments will sample the content and skills detailed in the Appendix to the Unit. The assessment instruments must, taken together, cover all Outcomes and all Performance Criteria.

Achievement in the closed-book test can be decided by the use of a cut-off score. The National Assessment Bank items illustrate the standard that should be applied and also the nature and extent of the sample to be used. If a centre wishes to design its own assessments for the closed book test, they should be of a comparable standard.

Achievement in the folio of work will be decided on an achieved/not achieved basis. The criteria for achievement in the folio of work are the Performance Criteria in Outcome 3.

An exemplar for the folio of work for Outcome 3 can be accessed via the SQA Coordinator for each centre. The exemplar provided illustrates the standard that should be applied for the folio of work.

For the closed-book test for Outcomes 1 and 2, where candidates fail to reach the agreed threshold score, reassessment should follow using an alternative instrument of assessment.

For the folio of work for Outcome 3, where candidates fail to achieve the required performance, reassessment of one or more sub-tasks may be all that is required to bring the candidate's performance up to an acceptable standard.

National Unit Specification: statement of standards (cont)

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APPENDIX

NB: All of the content in this section should be covered and is liable to sample through Unit and/or Course assessment.

Content to be covered (Outcomes 1 and 2)

- The overall function or functional requirements of domestic buildings:
  - comfort/shelter
  - structural integrity
  - aesthetic merit/architectural
  - space provision for activities/work

- Design factors relevant to domestic building projects and their impact:
  - architectural/aesthetic
  - spatial
  - safety
  - structural
  - buildability
  - physiological comfort
  - design life (maintenance)
  - economic
  - environmental

- Constraints relevant to domestic building projects and their impact:
  - social
  - technical
  - legal/statutory (including planning and building control)
  - financial

- The main enclosure and structural elements and their functions: any three domestic building elements and any four functional requirements of each element.

- Typical materials for the main enclosure and structural elements for any three domestic building elements.

Open-book folio of work (Outcome 3)

A folio of work for this Outcome will be prepared by each candidate individually. Centres will ensure that work submitted in the folio is the candidate's own work. It is anticipated that the folio of work is produced as a natural part of the learning and teaching process.

The folio of work is based on the development of a design and the selection of appropriate forms of construction and materials from a given brief, to include:

- an explanation of the advantages and limitations of the form of construction selected
- an appropriate selection of materials for the enclosure and structural systems to suit the chosen form of construction

National Unit Specification: statement of standards (cont)

UNIT Architectural Technology: Building Design (Higher)

- bubble diagrams and preliminary sketch drawings, well proportioned, showing the development of the design and encompassing a minimum of a floor plan and two elevations

National Unit Specification: support notes

UNIT Architectural Technology: Building Design (Higher)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The *Architectural Technology: Building Design* Unit is set in the context of single domestic buildings or small residential developments. No prior knowledge of building design is required of candidates undertaking this Unit.

Corresponding to Outcomes 1-3

Outcome 1 This Outcome creates an awareness of the functional requirements of domestic buildings and the inter-relationship of the range of design factors contributing to the overall building design process. The following design factors are considered: architectural-aesthetic, spatial, safety, structural, physiological comfort, design life (maintenance), economic and environmental. Design constraints include social, technical, legal and financial.

Outcome 2 This Outcome provides candidates with knowledge of the functions of the elements of common enclosure and structural systems. It also considers the materials typically used in the main enclosure and structural elements.

Outcome 3 This Outcome follows naturally from Outcomes 1 and 2 with the development of a design and the selection of appropriate forms of construction and materials for a domestic building. This will develop design skills and enhance understanding of design problems and processes. This Outcome covers main construction methods used in the UK for domestic buildings and suitable materials for such buildings.

Building design

Candidates studying this Unit will develop an appreciation of the basic principles and procedures relating to building design through an introduction to the function of domestic buildings and their separate elements, the performance requirements of these and the inter-related design factors that impact on the design solution.

Design factors should be considered in relation to examples of sites in various locations and climatic conditions as this can influence or alter the functions/functional requirements of the elements of the building. These factors may influence the form of construction chosen and the materials selected (which may or may not align with the original brief).

The function of a domestic building in providing a controlled environment will be introduced and the functional requirements to be satisfied for creation of a successful dwelling considered. These requirements include: shelter and enclosure, space provision and physiological comfort. The effects of the outdoor site environment on the indoor environment will be explored.

National Unit Specification: support notes (cont)

UNIT Architectural Technology: Building Design (Higher)

The following requirements and design factors are considered:

- Architectural
- Structural
- Comfort
- Buildability
- Design life
- Economic
- Environmental impact
- Safety

The social, technical, legal and financial constraints to domestic building projects are covered. The role of the statutory authorities (planning and building control), in ensuring that development, design and construction satisfy minimum acceptable standards, will be considered. Candidates may examine the official technical handbooks regarding the requirements of current legislation pertaining to domestic building construction in Scotland, although specific requirements of the current regulations should not be considered in detail at this stage. The application procedure for a building warrant and planning permission should be covered briefly.

In considering the environmental impact of buildings, reference is made to the determination of the eco-friendliness (or otherwise) of construction materials, ecologically orientated product choice and eco-labelling. Candidates should also be made aware of the following environmental assessment schemes and initiatives:

- Building Research Establishment Environmental Assessment Method (BREEAM) for assessing the environmental performance of new building designs and for existing buildings in terms of:
  - energy use
  - health and well-being
  - pollution
  - land use
  - ecology
  - materials
  - water consumption and waste
- National Home Energy Rating (NHER) scheme and energy efficiency advice.
- The Government's Standard Assessment Procedure (SAP) for producing energy cost ratings and a carbon index (CI).
- Any other relevant current schemes and initiatives regarding sustainability and environmental considerations.

The application of quality assurance principles to construction should be considered, relating to:

- control of the design process;
- purchasing and product certification
- checking and issue of drawings
- building process control
- the National House Building Council (NHBC) '*Buildmark*' scheme
- NHBC Standards manuals and other publications on quality in construction works generally

Construction methods

Study of construction methods provides candidates with knowledge of the main construction methods used in the UK for domestic buildings. Candidates will be able to select forms of construction and suitable materials for such buildings.

A building construction form or method should be explained as a combination of a structural system and an enclosure system.

The forms of construction will include: traditional masonry cavity wall construction and timber frame. Materials appropriate to each method of construction are to be considered. The advantages and limitations of each type of construction are to be covered, including:

- Traditional — *suitable for small builders, uses traditional crafts, one-off production, labour intensive*
- Timber frame — *offers speed of erection, reduction in site work, economy of labour, high strength/weight ratio of timber, rationalisation*

The need for environmental sensitivity in the choice of construction methods is covered and reference is made to the concept of 'best available technology'.

Elements of buildings

Study of this enables candidates to describe, through sketches, the elements of common enclosure and structural systems. Only domestic buildings are considered. Enclosure elements covered include: walls, cladding, windows, doors and roofs. Structural elements include: foundations, walls, floors, roofs and stairs. The functions of elements, the connections between elements and the support systems for elements are to be included.

Candidates will practise describing, by use of either free-hand or instrument-aided sketches, building elements and the connections between such elements. These should be well proportioned and annotated.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

To begin this Unit, candidates may be given a small design project, for example, designing their 'dream' bedroom. To make this exercise realistic, a space restriction should be imposed. This helps to develop skills in analysing, prioritising and making decisions regarding available space. This space planning exercise provides an opportunity for candidates to think imaginatively and to develop technical skills such as working to scale, sketching and drawing.

This exercise could be followed up with a building case study focusing on functional requirements, design procedures, selecting building forms and construction details. Standard house types from a developer's catalogue may provide useful subjects for critical discussion.

Another exercise may involve studying a building (domestic or otherwise) by a notable architect which will introduce candidates to architectural design and allow them to develop research skills. Alternatively, a local architect may be willing to supply drawings and information for one of their own buildings and make a presentation on the development of their design.

National Unit Specification: support notes (cont)

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Candidates may learn through practical design exercises, lectures, tutorials and discussions on the choices made by architects regarding:

- Site analysis:
  - orientation
  - location
  - aspect
  - exposure
  - surrounding environment (urban/rural/industrial/coastal/conservation area)
  - topography
  - micro-climate

- Functional and performance requirements of the building and its elements

- Plan layout:
  - placing of rooms
  - influence of the structural form on the plan
  - influence of the design concept on the structural form

- Choice of architectural form

- Choice of form of construction (for example traditional masonry cavity wall construction and timber frame)

- Choice and justification of materials:
  - locally available
  - traditional
  - imported
  - ecologically beneficial

- Proportion, colour, texture, scale

Having discussed an example in class, candidates could be encouraged to research a building on their own, identifying the relevant functional requirements and design factors. Visits to local buildings will also play an important role in developing candidates' abilities to recognise the above factors. It is often helpful to look at a variety of building types in this regard.

Visits to building sites would be very valuable as the different stages of a building project and different structural forms and materials can be observed. Candidates should be encouraged to speculate about the reasons behind design decisions (for example constraints on technical, aesthetic and perhaps economic and legal factors).

Learning and teaching for Outcomes 1 and 2 should not be restricted to the design factors relevant to domestic buildings. Candidates will find it beneficial to be introduced to the range of design factors influencing all types of modern building. If the learning and teaching for this Unit was to be restricted to domestic buildings only it might be difficult for candidates to grasp some of the design factors that are best illustrated or exampled through a wider range of building types. However, for assessment purposes, the Unit focuses on low-rise domestic buildings only.

National Unit Specification: support notes (cont)

UNIT Architectural Technology: Building Design (Higher)

Tutorial exercises may be beneficial in the subject area of design factors. Candidates should be helped to appreciate that the various design factors can rarely be considered in isolation, but that they will be inter-related. When considering design factors it may be beneficial to allow candidates to dwell on the sub-factors (in *italics*). This will help them to understand what the main (**bold**) factors are all about.

- **Architectural** — *creativity, spatial, form/scale relationships, harmony, fire protection and escape, site influences, function, security, access*
- **Structural** — *loading, force resistance, structural concept, strength, stability*
- **Comfort** — *water exclusion, thermal, light, air quality, sound and acoustics, ergonomics*
- **Buildability** — *ease of construction, safety, standardisation, modular co-ordination, prefabrication*
- **Design life** — *durability, maintenance*
- **Economic** — *client's budget, contract completion requirements, concept of required standard at lowest cost, whole life costs, investment potential*
- **Environmental impact** — *visual, energy use, eco-friendliness of materials and activities*
- **Safety** — *fire escape and compartmentation, radon gas, accident prevention*

This Unit should provide a valuable introduction to building design principles and processes and to standard forms of construction. Research in the library and on the Internet could be encouraged to broaden candidates' understanding of design. On completion of this Unit candidates should be able to tackle a simple design of their own.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

This Unit gives candidates experience of design activity. Although candidates will develop their knowledge and understanding of design factors and issues, Unit assessment is focused on the application of this knowledge and understanding.

Candidates should produce a folio of work for Outcome 3. The standard to be applied is exemplified in the exemplar provided. The folio of work will be assessed on an achieved/not achieved basis only.

Candidates should achieve a satisfactory mark in the tests for Outcomes 1 and 2. The standard to be applied is detailed in the National Assessment Bank item for the Unit.

CANDIDATES WITH ADDITIONAL SUPPORT NEEDS

This Unit Specification is intended to ensure that there are no artificial barriers to learning or assessment. The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (SQA, 2004).