

Unit 17: Construction Technology

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| Unit code: | D/504/4378 |
| QCF level: | 6 |
| Credit value: | 15 |

Aim

This unit enables learners to translate the architectural intent in relation to innovation and sustainability over the lifecycle of a building. Learners will develop skills to determine the performance of buildings so that the end product is buildable, sustainable, adaptable and flexible with the least environmental impact.

Unit abstract

This unit will explore the innovative and sustainable technologies used in the construction of buildings. Learners will critically evaluate production techniques and applications of components and systems. Learners will determine the performance of a building in terms of buildability, adaptability and end of use. Learners will also assess the energy efficiency performance of a building services system.

Learning outcomes

On successful completion of this unit a learner will:

- 1 Understand the production and construction techniques associated with innovative technologies
- 2 Understand how innovation and sustainability may affect the lifecycle of a construction project
- 3 Be able to determine the performance of buildings
- 4 Be able to determine the energy efficiency performance of the building services systems.

Unit content

1 **Understand the production and construction techniques associated with innovative technologies**

Innovative technologies to monitor energy use: foundations; floors; cladding and external finishes; internal finishes; roof structures; building management systems; intelligent buildings

Production techniques: design stage processes, e.g. 3-dimensional modelling, prototypes; topographical surveying, e.g. positioning; mass production; bespoke elements; modular construction

Legislation and approved codes of practice: current legislation relevant to the home country; UK legislation to include the Health and Safety at Work etc Act (1974), the Construction (Design and Management) Regulations (2007), approved codes of practice and guidance notes, the Management of Health and Safety at Work Regulations (1999)

Innovative technologies for commercial development: robotics in construction; satellite navigation systems; surveying instruments; scanning technologies; rapid manufacturing; modelling technologies

2 **Understand how innovation and sustainability may affect the lifecycle of a construction project**

Sustainability over project life cycle: environmental challenges, e.g. resource depletion, construction waste, embodied energy; resource-intensive nature of construction activities; low-carbon and low-impact construction; social responsibilities of the industry

Innovation: approaches and techniques; modern methods of construction (MMC); lean and agile construction; concept of 'waste'; waste minimisation; re-use/recycling; adaptable buildings; off-site construction; brownfield sites; project level application

3 **Be able to determine the performance of buildings**

Buildability of building structure: appraisal; embodied energy; benchmarking for sustainability potential; constraints; specification of materials (descriptive and prescriptive); stakeholder input; analysis; synthesis and testing processes; design iterations; cost planning; time and cost savings; adaptability; flexibility; value for money; Building Information Modelling (BIM) systems; calculations; building regulations; drawings; specifications; late amendments; changes and variations

Adaptability and flexibility: re-defining the use; changes in working practices and lifestyle; technological advancements; embedding building services

End of use performance: strategies for different structures; material considerations; recycling and re-use; demolition and de-construction

4 Be able to determine the energy efficiency performance of the building services systems

Energy efficiency: principles (alternative energy sources, Building Management Systems (BMS), services and energy control in building)

Performance: lifecycle issues; integrated assessment of services (heating, cooling, lighting and controls); monitoring energy efficiency performance

Learning outcomes and assessment criteria

| Learning outcomes On successful completion of this unit a learner will: | Assessment criteria for pass The learner can: |
|---|--|
| LO1 Understand the production and construction techniques associated with innovative technologies | 1.1 Discuss the innovative technologies used to monitor energy use in a building 1.2 Critically evaluate production techniques used to construct a Code 6 dwelling 1.3 Critically evaluate health and safety requirements to construct a Code 6 dwelling 1.4 Critically evaluate applications of innovative components and systems used in a building service of a commercial development |
| LO2 Understand how innovation and sustainability may affect the lifecycle of a construction project | 2.1 Evaluate the effect on a project lifecycle of a given set of environmental challenges 2.2 Critically examine the application of innovation to a given project brief |
| LO3 Be able to determine the performance of buildings | 3.1 Analyse the buildability of a given building structure 3.2 Assess the adaptability and flexibility of a given building structure 3.3 Critically evaluate the end-of-use performance of a given building structure |
| LO4 Be able to determine the energy efficiency performance of the building services systems | 4.1 Critically examine the energy efficiency issues for a given building services design 4.2 Assess the performance of a given building services design |

Guidance

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

The learning outcomes associated with this unit are closely linked with:

| Level 4 | Level 5 | Level 6 |
|---|---|--|
| Unit 7: Construction and Maintenance of Buildings (F/601/1254) Unit 13: Environmental Impact of Construction (A/601/1270) Unit 10: Building Services Design, Installation and Maintenance in Construction (R/601/1260) Unit 54: Building Management Systems for Building Services Engineering (M/601/1394) | Unit 8: Technology of Complex Buildings (J/601/1255) Unit 20: Construction Methods and Design Solutions (M/601/1279) Unit 25: Design Technology for Construction (F/601/1285) | Unit 2: Innovation in a Sustainable Construction industry (H/504/4334) Unit 3: Managing in the Natural and Built Environment (T/504/4337) |

This unit has been informed by the following National Occupational Standards:

BEDCL4/O02.1 Evaluate complex issues and generate solutions

BEDCL4/O05.1 Assess the environmental impact of development proposals.

Essential requirements

There are no special requirements for this unit.

Delivery

Delivery of this unit should be supported with real-world examples of products, case studies, visits to exhibitions/shows and attendance at conferences. External speakers from a design, construction or product development background will enrich the learning experience.

Assessment

The design of this unit allows a variety of assessment methods. It is recommended that presentations, research-based reports and practical projects are used in a holistic and integrated manner.

Resources

Books

- Akintoye A, Goulding J and Zawdie G – *Construction Innovation and Process Improvement* (John Wiley and Sons, 2012) ISBN 978-1118280317
- Bryan T – *Construction Technology: Analysis and Choice*, 2nd edition (John Wiley and Sons, 2010) ISBN 978-1405158749
- Chadderton D – *Building Services Engineering*, 5th edition (Taylor and Francis, 2007) ISBN 978-0415413541
- Deplazes A – *Constructing Architecture: Materials, Processes, Structures, A Handbook* (Springer, 2006) ISBN 978-3764371906
- Fleming E – *Construction Technology: An Illustrated Edition* (John Wiley and Sons, 2009) ISBN 978-1405148160
- Ma U – *No Waste: Managing Sustainability in Construction* (Gower Publishing, 2011) ISBN 978-0566088032
- Sommerville J and Craig N – *Implementing IT in Construction* (Taylor and Francis, 2004) ISBN 978-0415370516
- Sun M and Howard R – *Understanding IT in Construction* (Taylor and Francis, 2004) ISBN 978-0415231909

Journals

- The Architects' Journal* (Emap)
- Architectural Engineering and Design Management* (Earthscan)
- BRE Digest* (BRE)
- BRE Good Building Guides* (BRE)
- Journal of Green Building* (College Publishing)

Websites

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| www.itcon.org | <i>Journal of Information Technology in Construction</i> |
| www.cibse.org | Chartered Institution of Building Services Engineers |
| www.ocsmagazine.com | Publication dedicated to off-site construction, its methods, products and systems |
| www.greenspec.co.uk | Green building and sustainable construction |