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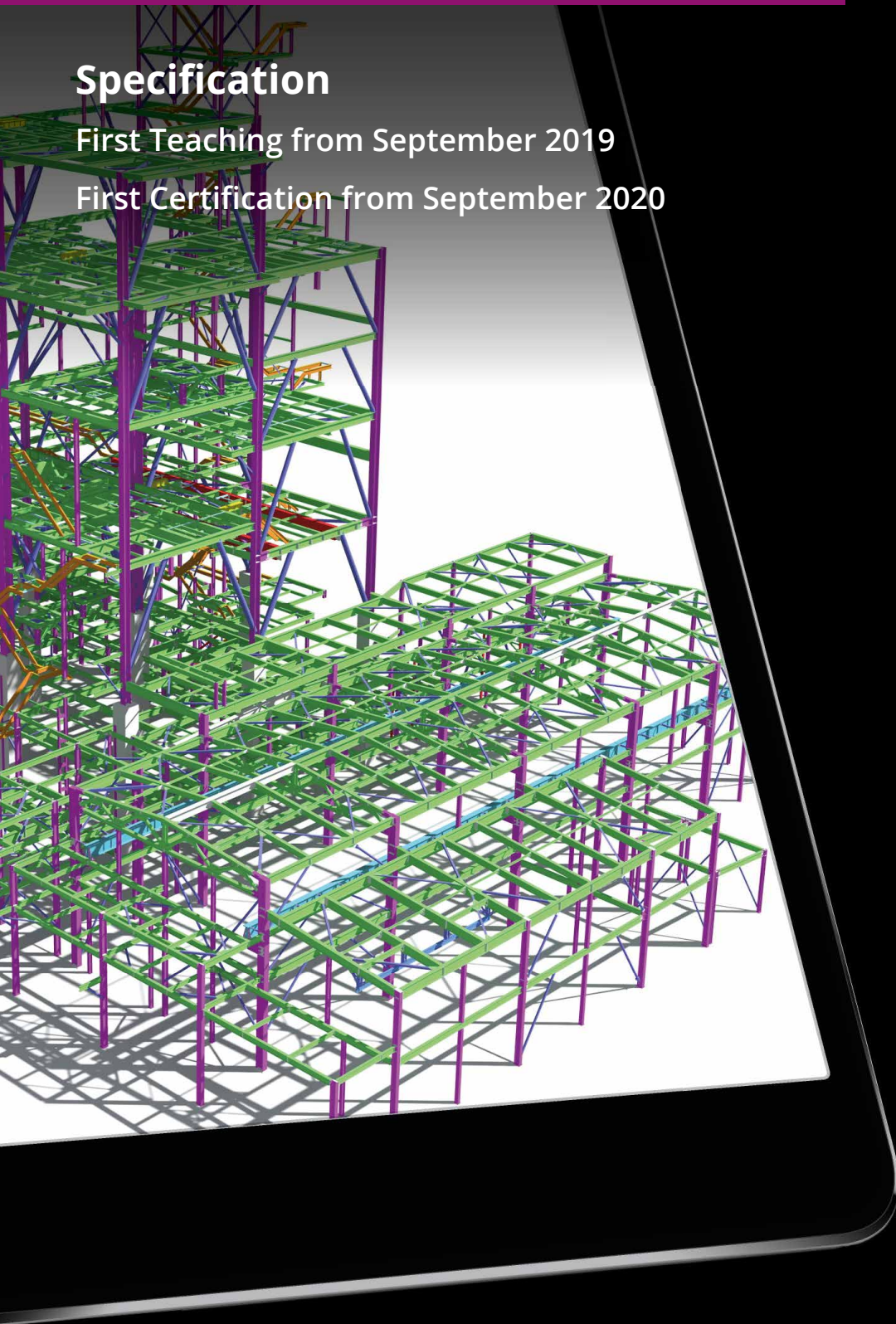
HIGHER NATIONALS

Future Homes Design and Construction

Specification

First Teaching from September 2019

First Certification from September 2020



**Higher National
Certificate Lvl 4**

**Higher National
Diploma Lvl 5**

About Pearson

We are the world's leading learning company operating in countries all around the world. We provide content, assessment and digital services to learners, educational institutions, employers, governments and other partners globally. We are committed to helping equip learners with the skills they need to enhance their employability prospects and to succeed in the changing world of work. We believe that wherever learning flourishes so do people.

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Summary of changes in Pearson BTEC Higher Nationals in Future Homes Design and Construction Issue 2

Summary of changes made between previous issue and this current issue	Page number
<p><i>Branding</i></p> <p>Added new front cover</p> <p>Applied updated Pearson BTEC Higher Nationals branding colour, font and tables throughout the spec</p>	1-193
<p><i>1.9 Ministry of Building Innovation and Education (MOBIE)</i></p> <p>Added section 1.9 Ministry of Building Innovation and Education (MOBIE)</p>	5
<p><i>2.5.1 Progression to university</i></p> <p>University recognition and articulations section updated and reflects new website.</p>	10
<p><i>2.7 How Pearson BTEC Higher Nationals in Future Homes Design and Construction provide both transferable employability skills and academic study skills</i></p> <p>Correction. Changed word from moderated to verified</p>	12
<p><i>3.2.1 English language requirements for Higher Nationals</i></p> <p>Reverted wording back to previous issue</p>	15
<p><i>6.3.2 Making assessment decisions using criteria</i></p> <p>Correction. Changed word from moderated to 'verified'</p> <p>Correction. Changed word from mark to 'grade'</p> <p>Correction. Changed word from marks to 'grades'</p>	53
<p><i>6.5.2 Compensation of HNC</i></p> <p>Clarified statement by inserting words "<i>attempted but</i>" as is the case with the wording on compensation of HND</p>	57

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

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1 Introduction

BTEC is one of the world's most recognised applied learning brands, engaging students in practical, interpersonal and thinking skills, for more than thirty years.

BTECs are work-related qualifications for students taking their first steps into employment, or for those already in employment and seeking career development opportunities. BTECs provide progression into the workplace either directly or via study at university and are also designed to meet employers' needs. Therefore, Pearson BTEC Higher National qualifications are widely recognised by industry and higher education as the principal vocational qualification at Levels 4 and 5.

When developing the Pearson BTEC Higher National qualifications in Future Homes Design and Construction, we collaborated with a wide range of students, employers, higher education providers, colleges and subject experts to ensure that the new qualifications meet their needs and expectations. We also worked closely with the relevant Professional Bodies, to ensure alignment with recognised professional standards.

There is now a greater emphasis on employer engagement and work readiness. The new BTEC Higher National qualifications in Future Homes Design and Construction are designed to reflect this increasing need for high quality professional and technical education pathways at Levels 4 and 5, thereby providing students with a clear line of sight to employment and to progression to a degree at Level 6.

1.1 The Student Voice

Students are at the heart of what we do. That is why, from the outset, we consulted with students in the development of these qualifications. We involved them in writing groups, sought their feedback, and added their voices and views to those of other stakeholders.

The results, we believe, are qualifications that will meet the needs and expectations of students worldwide.

1.2 Why choose Pearson BTEC Higher Nationals?

Pearson BTEC Higher Nationals are designed to help students secure the knowledge skills and behaviours needed to succeed in the workplace. They represent the latest in professional standards and provide opportunities for students to develop behaviours for work, for example by undertaking a group project, or responding to a client brief. A student may even achieve exemption from professional or vendor qualifications, or student membership of selected professional bodies, to help them on their journey to professional competence.

At the same time the BTEC Higher Nationals are intended to keep doors open for future study should a student wish to progress further in their education after their level 5 study. They do this by allowing space for the development of higher education study skills, such as the ability to research. Clear alignment of Level of demand with the Framework for Higher Education qualification descriptors at Level 4 and 5 means that students wishing to progress to Level 6 study should feel better prepared. The BTEC Higher Nationals address these various requirements by providing the following:

- A range of general and specialist units, both core and optional, each with a clear purpose, so there is something to suit each student's choice of programme and future progression plans.
- Fully revised content that is closely aligned with the needs of employers, Professional Bodies, vendors and higher education for a skilled future workforce.
- Learning outcomes mapped against Professional Body standards and vendor accreditation requirements, where appropriate.
- Assessments and projects chosen to help students progress to the next stage (this means some are set by the Centre to meet local needs, while others are set by Pearson).
- An approach to demand at Levels 4 and 5 which is aligned with the Framework for Higher Education Qualifications (FHEQ).
- Support for students and tutors including Schemes of Work and Example Assessment Briefs.

1.3 HN Global

Pearson BTEC Higher Nationals are supported by a specially designed range of digital resources, to ensure that tutors and students have the best possible experience during their course. These are available from the HN Global website <http://www.highernationals.com/>.

With HN Global, tutors can access programme specifications which contain useful information on programme planning and quality assurance processes. Tutors can also view Schemes of Work and Example Assessment Briefs, helping them create meaningful courses and assessments. HN Global also allows tutors to create and annotate reading lists for their students and also keep up-to-date on the latest news regarding HN programmes.

1.4 Qualification titles

Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction

Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction

1.5 Qualification codes

Ofqual Regulated Qualifications Framework (RQF) Qualification numbers:

- Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction: 603/3431/9
- Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction: 603/3432/0

1.6 Awarding institution

Pearson Education Ltd.

1.7 Key features

Pearson BTEC Higher National qualifications in Future Homes Design and Construction offers:

- A stimulating and challenging programme of study that will be both engaging and memorable for students
- The essential subject knowledge that students need to progress successfully into further study and the world of work
- A simplified structure: students undertake a substantial core of learning in the Higher National Certificate and can build on this in the Higher National Diploma, with optional units linked to their specialist area of study
- Content that is closely aligned with Professional Body, vendor, employer and higher education needs
- Assessments that consider cognitive skills (what students know) along with effective and applied skills (respectively how they behave and what they can do)
- Unit-specific grading
- Pearson-set assignments
- A diverse approach to assessment that supports progression to Level 6 and also allows Centres to offer assessment relevant to the local economy, thereby accommodating and enhancing different learning styles

- Quality assurance measures – as outlined in *sections 6 and 7* – to ensure that all stakeholders (e.g. Professional Bodies, vendors, universities, businesses, colleges and students) can feel confident in the integrity and value of the qualifications
- A qualification designed to meet the needs and expectations of students aspiring to work in an international business environment.

Qualification frameworks

Pearson BTEC Higher National qualifications are designated higher education qualifications in the UK. They are aligned to the Framework for Higher Education Qualifications (FHEQ) in England, Wales and Northern Ireland, and Quality Assurance Agency (QAA) Subject Benchmark Statements. These qualifications are part of the UK Regulated Qualifications Framework (RQF).

1.8 Collaborative development

Students completing their BTEC Higher Nationals in Future Homes Design and Construction will be aiming to go on to employment or progress to a final year at university. Therefore, it was essential that we developed these qualifications in close collaboration with experts from Professional Bodies, vendors, businesses and universities, and with the providers who will be delivering the qualifications.

We are very grateful to the university and further education tutors, employers, vendors, Professional Body representatives and other individuals who have generously shared their time and expertise to help us develop these new qualifications.

- Ministry of Building Innovation and Education (MOBIE)
- Teesside University
- Harlow College
- Cundall (international, multi-disciplinary consulting engineers)
- Institution of Structural Engineers (iStructE)
- Royal Academy of Engineering (RAE)
- Royal Institution of Chartered Surveyors (RICS)
- Institution of Civil Engineers (ICE)
- Vinci Construction (multinational construction and facilities company)
- University College London
- Bath College
- Leeds College of Building
- Engineering Construction Industry Training Board (ECITB)
- Chartered Association of Building Engineers (CABE)

- Arup (multinational architecture, engineering and consulting firm)
- Construction Industry Training Board (CITB)
- London South Bank University
- Chartered Institute of Architectural Technologists (CIAT)
- Bentley (global architecture, engineering and construction software vendor)
- Autodesk (global architecture, engineering and construction software vendor)

This qualification has been developed to meet the requirements of the following Professional Bodies:

- Institution of Civil Engineers
- Institution of Structural Engineers
- Royal Institution of Chartered Surveyors
- Chartered Institute of Building
- Chartered Institute of Architectural Technologists
- Chartered Institution of Building Services Engineers
- Chartered Institute of Plumbing and Heating and Engineers

For a list of recognitions received, please see supplemental documentation.

1.9 Ministry of Building Innovation and Education (MOBIE)

This qualification has been developed in collaboration with MOBIE. Founded in 2017, MOBIE is an education charity that seeks to train and inspire young people to innovate in the design and construction of homes in the UK and abroad. The charity's purpose is to attract and inspire future creators of the built environment through new technical and vocational programmes and schools outreach.

As founder, George Clarke, has said "home is the most important piece of architecture in our lives. It crafts the way we live, and he we grow as families and communities. A well-designed home can enhance the way we live and promote our well-being."

Working with schools, colleges, universities, and industry, MOBIE is engaged in design, research & development and training to support the future of modern house building.

To find out more about MOBIE and how they may support your delivery of this qualification, visit: <http://mobie.org.uk>.

2 Programme purpose and objectives

2.1 Purpose of the BTEC Higher Nationals in Future Homes Design and Construction

The purpose of BTEC Higher Nationals in Future Homes Design and Construction is to develop students as professional, self-reflecting individuals able to meet the demands of employers in the construction and the built environment sector and adapt to a constantly changing world; with specific emphases on the design, manufacture and installation of housing, using off-site, factory-built and new technologies. The qualifications aim to widen access to higher education and enhance the career prospects of those who undertake them.

2.2 Objectives of the BTEC Higher Nationals in Future Homes Design and Construction

The objectives of the BTEC Higher Nationals in Future Homes Design and Construction are as follows:

- To equip students with construction and the built environment skills, knowledge and the understanding necessary to achieve high performance in the global construction and the built environment sector
- To provide education and training for a range of careers in construction with emphasis on transforming the design, manufacture and installation of homes using new technologies and innovative approaches
- To provide students with an understanding of the way technologies are transforming the industries of construction and the built environment and prepare them to work with these technologies
- To provide insight and understanding into diversity of roles with construction and the built environment, recognising the importance of collaboration at all levels
- To equip students with knowledge and understanding of culturally diverse organisations, cross-cultural issues, diversity and values
- To provide opportunities for students to enter or progress in employment in construction and the built environment, or progress to higher education qualifications; such as an Honours degree in Construction and The Built Environment or a related area
- To provide opportunities for students to develop the skills, techniques and personal attributes essential for successful working lives

- To support students to understand the local, regional and global context of construction and the built environment and, for those students with a global outlook, to aspire to international career pathways
- To provide students with opportunities to address contemporary issues facing the industry, and society at large; with particular emphasis on sustainability and the environment, recognising the role that construction and the built environment plays in addressing these issues
- To provide opportunities for students to achieve a nationally-recognised professional qualification within their chosen area of specialisation
- To provide opportunities for students to achieve vendor accredited certifications
- To offer students the chance of career progression in their chosen field, with particular emphasis on achieving management-level positions, professional recognition and beyond
- To allow flexibility of study and to meet local or specialist needs
- To offer a balance between employability skills and the knowledge essential for students with entrepreneurial, employment or academic aspirations
- To provide students with opportunities to engage in an industry-recognised apprenticeship scheme that aligns with their employer's needs and their own career aspirations
- To provide students with the context in which to consider professional ethics and their relation to personal, professional and statutory responsibilities within the industry.

We meet these objectives by:

- Providing a thorough grounding in construction and the built environment principles; with some specialisation in off-site construction and design, at Level 4. This leads to greater specialism at Level 5, with greater depth and detail in related areas of design, manufacture and prototyping
- Enabling progression to a university degree by supporting the development of appropriate academic study skills and personal development planning
- Enabling progression to further professional qualifications in specific construction and the built environment areas by mapping to units in a range of vendor accredited certificates.

Who is this qualification for?

The BTEC Higher National qualifications in Future Homes Design and Construction are aimed at students wanting to continue their education through applied learning. Higher Nationals provide a wide-ranging study of the construction and the built environment sector and are designed for students who wish to pursue or advance their career in construction and the built environment. In addition to the knowledge, understanding and skills that underpin the study of the construction and the built environment sector, Pearson BTEC Higher Nationals in Future Homes Design and Construction give students experience of the breadth and depth of the sector that will prepare them for further study or training.

2.3 Aims of the Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction

The Pearson BTEC Level 4 BTEC Higher National Certificate in Future Homes Design and Construction offers students an introduction to the subject area via a mandatory core of learning, as well as units with specialisation in particular areas. This effectively builds underpinning core skills, with specialisation; preparing the student for further specialisation at Level 5. Students will gain a wide range of sector knowledge tied to practical skills gained in research, self-study, directed study and workplace scenarios.

At Level 4 students develop a broad knowledge and awareness of key aspects of the construction and the built environment sector through three core units, which includes one unit assessed through a Pearson-set assignment. The core units are:

- 1 – Individual Project (Pearson Set)
- 2 – Construction Technology
- 4 – Construction Practice and Management

Students will also undertake the following mandatory, specialist, units:

- 14 – Building Information Modelling
- 16 – Principles of Alternative Energy
- 50 – Housing Design & Specification
- 51 – Principles of Off-site Construction
- 52 – Housing Economics

Graduates successfully completing the BTEC Higher National Certificate in Future Homes Design and Construction will be able to demonstrate a sound knowledge of the basic concepts of construction and the built environment, with specialist focus on the design and delivery of homes; through off-site construction techniques, manufacturing processes and new technologies. They will be able to communicate accurately and appropriately, and they will have the qualities needed for employment that requires some degree of personal responsibility. They will have developed a range of transferable skills to ensure effective team working, independent initiatives, organisational competence and problem-solving strategies. They will be adaptable and flexible in their approach to construction and the built environment, show resilience under pressure, and meet challenging targets within a given resource.

2.4 Aims of the Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction

The Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction offers students a range of units designed to support progression into relevant occupational areas or on to degree-level study.

Holders of the Pearson BTEC Level 5 Higher National Diploma will have developed a sound understanding of the principles in the design, specification, manufacture and delivery of homes, and will have learned to apply those principles more widely. They will have learned to evaluate the appropriateness of different approaches to solving problems. They will be able to perform effectively in their chosen field and will have the qualities necessary for employment in situations requiring the exercise of personal responsibility and decision-making.

2.5 What could these qualifications lead to?

The Pearson BTEC Level 4 Higher National Certificate provides a solid grounding in construction and the built environment, vendor accredited certification and Professional Body membership, upon which students can build; should they decide to continue their studies beyond the Certificate stage. The Pearson BTEC Level 5 Higher National Diploma allows students to specialise by committing to specific career paths and progression routes to degree-level study. In addition, the qualifications may provide links to industry-related and employer-supported apprenticeship schemes that can provide further opportunities for enhanced employability.

On successful completion of the Pearson BTEC Level 5 Higher National Diploma, students can develop their careers in the construction and the built environment sector through:

- Entering employment
- Continuing existing employment
- Linking with the appropriate vendor accredited certificates

- Committing to Continuing Professional Development (CPD)
- Progressing to university
- Progressing to a higher apprenticeship scheme, in conjunction with progression to a university degree course.

University recognition and articulations

We work with a range of higher education institutions around the world that recognise and accept BTEC Higher Nationals as a qualification for entry onto an undergraduate degree. Many universities allow advanced entry onto the second or third year of a degree, and agreements can include credit transfer, articulation and case-by-case admission. Students should be aware that university admission criteria are always subject to change and remain at the discretion of the institution. Students should take time to understand the course entry requirements for subject, year and grade before applying.

For more information on entry requirements, including 2+1 articulations, please visit: <https://www.highernationals.com/degree-finder>.

Details of entry requirements for BTEC Higher National graduates into degree programmes at institutions in the UK and internationally can be found on the Pearson Degree Course Finder website. Students should always check the entry requirements for degree programmes at specific Higher Education providers.

2.5.1 Employment

The focus on specialist technical skills, at Level 4 and Level 5, provides students with a clear set of skills and goals for further study or entering employment. Typical jobs related to the qualification may include:

- Housing Design Technician
- Housing Project Manager
- Off-Site Construction Manager
- BIM Technician
- Digital Design Technician
- Architectural Technologist
- Planning Officer
- Building Control Officer.

2.6 How Higher Nationals in Future Homes Design and Construction provides both transferable employability skills and academic study skills

Students need both relevant qualifications and employability skills to enhance their career prospects and contribute to their personal development. Pearson BTEC Higher National Future Homes Design and Construction qualification embeds the development of key skills throughout the programme; attributes and strengths required by 21st century employers.

Where employability skills are referred to in this specification, this generally refers to skills in five main categories:

- **Cognitive and problem-solving skills:** critical thinking, approaching non-routine problems by applying expert and creative solutions, use of systems and digital technology, generating and communicating ideas creatively.
- **Intra-personal skills:** self-management, adaptability and resilience, self-monitoring and self-development, self-analysis and reflection, planning and prioritising.
- **Interpersonal skills:** effective communication and articulation of information, working collaboratively, negotiating and influencing, self-presentation.
- **Commercial skills:** sector awareness; sales; marketing/promotion; budget management/monitoring.
- **Business skills:** awareness of types of companies, company formation, invoicing, calculating fees, business management.

Pearson Example Assessment Briefs make recommendations for a range of real or simulated assessment activities, for example, group work where appropriate, to encourage development of collaborative and interpersonal skills or a solution focused case study to provide the opportunity to develop cognitive skills. There are specific requirements for the assessment of these skills, as relevant, within the assessment grids for each unit. Example Assessment Briefs are for guidance and support only and can be customised and amended according to localised needs and requirements. All assignments must still be verified as per the internal verification process.

Students can also benefit from opportunities for deeper learning, where they are able to make connections between units and select areas of interest for detailed study. In this way BTEC Higher Nationals provide a vocational context in which students can develop the knowledge and academic study skills required for progression to university degree courses, including:

- Active research skills
- Effective writing skills
- Analytical skills

- Critical thinking
- Creative problem-solving
- Decision-making
- Team building
- Exam preparation skills
- Digital literacy
- Competence in assessment methods used in higher education.

To support you in developing these skills in your students, we have developed a map of Higher Education relevant transferable and academic study skills, available in appendices.

2.7 Use of Maths and English within the curriculum

Those working within the construction sector cannot just rely on their technical skills and must ensure all skills are relevant to increase employment opportunities. They will be required to communicate appropriately with stakeholders throughout their career and the ability to use maths and English in a professional context is an essential employability skill that must be developed at all levels of study.

Development of essential maths and English skills are embedded throughout these qualifications in accordance with industry requirements and below are some examples of how these skills are developed in the BTEC Higher Nationals Curriculum:

- Written reports
- Formal presentations
- Formal and informal conversations
- Use of professional, sector-specific language
- Measuring accurately
- Understanding scale
- Calculating material requirements, costs, time
- Using formulas appropriate to a given problem.

Some aspects of construction require higher level maths skills than others, but throughout your studies you will be using some level of maths within the curriculum. It is vital that students taking a BTEC Higher National in Future Homes Design and Construction are aware that these skills will be required throughout their studies, and as part of learning activities and assessments to ensure their skills are in line with current industry standards.

2.8 The relationship between the Higher Nationals in Future Homes Design and Construction and other Higher Nationals in Construction

Students who have completed the Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction will have the opportunity, if they wish, to transfer to another Pearson BTEC Level 5 Higher National in Construction.

The Higher Nationals in Construction offer pathways in:

- Civil Engineering
- Building Services Engineering (Electrical)
- Building Services Engineering (Heating, Ventilation and Air Conditioning)
- Architectural Technology
- Construction Management
- Surveying.

Typically, students who have completed a Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction will not have sufficient specialist knowledge to be able to progress into Civil Engineering or Building Services Engineering pathways; unless they are able to provide evidence of additional learning or training.

In most cases, students may be eligible for progression to the following pathways:

- Architectural Technology
- Construction Management
- Surveying.

For a Centre, offering a Pearson BTEC Level 5 Higher National Diploma in Construction to consider a student from a Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction they will be required to follow a standard process for Recognition of Prior Learning (RPL). For more information about this process, please see *section 8* of this document.

3 Planning your programme

3.1 Delivering the Higher Nationals in Future Homes Design and Construction

You play a central role in helping your students to choose the right BTEC Higher National qualification.

You should assess your students very carefully to ensure that they take the right qualification and the right optional units, to allow them to progress to the next stage. You should check the qualification structures and unit combinations carefully when advising students.

You will need to ensure that your students have access to a full range of information, advice and guidance in order to support them in making the necessary qualification and unit choices. When students are recruited, you need to give them accurate information on the title and focus of the qualification for which they are studying.

3.2 Entry requirements and admissions

Although Pearson do not specify formal entry requirements (beyond English language requirements, as noted below), as a Centre it is your responsibility to ensure that the students you recruit have a reasonable expectation of success on the programme.

For students who have recently been in education, the entry profile is likely to include one of the following:

- A BTEC Level 3 qualification in Construction
- A GCE Advanced Level profile that demonstrates strong performance in a relevant subject or adequate performance in more than one GCE subject. This profile is likely to be supported by GCSE grades at A* to C and/or 9 to 4 (or equivalent)
- Other related Level 3 qualifications
- An Access to Higher Education Diploma awarded by an approved further education institution
- Related work experience
- An international equivalent of the above.

Centres may wish to consider applicants' prior learning when considering their acceptance on a BTEC Higher Nationals, through Recognition of Prior Learning. (For further information please refer to *section 8* of this document.)

3.2.1 English language requirements for Higher Nationals

Pearson's mission is to help people make more of their lives through learning. In order for students to be successful on Pearson BTEC Higher National qualifications which are **both** taught and assessed in English, it is critical that they have an appropriate level of English language skills.

The following clarifies the requirements for all centres when recruiting applicants on to new Pearson BTEC Higher National qualifications.

All centres delivering the new Pearson BTEC Higher National qualifications must ensure that all students who are non-native English speakers and who have not undertaken their final two years of schooling in English, can demonstrate capability in English at a standard equivalent to the levels identified below, before being recruited to the programme **where the programme is both taught and assessed in English:**

- Common European Framework of Reference (CEFR) level B2
- PTE **51**
- IELTS **5.5**; Reading and Writing must be at **5.5**
- or equivalent.

It is up to the centre to decide what proof will be necessary to evidence individual student proficiency.

The following clarifies the requirements for all centres when recruiting applicants on to new Pearson BTEC Higher National qualifications which are taught in a language other than English, but are assessed in English.

All centres delivering the new Pearson BTEC Higher National qualifications **wholly or partially** in a language other than English, but who are assessed in English, must ensure that all students can demonstrate capability in English at a standard equivalent to the levels identified below, on completion of the programme:

- Common European Framework of Reference (CEFR) level B2
- PTE **51**
- IELTS **5.5**; Reading and Writing must be at **5.5**
- or equivalent.

It is up to the centre to decide what proof will be necessary to evidence individual student proficiency.

3.2.2 Centre approval

To ensure that Centres are ready to assess students and that we can provide the support that is needed all centres must be approved before they can offer these qualifications. For more information about becoming a Centre and seeking approval to run our qualifications please visit the support section on our website (<http://qualifications.pearson.com/>).

3.2.3 Level of sector knowledge required

We do not set any requirements for tutors, but we do recommend that Centres assess the overall skills and knowledge of the teaching team, which should be relevant, up to date and at the appropriate level.

3.2.4 Resources required

As part of your Centre approval, you will need to show that the necessary material resources and work spaces are available to deliver BTEC Higher Nationals. For some units, specific resources are required, this is clearly indicated in the unit descriptors.

3.2.5 HN Global support

HN Global is an online resource that supports Centre planning and delivery of BTEC Higher Nationals by providing appropriate teaching and learning resources. For further information, see *sections 5 and 6* of this Programme Specification.

3.2.6 Modes of delivery

Subject to approval by Pearson, Centres are free to deliver BTEC Higher Nationals using modes of delivery that meet the needs of their students.

3.2.7 Recommendations for employer engagement

BTEC Higher Nationals are vocational qualifications and as an approved centre you are encouraged to work with employers on the design, delivery and assessment of the course. This will ensure that students enjoy a programme of study that is engaging and relevant, and which equips them for progression. There are suggestions in *section 5.2* about how employers could become involved in delivery and/or assessment, but these are not intended to be exhaustive and there will be other possibilities at a local level.

3.2.8 Support from Pearson

We provide a range of support materials, including Schemes of Work and suggested assignments, with supporting templates. You will be allocated a Standards Verifier early in the planning stage, to support you with planning your assessments, and there will be training events and support from our Subject Leads.

3.2.9 Student employability

All BTEC Higher Nationals have been designed and developed with consideration of National Occupational Standards, where relevant, and have been mapped to relevant Professional Body standards and vendor accreditation requirements.

Employability skills such as team working and project management as well as practical hands-on skills have been built into the design of the learning aims and content. This gives you the opportunity to use relevant contexts, scenarios and materials to enable students to develop a portfolio of evidence demonstrating the breadth of their skills and knowledge in a way that equips them for employment.

3.3 Access to study

This section focuses on the administrative requirements for delivering a BTEC Higher National qualification. It will be of value to Quality Nominees, Programme Leaders and Examinations Officers.

Our policy regarding access to our qualifications is that:

- They should be available to everyone who is capable of reaching the required standards.
- They should be free from any barriers that restrict access and progression.

There should be equal opportunities for all those wishing to access the qualifications. We refer Centres to our Pearson Equality and Diversity Policy, which can be found in the support section of our website (<http://qualifications.pearson.com/>).

Centres are required to recruit students to Higher National programmes with integrity. They will need to make sure that applicants have relevant information and advice about the qualification, to make sure it meets their needs. Centres should review the applicant's prior qualifications and/or experience to consider whether this profile shows that they have the potential to achieve the qualification. For students with disabilities and specific needs, this review will need to take account of the support available to the student during the teaching and assessment of the qualification. For further guidance and advice please refer to *section 9* on reasonable adjustments.

3.4 Student registration and entry

All students should be registered for the qualification, and appropriate arrangements made for internal and external verification. For information on making registrations for the qualification, you will need to refer to the information manual available in the support section of our website (<http://qualifications.pearson.com/>).

Students can be formally assessed only for a qualification on which they are registered. If students' intended qualifications change (for example, if a student decides to choose a different specialist pathway), then the centre must transfer the student to the chosen pathway appropriately. Please note that student work cannot be sampled if the student is not registered or is registered on an incorrect pathway.

3.5 Access to assessments

Assessments need to be administered carefully, to ensure that all students are treated fairly, and that results and certification are issued on time, allowing students to move on to chosen progression opportunities.

Our equality policy requires that all students should have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every student. We are committed to making sure that:

- Students with a protected characteristic (as defined in legislation) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to students who do not share that characteristic
- All students achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found on the Joint Council for Qualifications website (<http://www.jcq.org.uk/>).

3.6 Administrative arrangements for internal assessment

3.6.1 Records

You are required to retain records of assessment for each student. Records should include assessments taken, decisions reached and any adjustments or appeals. Further information on quality and assessment can be found in our UK and international guides available in the support section on our website (<http://qualifications.pearson.com/>). We may ask to audit your records, so they must be retained as specified. All student work must be retained for **a minimum of 12 weeks** after certification has taken place.

3.6.2 Reasonable adjustments to assessment

A reasonable adjustment is one that is made before a student takes an assessment, to ensure that he or she has fair access to demonstrate the requirements of the assessments.

You are able to make adjustments to internal assessments to take account of the needs of individual students. In most cases this can be achieved through a defined time extension or by adjusting the format of evidence. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable. You need to plan for time to make adjustments, if necessary.

Further details on how to make adjustments for students with protected characteristics are available on the support section of our website (<http://qualifications.pearson.com/>).

3.6.3 Special consideration

Special consideration is given after an assessment has taken place for students who have been affected by adverse circumstances, such as illness, and require an adjustment of grade to reflect normal level of attainment. You must operate special consideration in line with Pearson policy (see previous paragraph). You can provide special consideration related to the period of time given for evidence to be provided, or for the format of the assessment (if it is equally valid). You may not substitute alternative forms of evidence to that required in a unit, or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration in line with the policy, which can be found in the document linked above.

Please note that your centre must have a policy for dealing with mitigating circumstances if students are affected by adverse circumstances, such as illness, which result in non-submission or late submission of assessment.

3.6.4 Appeals against assessment

Your centre must have a policy for dealing with appeals from students. These appeals may relate to assessment decisions being incorrect or assessment not being conducted fairly. The first step in such a policy could be a consideration of the evidence by a Programme Leader or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to students. If there is an appeal by a student, you must document the appeal and its resolution. Students have a final right of appeal to Pearson, but only if the procedures that you have put in place have been followed. Further details of our policy on enquiries and appeals is available on the support section of our website (<http://qualifications.pearson.com/>).

If your centre is located in England or Wales and the student is still dissatisfied with the final outcome of their appeal s/he can make a further appeal to the Office of the Independent Adjudicator (OIA) by emailing: enquiries@oiahe.org.uk. In Northern Ireland a further appeal may be lodged with the Northern Ireland Public Service Ombudsman (NIPSO) by emailing: nipso@nipso.org.uk.

3.7 Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications and/or may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actual or attempted actions of malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where malpractice or attempted malpractice has been proven.

Malpractice may occur or be suspected in relation to any unit or type of assessment within a qualification. For further details on malpractice and advice on preventing malpractice by learners, please see Pearson's *Centre Guidance: Dealing with Malpractice*, available on our website.

The procedures we ask you to adopt vary between units that are internally assessed and those that are externally assessed.

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Learners must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the centre. The *Centre Guidance: Dealing with Malpractice* document gives full information on the actions we expect you to take.

Pearson may conduct investigations if we believe a centre is failing to conduct internal assessment according to our policies. The above document gives further information and examples, and details the penalties and sanctions that may be imposed.

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

3.7.1 Internally assessed units

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Students must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the Centre. Full information on dealing with malpractice and plagiarism is available on the support section of our website (<http://qualifications.pearson.com/>). It provides full information on the actions we expect you to take.

Pearson may conduct investigations if it is believed that a Centre is failing to conduct internal assessment according to Pearson policies. The above document gives further information, provides examples, and details the penalties and sanctions that may be imposed.

3.7.2 Student malpractice

The head of centre is required to report incidents of suspected learner malpractice that occur during Pearson qualifications. We ask centres to complete JCQ Form M1 (www.jcq.org.uk/malpractice) and email it with any accompanying documents (signed statements from the learner, invigilator, copies of evidence, etc) to the Investigations Processing team at candidatemaalpractice@pearson.com. The responsibility for determining appropriate sanctions or penalties to be imposed on learners lies with Pearson.

Learners must be informed at the earliest opportunity of the specific allegation and the centre's malpractice policy, including the right of appeal. Learners found guilty of malpractice may be disqualified from the qualification for which they have been entered with Pearson.

Failure to report malpractice constitutes staff or centre malpractice.

3.7.3 Tutor/centre malpractice

The head of centre is required to inform Pearson's Investigations team of any incident of suspected malpractice (which includes maladministration) by centre staff, before any investigation is undertaken. The head of centre is requested to inform the Investigations team by submitting a JCQ M2 Form (downloadable from www.jcq.org.uk/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff, anonymous informants), the Investigations team will conduct the investigation directly or may ask the head of centre to assist.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results/certificates while an investigation is in progress. Depending on the outcome of the investigation, results and/or certificates may not be released or they may be withheld.

We reserve the right to withhold certification when undertaking investigations, audits and quality assurance processes. You will be notified within a reasonable period of time if this occurs.

3.7.4 Sanctions and appeals

Where malpractice is proven, we may impose sanctions or penalties, such as:

- mark reduction for affected external assessments
- disqualification from the qualification
- debarment from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures we may impose sanctions such as:

- working with centres to create an improvement action plan
- requiring staff members to receive further training
- placing temporary suspensions on certification of learners
- placing temporary suspensions on registration of learners
- debarring staff members or the centre from delivering Pearson qualifications
- suspending or withdrawing centre approval status.

Your Centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from the head of centre (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in the JCQ Appeals booklet (<https://www.jcq.org.uk/exams-office/appeals>).

4 Programme structure

4.1 Units, credits and Total Qualification Time (TQT)

The BTEC Higher National Certificate (HNC) is a Level 4 qualification made up of 120 credits. It is usually studied full-time over one year, or part-time over two years.

The BTEC Higher National Diploma (HND) is a Level 4 and Level 5 qualification made up of 240 credits. It is usually studied full-time over two years, or part-time over four years.

Pearson would expect that an HND student would have achieved at least 90 credits at Level 4 before progressing to Level 5 units. This allows for the students to submit the remaining 30 credits at Level 4 while undertaking their Level 5 study.

Students undertaking an HND who fail to successfully complete the full qualification may be awarded a HNC, if their credit achievement permits.

BTEC Higher Nationals consist of core units, specialist units and optional units:

- Core and specialist units are mandatory
- Specialist units are designed to provide a specific occupational focus to the qualification and are aligned to vendor accredited certification
- Required combinations of optional units are clearly set out in the tables below.

All units are usually 15 credits in value, or a multiple thereof. These units will be designated a **Total Qualification Time (TQT)**. TQT is an estimate of the total amount of time that could reasonably be expected to be required for a student to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification. TQT includes undertaking each of the activities of Guided Learning, Directed Learning and Invigilated Assessment. This value will be allocated according to input from curriculum writers and peer-reviewing centres.

Total Qualification Time (TQT) Higher National Certificate (HNC) = 1,200 hours

Total Qualification Time (TQT) Higher National Diploma (HND) = 2,400 hours

Examples of activities which can contribute to Total Qualification Time include:

- Guided Learning
- Independent and unsupervised research/learning
- Unsupervised compilation of a portfolio of work experience
- Unsupervised e-learning
- Unsupervised e-assessment

- Unsupervised coursework
- Watching a pre-recorded podcast or webinar
- Unsupervised work-based learning.

Guided Learning Hours (GLH) are defined as the time when a tutor is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. Guided Learning includes any supervised assessment activity; this includes invigilated examination and observed assessment and observed work-based practice.

Total Guided Learning (GL) Higher National Certificate (HNC) = 480 hours

Total Guided Learning (GL) Higher National Diploma (HND) = 960 hours

Some examples of activities which can contribute to Guided Learning include:

- Classroom-based learning supervised by a tutor
- Work-based learning supervised by a tutor
- Live webinar or telephone tutorial with a tutor in real time
- E-learning supervised by a tutor in real time
- All forms of assessment which take place under the immediate guidance or supervision of a tutor or other appropriate provider of education or training, including where the assessment is competency-based and may be turned into a learning opportunity.

4.2 Programme structures

The programme structures specify:

- The total credit value of the qualification
- The minimum credit to be achieved at the level of the qualification
- The core units (mandatory)
- The specialist units (mandatory)
- The optional units
- The maximum credit value in units that can be centre commissioned.

When combining units for a BTEC Pearson Higher National qualification, it is the centre's responsibility to make sure that the correct unit combinations are followed.

4.2.1 Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction

- Qualification credit value: a minimum of 120 credits. This is made up of eight units, each with a value of 15 credits.
- **Total Qualification Time (TQT)** Higher National Certificate (HNC) = 1,200 hours
- **Total Guided Learning Hours (GLH)** Higher National Certificate (HNC)= 480 hours
- There is a required mix of core, specialist and optional units totalling 120 credits. All units are at Level 4.
- In some cases, a maximum of 30 credits can be imported from another RQF Pearson BTEC Higher National qualification and/or from units designed by the centre and approved by Pearson. Core units may **not** be substituted.
- Typically, students who may wish to change pathway (in Level 4), may do so following completion of 'core' units; ideally, prior to beginning 'specialist' units.

Pearson BTEC Level 4 Higher National Certificate in Future Homes Design and Construction		Unit credit	Level
Core Unit <i>Mandatory</i>	1 Individual Project (Pearson-set)	15	4
Core Unit <i>Mandatory</i>	2 Construction Technology	15	4
Core Unit <i>Mandatory</i>	4 Construction Practice & Management	15	4
Specialist Unit <i>Mandatory</i>	14 Building Information Modelling	15	4
Specialist Unit <i>Mandatory</i>	16 Principles of Alternative Energy	15	4
Specialist Unit <i>Mandatory</i>	50 Housing Design & Specification	15	4
Specialist Unit <i>Mandatory</i>	51 Principles of Off-site Construction	15	4
Specialist Unit <i>Mandatory</i>	52 Principles of Housing Economics	15	4

4.2.2 Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction

- Qualification credit value: a minimum of 240 credits, of which 120 credits are at Level 5, and 120 credits are at Level 4 and usually attained via the HNC.
- There is a required mix of core, specialist and optional units totalling 240 credits. The core units required for each Level 5 specialist pathway (in addition to the specialist units) are Construction Research Project, which is weighted at 30 credits, and Business Enterprise, weighted at 15 credits.
- The requirements of the Higher National Certificate (or equivalent) have to be met. In some cases, a maximum of 60 credits can be imported from another RQF Pearson BTEC Higher National qualification and/or from units designed by the centre and approved by Pearson. Core units and specialist units may **not** be substituted.

The Level 5 Higher National Diploma consists of the Level 4 Higher National Certificate **plus** an additional 120 credits at Level 5.

Pearson BTEC Level 5 Higher National Diploma in Future Homes Design and Construction		Unit credit	Level
Level 4 Units:			
Core Unit <i>Mandatory</i>	1 Individual Project (Pearson-set)	15	4
Core Unit <i>Mandatory</i>	2 Construction Technology	15	4
Core Unit <i>Mandatory</i>	4 Construction Practice & Management	15	4
Specialist Unit <i>Mandatory</i>	14 Building Information Modelling	15	4
Specialist Unit <i>Mandatory</i>	16 Principles of Alternative Energy	15	4
Specialist Unit <i>Mandatory</i>	50 Housing Design & Specification	15	4
Specialist Unit <i>Mandatory</i>	51 Principles of Off-site Construction	15	4
Specialist Unit <i>Mandatory</i>	52 Principles of Housing Economics	15	4

Level 5 Units:			
Core Unit <i>Mandatory</i>	22 Group Project (Pearson-set)	30	5
Specialist Unit <i>Mandatory</i>	36 Advanced Building Information Modelling	15	5
Specialist Unit <i>Mandatory</i>	40 Alternative Energy Systems Design & Installation	15	5
Specialist Unit <i>Mandatory</i>	53 Advanced Housing Design & Specification	15	5
Specialist Unit <i>Mandatory</i>	54 Advanced Off-site Construction	15	5
Specialist Unit <i>Mandatory</i>	55 Future Housing Development & Prototyping	30	5

4.2.3 Meeting local needs (MLN)

Centres should note that Pearson BTEC Higher National qualifications have been developed in consultation with centres, employers and relevant professional organisations. The units were designed to meet the skill needs of the sector and thereby allow coverage of the full range of employment within the sector. Centres should make maximum use of the choices available to them within the specialist pathways to meet the needs of their students, as well as the local skills and training needs.

Where centres identify a specific need that cannot be addressed using the units in this specification, centres can seek approval to use units from other RQF Pearson BTEC Higher National qualifications, through the MLN process (refer to *Commissioned qualification design and validation service* of our website

<http://qualifications.pearson.com> or get in touch your Pearson regional contact for application details. Centres will need to justify the rationale for importing units from other RQF Pearson BTEC Higher National specifications. **Meeting local need applications must be made in advance of delivery and before 31 January in the year of student registration.**

The flexibility to import standard units from other RQF Pearson BTEC Higher National specifications is **limited to a maximum of 30 credits in a BTEC HNC qualification and a maximum of 60 credits in a BTEC HND qualification (30 credits at Level 4 and 30 credits at Level 5)**. This is an overall maximum of units that can be imported. MLN units cannot be used at the expense of the mandatory units in any qualification nor can the qualification's rules of combination, as detailed in the specification, be compromised. It is the responsibility of the centre requesting the MLN to ensure that approved units are used only in eligible combinations.

4.2.4 Pearson BTEC Higher National Commissioned Development

Where MLN does not provide enough flexibility in terms of qualification structure, centres can request design and development of units by Pearson to meet their specific needs. This is offered by the following types of developments; full commission or partial commission.

We would be pleased to discuss your ideas for a Pearson BTEC Higher National Commissioned Development. For more information please refer to the *Commissioned qualification design and validation service* on our website <http://qualifications.pearson.com>

Once the centre is ready to proceed with a commissioned development, an application must be made, which provides a clear rationale for the development request. Pearson will review the application and may confirm or deny the request. The commissioned unit(s) will be authored by Pearson, in full consultation within the commissioning centre. Applications must be made one year in advance of the first year of commissioned unit(s) delivery.

4.3 Pearson-set Assignments

There are Pearson-set assignments, as part of the Core units. Each year, Pearson will issue a *Theme* and (for Level 4) a set of related *Topics*. Centres will develop an assignment, to be internally assessed, to engage students in work related to the Pearson-set Theme.

At Level 4, tutor will select a Topic to further define their approach to the Theme and assignment. At Level 5, it is expected that students will define their own Topic, in negotiation with Tutors, based on the Pearson-set Theme.

For example, a previous Pearson-set Theme/Topic for HN Future Homes Design and Construction was:

Theme: "Sustainability in the construction industry"

Level 4 Topics:

- The impact of material selection on overall project sustainability
- The influence of construction method on project sustainability
- Improving project sustainability through the supply chain management
- The role of technology in sustainability; through enhanced building performance and monitoring

Centres can find relevant support in the Pearson-set Assignment Guidance for the units, and the theme and topic release documentation which will be provided for each level.

The aim of the Pearson-set assignments are to provide a common framework for centres to develop work that will allow cross-sector benchmarking, through the standardisation of student work, and identification and sharing of 'best practice.' in higher education teaching and learning. Pearson will share the 'best practice' results with all centres. For further information about Pearson-set Assignments and assessment, see *section 6* of this document.

4.4 The unit descriptor

The Unit Descriptor is how we define the individual units of study that make up a Higher National qualification. Students will study and complete the units included in the programme offered at your centre.

We have described each part of the unit, as below. You may refer to any of the Unit Descriptors in *Section 10* of this programme specification.

Unit Title	A broad statement of what the unit will cover.
Unit Code	The Ofqual unit designation
Unit Type	There are three unit types: core (mandatory to all pathways); specialist (mandatory to specific pathways); and optional (available to most pathways)
Unit level	All Pearson BTEC Higher National units are at Level 4 or Level 5
Credit value	The credit value is related to total qualification time (TQT) and unit learning hours (ULH), and is easy to calculate. 1 credit is equal to 10 ULH, so 15 credits are equal to 150 ULH. To complete a Higher National Certificate or Diploma students are expected to achieve the appropriate number of credits
Introduction	Some general notes on the unit, setting the scene, stating the purpose, outlining the topics and skills gained on completion of the unit
Learning Outcomes	The Learning Outcomes are explicit statements that clearly express what students will be able to do after the completion of the unit. There are, typically, four Learning Outcomes for each unit.
Essential Content	This section covers the content that students can expect to study as they work towards achieving their Learning Outcomes.

Learning Outcomes and Assessment Criteria

Each unit sets out the 'Pass', 'Merit' and 'Distinction' criteria for that unit. When assignments are graded, a tutor will refer to this table, which connects the unit's Learning Outcomes with the student's work. This assignment may be graded at 'Pass', 'Merit' or 'Distinction level, depending on the quality of the students work.

Recommended Resources

Lists the resources appropriate to support the study of this unit. This includes books, journals and online material to support learning. The programme tutor may suggest alternatives and additions, usually with a local application or relevance.

Web resources – referencing:

Some units have web resources as part of their recommended resources lists. Hyperlinking to these resources directly can be problematic as locations and addresses of resources can change over time. To combat this we have referenced web resources as follows:

- [1] A link to the main page of the website
- [2] The title of the site
- [3] The name of the section or element of the website where the resource can be found
- [4] The type of resource it is, which may be one of the following –
 - research
 - general reference
 - tutorials
 - training
 - e-books
 - report
 - wiki
 - article
 - datasets
 - development tool
 - discussion forum

Web

- | | |
|-------------------------|---|
| [1]www.bimtaskgroup.org | [2]The BIM Task Group
[3]'COBie UK 2012'
[4](General Reference) |
| [1]www.thenbs.com | [2]NBS
[3]'BIM (Building Information Modelling)'
[4](General Reference) |

4.5 Professional Body exemptions

In developing the BTEC Higher National qualifications in Construction and The Built Environment, we have sought to align this qualification with the following Professional Bodies:

- Institution of Civil Engineers
- Institution of Structural Engineers
- Royal Institution of Chartered Surveyors
- Chartered Institute of Building
- Chartered Institute of Architectural Technologists
- Chartered Institution of Building Services Engineers
- Chartered Institute of Plumbing and Heating and Engineers.

With their agreement we have secured exemptions from certain memberships for students achieving BTEC Higher National qualifications in Construction and The Built Environment. (For information about professional recognition and exemption, see supplemental documents.) This adds value to the qualification by offering students access to Continuing Professional Development.

5 Teaching and learning

The aim of this section is to provide guidance to centres so that they can engage students in a dynamic, interactive and reflective learning experience. This experience should effectively prepare students to successfully engage in the assessments, which will measure depth, as well as breadth, of knowledge. Teaching should stimulate academic engagement, develop challenging yet constructive discourse and encourage students to reflect on their own performance in preparation for a professional career. Additionally, centres are encouraged to expose students to autonomous and independent learning, which will facilitate the development of their academic skills, experiences and techniques required as they progress from one level of study to the next.

Centres are encouraged to develop programmes that have a distinctive focus on entry into work, delivering a curriculum that embeds employability, has a strong commitment to ethics and diversity, and introduces students to contemporary as well as seminal research. All teaching and learning should reflect the expectations of employers and society, and be informed and guided by external benchmarks such as professional and statutory bodies. In so doing students completing a Higher National in Construction and The Built Environment will have the attributes, skills, principles and behaviours that will enable them to make a valuable contribution to local, national and international commerce.

The contributions students make to their own experiences, alongside the experience of their peers, is invaluable. Student engagement and the student voice should form a significant aspect of a student's life. Centres are encouraged to gather student opinions on a range of teaching and learning matters, which would be used to inform and enhance future practice within a programme of study and within a centre.

5.1 Delivering quality and depth

A high-quality teaching and learning experience should include qualified and experienced lecturers, an interactive and engaging curriculum, motivated and inspired students, and a support system that caters for the pastoral as well as academic interests of students.

In addition to delivering a quality learning experience, centres must also encourage students to have a deeper understanding of the subject where they are able to go beyond the fundamentals of explaining and describing. Students are expected to show they can analyse data and information, make sense of this and then reach evaluative judgements. At the higher levels of study there is an expectation that students will be able to apply a degree of criticality to their synthesis of knowledge. This criticality would come from exposure to appropriate and relevant theories, concepts and models.

One of the reasons for delivering a quality learning experience, which has depth as well as breadth, is the benchmarking of the qualification to the Framework for Higher Education Qualifications (FHEQ). It also meets requirements set by the Regulated Qualifications Framework (RQF). The first stage of a Higher National in Future Homes Design and Construction is the Higher National Certificate (HNC), which is aligned with Level 4 of both frameworks; with the Higher National Diploma (HND) aligned with Level 5. This means that the HNC has the same level of demand and expectations as the first year of a degree programme, with the HND having the same level of demand and expectations as the second year of a degree programme.

Centres are expected to provide a broadly similar experience for students to that which they would have if they attended a similar programme at a university. This could mean:

- Providing access to library facilities which has, as a minimum, available copies (physically and/or electronically) of all required reading material
- Access to research papers and journals
- Utilising a Virtual Learning Environment (VLE) to support teaching
- Working with local employers (see below) to present real-life case studies
- Creating schemes of work that embrace a range of teaching and learning techniques
- Listening to the student voice.

Irrespective of the type of programme on which a student is enrolled, it is highly advisable that students are inducted onto their Higher National programme. This induction should include an introduction to the course programme and academic study skills that will be essential in supporting their research and studies, and, therefore, enhance the learning experience.

An induction programme should consist of the following:

- Course programme overview
- Preparing for lessons
- Effective engagement in lectures and seminars
- Making the most out of their tutor
- Assignment requirements
- Referencing and plagiarism
- Centre policies
- Academic study skills.

Pearson offer Higher National Global Study Skills to all students – an online toolkit that supports the delivery, assessment and quality assurance of BTECs in centres. This is available on the HN Global website www.highernationals.com. HN Global provides a wealth of support to ensure that tutors and students have the best possible experience during their course. With HN Global, students can search, share, comment, rank and sort a vast range of learning resources via an online digital library and tutors can create and annotate reading lists for students.

In addition, there is a wide range of free-to-access websites that can be used to support students in developing their learning and academic study skills.

5.2 Engaging with employers

Just as the student voice is important, so too is the employer's. Employers play a significant role in the design and development of all regulated qualifications, including the Pearson BTEC Higher Nationals in Future Homes Design and Construction. This input should extend into the learning experience, where engagement with employers will add value to students, particularly in transferring theory into practice.

Centres should consider a range of employer engagement activities. These could include:

- Field trips to local businesses
- Inviting members of the local construction and the built environment community to present guest lectures
- Using employers to judge the quality of assessed presentations and/or products.

While detailed guidance on assessment has been provided in this specification (see section 6), it is worth considering the involvement of employers when determining assessment strategies and the use of different assessment vehicles. This enables centres to design assessments that are more closely related to what students would be doing in the workplace. Employers are able to comment on relevance and content, as well as the challenge presented by an assessment. Notwithstanding this, ultimately it is the centre's responsibility to judge the extent to which any employer contributes to teaching and learning.

5.3 Engaging with students

Students are integral to teaching and learning. As such it is important that they are involved as much as possible with most aspects of the programme on to which they are enrolled. This input could include taking into account their views on how teaching and learning will take place, their role in helping to design a curriculum, or on the assessment strategy that will test their knowledge and understanding.

There are many ways in which to capture the student voice and student feedback, both formal and informal. Formal mechanisms include the nomination of student representatives to act as the collective student voice for each student cohort, student representation at course team meetings, and an elected higher education representative as part of the Student Union. Student forums should also take place periodically throughout the year with minutes and action plans updated and informing the Annual Programme Monitoring Report. Unit specific feedback can also be collated by students completing unit feedback forms, end of year course evaluations, and scheduled performance review meetings with their tutor.

However, this should not be the only time when feedback from students is sought. Discourse with students should be constant, whereby teachers adopt a 'reflection on action' approach to adjust teaching, so that students are presented with an environment that is most supportive of their learning styles. Just as employers could have an input into assessment design, so too could students. This will support the development of assignments that are exciting and dynamic, and fully engage students in meaningful and informative assessment.

The biggest advantage of consulting students on their teaching, learning and assessment is securing their engagement in their own learning. Students are likely to feel empowered and develop a sense of ownership of all matters related to teaching, learning and assessment, not just their own experiences. Students could also view themselves as more accountable to their lecturers, ideally seeing themselves as partners in their own learning and not just part of a process.

5.4 Planning and structuring a programme

Learning should be challenging yet exciting; teaching should be motivating and inspirational. Consequently, both teaching and learning should form part of a programme structure that is active, flexible and progressive, and has an industry focus wherever possible.

It is important for a programme structure to be effectively planned, taking into account the nature of the student cohort, the primary mode of delivery (face-to-face or distance learning) and the level of study. It is also advisable to consider the student voice (whether that voice is heard through end of programme feedback, or through on-going dialogue) when planning how and when students will be exposed to a particular subject. One other vital source of information that centres would do well to embrace is the feedback from tutors who have been and/or will be delivering learning.

It is recommended that centres establish a programme planning forum where various stakeholders are represented. This forum could consider different perspectives of teaching and learning and how these are planned into an effective programme structure. Consideration could be given to, for example, the holistic and consistent use of Virtual Learning Environments (VLEs), a programme of field trips, a strategy for engaging with employers, and how and when to assess learning.

Consideration should be given to a number of factors when planning a programme structure. These include:

- The sequencing of units
- Whether to have condensed or expanded delivery
- Teaching and learning techniques.

5.4.1 Sequencing units

The level of demand embedded within a unit is benchmarked to recognised standards. This applies to all units within a level of study, and this means that all Level 4 units have similar demands, as do all Level 5 units. However, this does not mean that units can, or should, be delivered in any order. For example, in the Pearson BTEC Higher National Diploma in Future Homes Design and Construction Level 4 units are delivered, and achieved, by students before progression to Level 5. However, students are able to progress to level 5 with a minimum of 90 credits at Level 4.

Within each level it is advisable to sequence units so that those providing fundamental knowledge and understanding are scheduled early in the programme. It may also be advisable to schedule the assessment of units requiring the practice and application of more advanced skills later in the programme.

5.4.2 Condensed, expanded and mixed delivery

The next consideration is whether to deliver a unit in a condensed format alongside other units, or to deliver units over an extended period. The following tables provide examples of this, based on four units being delivered in one teaching block.

Condensed version:

Weeks 1 to 6	Week 7	Weeks 8 to 13	Week 14
Unit 1	Assessment	Unit 3	Assessment
Unit 2		Unit 4	

Expanded version:

Weeks 1 to 12	Weeks 13 and 14
Unit 1	Assessment
Unit 2	
Unit 3	
Unit 4	

Mixed version:

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
Unit 1													Assessment
Unit 2					Assessment	Unit 3							
Unit 4													

The decision to deliver a condensed, expanded or mixed programme would depend on a number of factors, including availability of resources, the subjects to be taught and the requirements of students. Each version has advantages: the condensed version would provide an opportunity for students to gain early success and achievement. This will enhance their self-efficacy, the sense of one's belief in one's ability to succeed, and self-confidence, with tutors being able to identify and respond to less able students early in the teaching and learning cycle. The advantages of the expanded version include providing a longer timescale for students to absorb new knowledge and therefore, potentially, improve success, and giving tutors an opportunity to coach and support less able students over a longer period of time. The mixed version, with some units spanning over the entire period and others lasting for shorter periods, provides opportunities for learning in some units to support development in others. This format may be particularly suited to a combination of practical and theoretical units. In all cases, the choice of which type of unit sequence must consider student opportunities as well as staff and physical resources of the Centre.

As there are pros and cons to both approaches, the use of a planning forum would help to ensure the most suitable approach is taken. For example, Centres could choose to deliver the first teaching block using the expanded version, with the subsequent teaching block being delivered through a condensed approach.

It should be noted that the above consideration would apply equally to programmes that are being delivered face-to-face or through distance learning.

5.4.3 Drawing on a wide range of delivery techniques

As part of planning the range of techniques that will be used to deliver the syllabus, centres should also consider an appropriate combination of techniques for the subject.

The table below lists some of the techniques that centres could introduce into a planned programme structure.

Technique	Face-to-face	Distance learning
Lectures and seminars	These are the most common techniques used by tutors. They offer an opportunity to engage with a large number of students, where the focus is on sharing knowledge through the use of presentations.	Delivery would be through video conferencing and/or pre-recorded audio and/or visual material, available through an online platform. Synchronous discussion forums could also be used.
Workshops	These are used to build on knowledge shared via tutors and seminars. Teaching can be more in-depth where knowledge is applied, for example to case studies or real-life examples. Workshops could be student-led, where students present, for example, findings from independent study.	While more challenging to organise than for face-to-face delivery, workshops should not be dismissed. Smaller groups of three or four students could access a forum simultaneously and engage in the same type of activity as for face-to-face.
Tutorials	These present an opportunity for focused one-to-one support, where teaching is led by an individual student's requirements. These can be most effective in the run up to assessment, where tutors can provide more focused direction, perhaps based on a formative assessment.	Other than not necessarily being in the same room as a student, tutors could still provide effective tutorials. Video conferencing tools provide the means to see a student, which makes any conversation more personal.

Technique	Face-to-face	Distance learning
Virtual Learning Environments (VLEs)	These are invaluable to students studying on a face-to-face programme. Used effectively, VLEs not only provide a repository for taught material such as presentation slides or handouts, but could be used to set formative tasks such as quizzes. Further reading could also be located on a VLE, along with a copy of the programme documents, such as the handbook and assessment timetable.	A VLE is a must if students are engaged with online delivery through distance or blended learning, as this would be the primary or the key source of learning. Where distance learning is primarily delivered through hard copies of workbooks, etc., the same principle would apply as for face-to-face learning.
Blended learning	The combination of traditional face-to-face learning and online learning. This can enable the students to gain personalised support, instruction and guidance while completing assigned activities and tasks remotely.	Offline learning enables students to develop autonomy and self-discipline by completing set activities and tasks with limited direction and traditional classroom-based constraints.
Work-based learning	Any opportunity to integrate work-based learning into a curriculum should be taken. This adds realism and provides students with an opportunity to link theory to practice in a way in which case studies do not. Many full-time students are involved in some form of employment, either paid or voluntary, which could be used, where appropriate, as part of their learning, for example when assignments require students to contextualise a response to a real organisation.	It is likely that the majority of distance learning students would be employed and possibly classed as mature students. Bringing theory to life through a curriculum, which requires work-based application of knowledge, would make learning for these students more relevant and meaningful. Perhaps more importantly, assessment should be grounded in a student's place of work, wherever possible.
Guest speakers	These could be experts from industry or visiting academics in the subject area that is being studied. They could be used to present a lecture/seminar, a workshop or to contribute to assessment. The objective is to make the most effective use of an expert's knowledge and skill by adding value to the teaching and learning experience.	As long as the expert has access to the same platform as the students then the value-added contribution would still be very high. Consideration would need to be given to timings and logistics, but with some innovative management this technique would still have a place in distance learning programmes.

Technique	Face-to-face	Distance learning
Field trips	Effectively planned field trips, which have a direct relevance to the syllabus, would add value to the learning experience. Through these trips students could relate theory to practice, have an opportunity to experience organisations in action, and potentially open their minds to career routes.	The use of field trips could be included as part of a distance learning programme. They will add the same value and require the same planning. One additional benefit of field trips for distance learning is that they provide an opportunity for all students in a cohort to meet, which is a rare occurrence for distance learning students.

5.4.4 Assessment considerations

Centres should design assessment for learning. This is where an assessment strategy requires students to engage with a variety of assessment tools that are accessible, appropriately challenging, and support the development of student self-efficacy and self-confidence. To ensure that assignments are valid and reliable, centres must implement robust quality assurance measures and monitor the effectiveness of their implementation (see section 6 of this Programme Specification). This includes ensuring that all students engage in assessment positively and honestly.

Assessment also provides a learning opportunity for all stakeholders of the assessment to have access to feedback that is both individual to each student and holistic to the cohort. Feedback to students should be supportive and constructive. Student self-efficacy (and therefore self-confidence) can be significantly enhanced where feedback not only focuses on areas for improvement, but recognises the strengths a student has. At the cohort level, similar trends could be identified that inform future approaches to assessments and teaching. Assessment is an integral part of the overall learning process and assessment strategy must be developed to support effective, reflective, thinking construction and the built environment practitioners for the future. Assessment can be either formative, summative or both.

5.4.5 Formative assessment

Formative assessment is primarily developmental in nature and designed to give feedback to students on their performance and progress. Assessment designed formatively should develop and consolidate knowledge, understanding, skills and competencies. It is a key part of the learning process and can enhance learning and contribute to raising standards.

Through formative assessment tutors can identify students' differing learning needs early on in the programme and so make timely corrective interventions. Tutors can also reflect on the results of formative assessment to measure how effective the planned teaching and learning is at delivering the syllabus. Each student should receive one set of written formative feedback, otherwise some students may feel that others are being given more than their share of verbal feedback.

5.4.6 Summative assessment

Summative assessment is where students are provided with the assignment grades contributing towards the overall unit grade. For summative assessment to be effective it should also give students additional formative feedback to support on-going development and improvement in subsequent assignments. All formative assessment feeds directly into the summative assessment for each unit and lays the foundations from which students develop the necessary knowledge and skills required for the summative assessment.

5.4.7 Assessment feedback

Effective assessment feedback is part of continuous guided learning which promotes learning and enables improvement. It also allows students to reflect on their performance and helps them understand how to make effective use of feedback. Constructive and useful feedback should enable students to understand the strengths and limitations of their performance, providing positive comments where possible as well as explicit comments on how improvements can be made. Feedback should reflect the learning outcomes and assessment criteria to also help students understand how these inform the process of judging the overall grade.

The timing of the provision of feedback and of the returned assessed work also contributes to making feedback effective. Specific turnaround time for feedback should be agreed and communicated with both tutors and students. Timing should allow students the opportunity to reflect on the feedback and consider how to make use of it in forthcoming assessments, taking into account the tutor's workload and ability to provide effective feedback.

5.4.8 Designing valid and reliable assessments

To help ensure valid and reliable assignments are designed and are consistent across all units, centres could consider a number of actions.

Use of language

The first aspect of an assignment that a centre could focus on is ensuring that language makes tasks/questions more accessible to students.

Due consideration must be given to the command verbs (i.e. the verbs used in unit assessment criteria) when considering the learning outcomes of a unit. Assignments must use appropriate command verbs that equate to the demand of the learning outcome. If the outcome requires 'analysis' then 'evaluative' requirements within the assignment must not be set when testing that outcome. This would be viewed as over-assessing. Similarly, it is possible to under-assess where analytical demands are tested using, for example, explanatory command verbs.

The following can be used as a guide to support assignment design:

- Ensure there is a holistic understanding (by tutors and students) and use of command verbs.
- Set assignment briefs that use a single command verb, focusing on the highest level of demand expected for the learning outcome(s) that is (are) being tested.
- Assignments should be supported by additional guidance that helps students to interpret the demand of the assessment criteria.
- Time-constrained assessments should utilise the full range of command verbs (or acceptable equivalents) appropriate to the academic level. Modes of time-constrained assessments include in-class tests and exams that could be both open- or closed-book. Centres should pay close consideration to ensuring tests and exams are not replicated during the course of the year.

Consistency

This relates to the consistency of presentation and structure, the consistent use of appropriate assessment language, and the consistent application of grading criteria. Where assignments are consistent, reliability is enhanced. Where validity is present in assignments this will result in assignments that are fit for purpose and provide a fair and equitable opportunity for all students to engage with the assignment requirements.

Employing a range of assessment tools

Just as variation in teaching methods used is important to the planning of a programme structure, so too is the use of a range of assessment tools appropriate to the unit and its content. Centres should consider taking a holistic view of assessment, ensuring a balanced assessment approach with consideration given to the subject being tested and what is in the best interests of students. As mentioned above, consultation with employers could add a sense of realism to an assessment strategy. (A comprehensive list of assessment tools is provided in section 6.2 *Setting effective assignments*).

No matter what tool is used, assignments should have a sector focus (whether this is in a workplace context or through a case study), and be explicitly clear in its instructions. In the absence of a case study a scenario should be used to provide some context. Finally, students should be clear on the purpose of the assignment and which elements of the unit it is targeting.

6 Assessment

Pearson BTEC Higher Nationals in Future Homes Design and Construction are assessed using a combination of internally assessed, **centre-devised internal assignments** (which are set and marked by centres), and internally assessed, **Pearson-set assignments** (which are set by Pearson and marked by centres). Pearson-set assignments are mandatory and target particular industry-specific skills. The number and value of these units are dependent on qualification size:

- For the HNC, one core, 15 credit, unit at Level 4 will be assessed by a mandatory Pearson-set assignment targeted at particular skills;
- For the HND, two core units: one core, 15 credit, unit at Level 4 and one core, 30 credit, unit at Level 5, will be assessed by a mandatory Pearson-set assignment targeted at particular skills.

All other units in both qualifications are assessed by centre-devised internal assignments.

The purpose and rationale of having Pearson- set units on Higher Nationals is as follows:

- **Standardisation of student work** – Assessing the quality of student work, that it is meeting the level and the requirements of the unit across all centres, that grade decisions and assessor feedback are justified and that internal verification and moderation processes are picking up any discrepancies and issues.
- **Sharing of good practice** – We will share good practice in relation to themes such as innovative approaches to delivery , the use of digital literacy, enhancement of student employability skills and employer engagement. **These themes will align to those for QAA Higher Education Reviews**

An appointed External Examiner (EE) for the centre will ask to sample the Pearson-set assignment briefs for review as part of the remote sampling request. Although this is not a mandatory requirement for centres we strongly advise that centres seek guidance and support from their EE on the Pearson-set assignment. The EE may also include the Pearson-set units in the centre visit sample of student work.

We have taken great care to ensure that the assessment method chosen is appropriate to the content of the unit and in line with requirements from professional bodies, employers and higher education.

In developing an overall plan for delivery and assessment for the programme, you will need to consider the order in which you deliver units, whether delivery will take place over short or long periods of time, and when assessment can take place.

6.0.1 Example Assessment Briefs

Each unit has supporting Example Assessment Briefs that are available to download from the course materials section on our website (<http://qualifications.pearson.com/>). The Example Assessment Briefs are there to give you an example of what the assessment will look like in terms of the feel and level of demand of the assessment.

The Example Assessment Briefs, with the exception of the mandatory Pearson-set unit, provide tutors with suggested types of assignment and structure that can be adopted or adapted accordingly.

6.1 Principles of Internal Assessment

This section gives an overview of the key features of internal assessment and how you, as an approved centre, can offer it effectively. The full requirements and operational information are given in the Pearson Quality Assurance Handbook available in the support section of our website (<http://qualifications.pearson.com/>).

For BTEC Higher Nationals it is important that you can meet the expectations of stakeholders and the needs of students by providing a programme that is practical and applied. Centres can tailor programmes to meet local needs and should use links with local employers and the wider construction and the built environment sector.

When internal assessment is operated effectively it is challenging, engaging, practical and up to date. It must also be fair to all students and meet national standards.

6.1.1 Assessment through assignments

For internally assessed units the format of assessment is an assignment taken after the content of the unit, or part of the unit if several assignments are used, has been fully delivered. An assignment may take a variety of forms, including practical and written types. An assignment is a distinct activity completed independently by students (either alone or in a team). An assignment is separate from teaching, practice, exploration and other activities that students complete with direction from and, formative assessment by tutors.

An assignment is issued to students as an **assignment brief** with a hand-out date, a completion date and clear requirements for the evidence that students are expected to provide. There may be specific observed practical components during the assignment period. Assignments can be divided into separate parts and may require several forms of evidence. A valid assignment will enable a clear and formal assessment outcome based on the assessment criteria.

6.1.2 Assessment decisions through applying unit-based criteria

Assessment decisions for BTEC Higher Nationals are based on the specific criteria given in each unit and set at each grade level. The criteria for each unit have been defined according to a framework to ensure that standards are consistent in the qualification and across the suite as a whole. The way in which individual units are written provides a balance of assessment of understanding, practical skills and vocational attributes appropriate to the purpose of the qualifications.

The assessment criteria for a unit are hierarchical and holistic. For example, if an M criterion requires the student to show 'analysis' and the related P criterion requires the student to 'explain', then to satisfy the M criterion a student will need to cover both 'explain' and 'analyse'. The unit assessment grid shows the relationships among the criteria so that assessors can apply all the criteria to the student's evidence at the same time. In *Appendix 1* we have set out a definition of terms that assessors need to understand.

Assessors must show how they have reached their decisions using the criteria in the assessment records. When a student has completed all the assessment for a unit then the assessment team will give a grade for the unit. This is given simply according to the highest level for which the student is judged to have met all the criteria. Therefore:

- **To achieve a Pass**, a student must have satisfied all the Pass criteria for the learning outcomes, showing coverage of the unit content and therefore attainment at Level 4 or 5 of the national framework.
- **To achieve a Merit**, a student must have satisfied all the Merit criteria (and therefore the Pass criteria) through high performance in each learning outcome.
- **To achieve a Distinction**, a student must have satisfied all the Distinction criteria (and therefore the Pass and Merit criteria), and these define outstanding performance across the unit as a whole.

The award of a Pass is a defined level of performance and cannot be given solely on the basis of a student completing assignments. Students who do not satisfy the Pass criteria should be reported as Unclassified.

6.1.3 The assessment team

It is important that there is an effective team for internal assessment. There are three key roles involved in implementing assessment processes in your centre, each with different interrelated responsibilities, and these roles are listed below. Full information is given in the Pearson Quality Assurance Handbook available in the support section of our website (<http://qualifications.pearson.com/>).

- **The Programme Leader** has overall responsibility for the programme, its assessment and internal verification to meet our requirements, record keeping and liaison with the EE. The Programme Leader registers annually with Pearson and acts as an assessor, supports the rest of the assessment team, makes sure they have the information they need about our assessment requirements, and organises training, making use of our guidance and support materials.
- **Internal Verifiers** (IVs) oversee all assessment activity in consultation with the Programme Leader. They check that assignments and assessment decisions are valid and that they meet our requirements. IVs will be standardised by working with the Programme Leader. Normally, IVs are also assessors, but they do not verify their own assessments.
- **Assessors** set or use assignments to assess students to national standards. Before taking any assessment decisions, assessors participate in standardisation activities led by the Programme Leader. They work with the Programme Leader and IVs to ensure that the assessment is planned and carried out in line with our requirements.
- Your **External Examiner** (EE) will sample student work across assessors. Your EE will also want to see evidence of internal verification of assignments and assessed decisions.

6.1.4 Effective organisation

Internal assessment needs to be well organised so that student progress can be tracked and so that we can monitor that assessment is being carried out in line with national standards. We support you in this through, for example, providing training materials and sample documentation. Our online HN Global service can also help support you in planning and record keeping.

It is particularly important that you manage the overall assignment programme and deadlines to make sure that all your students are able to complete assignments on time.

6.1.5 Student preparation

To ensure that you provide effective assessment for your students, you need to make sure that they understand their responsibilities for assessment and the centre's arrangements. From induction onwards you will want to ensure that students are motivated to work consistently and independently to achieve the requirements of the qualifications. They need to understand how assignments are used, the importance of meeting assignment deadlines, and that all the work submitted for assessment must be their own.

You will need to give your students a guide that explains:

- How assignments are used for assessment
- How assignments relate to the teaching programme
- How students should use and reference source materials, including what would constitute plagiarism.

The guide should also set out your centre's approach to operating assessments, such as how students must submit assignments/work and the consequences of submitting late work and the procedure for requesting extensions for mitigating circumstances.

6.2 Setting effective assessments

6.2.1 Setting the number and structure of assignments

In setting your assessments you need to work with the structure of assessments shown in the relevant section of a unit. This shows the learning aims and outcomes and the criteria that you are expected to follow.

Pearson provide online EABs for each unit to support you in developing and designing your own assessments.

In designing your own assignment briefs you should bear in mind the following points:

- The number of assignments for a unit must not exceed the number of learning outcomes listed in the unit descriptor. However, you may choose to combine assignments, either to cover a number of learning outcomes or to create a single assignment for the entire unit.
- You may also choose to combine all or parts of different units into single assignments, provided that all units and all their associated learning outcomes are fully addressed in the programme overall. If you choose to take this approach you need to make sure that students are fully prepared, so that they can provide all the required evidence for assessment, and that you are able to track achievement in assessment records.

- A learning outcome must always be assessed as a whole and must not be split into two or more elements.
- The assignment must be targeted to the learning outcomes but the learning outcomes and their associated criteria are not tasks in themselves. Criteria are expressed in terms of the outcome shown in the evidence.
- Some units may be more suited to an exam-based assessment approach, to appropriately prepare students for further study, such as progression onto level 6 programmes or to meet professional recognition requirements. Example Assessment Briefs are available for examples of exam-based assessments.
- You do not have to follow the order of the learning outcomes of a unit in setting assignments, but later learning outcomes often require students to apply the content of earlier learning outcomes, and they may require students to draw their learning together.

Assignments must be structured to allow students to demonstrate the full range of achievement at all grade levels. Students need to be treated fairly by being given the opportunity to achieve a higher grade, if they have the ability.

As assignments provide a final assessment, they will draw on the specified range of teaching content for the learning outcomes. **The specified unit content must be taught/delivered.** The evidence for assessment need not cover every aspect of the teaching content, as students will normally be given particular examples, case studies or contexts in their assignments. For example, if a student is carrying out one practical performance, or an investigation of one organisation, then they will address all the relevant range of content that applies in that instance.

6.2.2 Providing an assignment brief

A good assignment brief is one that, through providing challenging and authentic sector/work-related tasks, motivates students to provide appropriate evidence of what they have learnt.

An assignment brief should have:

- A vocational scenario: this could be a simple situation or a full, detailed set of vocational requirements that motivates the student to apply their learning through the assignment.
- Clear instructions to the student about what they are required to do, normally set out through a series of tasks.
- An audience or purpose for which the evidence is being provided.
- An explanation of how the assignment relates to the unit(s) being assessed.

6.2.3 Forms of evidence

BTEC Higher Nationals have always allowed for a variety of forms of assessment evidence to be used, provided they are suited to the type of learning outcomes being assessed. For many units, the practical demonstration of skills is necessary and, for others, students will need to carry out their own research and analysis, working independently or as part of a team. Where students are working together on a group project, they must still produce evidence and be assessed as *individuals*, based on their own work (contributing to a team outcomes) and their role within the team environment.

The Example Assessment Briefs give you information on what would be suitable forms of evidence to give students the opportunity to apply a range of employability or transferable skills. Centres may choose to use different suitable forms of evidence to those proposed. Overall, students should be assessed using varied forms of evidence.

These are some of the main types of assessment:

- Written reports, essays
- In-class tests
- Examinations
- Creation of design documents
- Creation of implementation documents
- Work-based projects
- Academic posters, displays, leaflets
- PowerPoint (or similar) presentations
- Recordings of interviews/role plays
- Working logbooks, reflective journals
- Presentations with assessor questioning
- Time-constrained assessment.

(Full definitions of different types of assessment are given in *Appendix 2*.) The form(s) of evidence selected must:

- Allow the student to provide all the evidence required for the learning outcomes and the associated assessment criteria at all grade levels.
- Allow the student to produce evidence that is their own independent work.
- Allow a verifier to independently reassess the student to check the assessor's decisions.

For example, when you are using performance evidence, you need to think about how supporting evidence can be captured through recordings, photographs or task sheets.

Centres need to take particular care that students are enabled to produce independent work. For example, if students are asked to use real examples, then best practice would be to encourage them to use examples of their own or to give the group a number of examples that can be used in varied combinations.

6.3 Making valid assessment decisions

6.3.1 Authenticity of student work

An assessor must assess only student work that is authentic, i.e. the student's own independent work. Students must authenticate the evidence that they provide for assessment through signing a declaration stating that it is their own work. A student declaration must state that:

- Evidence submitted for the assignment is the student's own
- The student understands that false declaration is a form of malpractice.

Assessors must ensure that evidence is authentic to a student through setting valid assignments and supervising them during the assessment period. Assessors must also take care not to provide direct input, instructions or specific feedback that may compromise authenticity.

Centres may use Pearson templates or their own templates to document authentication.

During assessment an assessor may suspect that some or all of the evidence from a student is not authentic. The assessor must then take appropriate action using the centre's policies for malpractice. (See *section 3.7* in this Programme Specification for further information.)

6.3.2 Making assessment decisions using criteria

Assessors make judgements using the criteria. The evidence from a student can be judged using all the relevant criteria at the same time. The assessor needs to make a judgement against each criterion that evidence is present and sufficiently comprehensive. For example, the inclusion of a concluding section may be insufficient to satisfy a criterion requiring 'evaluation'.

Assessors should use the following information and support in reaching assessment decisions:

- The explanation of key terms in *Appendix 1* of this document
- Examples of verified assessed work
- Your Programme Leader and assessment team's collective experience.

6.3.3 Dealing with late completion of assignments

Students must have a clear understanding of the centre's policy on completing assignments by the deadlines that you give them. Students may be given authorised extensions for legitimate reasons, such as illness, at the time of submission, in line with your centre policies (see also Section 3.6 "Administrative arrangements for internal assessment").

For assessment to be fair, it is important that students are all assessed in the same way and that some students are not advantaged by having additional time or the opportunity to learn from others. Centres should develop and publish their own regulations on late submission; and, this should make clear the relationship between late submission and the centre's mitigating circumstances policy.

Centres may apply a penalty to assignments that are submitted beyond the published deadline. However, if a late submission is accepted, then the assignment should be assessed normally, when it is submitted, using the relevant assessment criteria; with any penalty or cap applied after the assessment. Where the result of assessment may be capped, due to late submission of the assignment, the student should be given an indication of their uncapped grade; in order to recognise the learning that has been achieved, and assessment feedback should be provided in relation to the uncapped achievement.

As with all assessment results, both the uncapped and capped grades should be recorded and ratified by an appropriate assessment board; taking into account any mitigating circumstances that may have been submitted.

6.3.4 Issuing assessment decisions and feedback

Once the assessment team has completed the assessment process for an assignment, the outcome is a formal assessment decision. This is recorded formally and reported to students. The information given to the student:

- Must show the formal decision and how it has been reached, indicating how or where criteria have been met.
- May show why attainment against criteria has not been demonstrated.
- Must not provide feedback on how to improve evidence but how to improve in the future.

6.3.5 Resubmission opportunity

An assignment provides the final assessment for the relevant learning outcomes and is normally a final assessment decision. A student who, for the first assessment opportunity, has failed to achieve a Pass for that unit specification **shall be expected to undertake a reassessment**.

- Only one opportunity for reassessment of the unit will be permitted.
- Reassessment for course work, project- or portfolio-based assessments shall normally involve the reworking of the original task.
- For examinations, reassessment shall involve completion of a new task.
- A student who undertakes a reassessment will have their grade capped at a Pass for that unit.
- A student will not be entitled to be reassessed in any component of assessment for which a Pass grade or higher has already been awarded.

6.3.6 Repeat Units

A student who, for the first assessment opportunity and resubmission opportunity, still failed to achieve a Pass for that unit specification:

- At Centre discretion and Assessment Board, decisions can be made to permit a repeat of a unit.
- The student must study the unit again with full attendance and payment of the unit fee.
- The overall unit grade for a successfully completed repeat unit is capped at a Pass for that unit.
- Units can only be repeated once.

6.3.7 Assessment Boards

Each centre is expected by Pearson to hold Assessment Boards for all of its BTEC Higher National programmes. The main purpose of an Assessment Board is to make recommendations on:

- The grades achieved by students on the individual units
- Extenuating circumstances
- Cases of cheating and plagiarism
- Progression of students on to the next stage of the programme
- The awards to be made to students
- Referrals and deferrals.

Assessment Boards may also monitor academic standards. The main boards are normally held at the end of the session, although if your centre operates on a semester system there may be (intermediate) boards at the end of the first semester. There may also be separate boards to deal with referrals.

Where a centre does not currently have such a process then the EE should discuss this with the Quality Nominee and Programme Leader, stressing the requirement for Assessment Boards by both Pearson and QAA and that Assessment Board reports and minutes provide valuable evidence for QAA's Review of Higher Education process.

6.4 Planning and record keeping

For internal processes to be effective, an assessment team needs to be well organised and keep effective records. The centre will also work closely with us so that we can quality assure that national standards are being satisfied. This process gives stakeholder's confidence in the assessment approach.

The Programme Leader should have an assessment plan. When producing a plan the assessment team will wish to consider:

- The time required for training and standardisation of the assessment team.
- The time available to undertake teaching and carrying out of assessment, taking account of when students may complete external assessments and when quality assurance will take place.
- The completion dates for different assignments.
- Who is acting as IV for each assignment and the date by which the assignment needs to be verified.
- Setting an approach to sampling assessor decisions though internal verification that covers all assignments, assessors and a range of students.
- How to manage the assessment and verification of students' work, so that they can be given formal decisions promptly.
- How resubmission opportunities can be scheduled.

The Programme Leader will also maintain records of assessment undertaken. The key records are:

- Verification of assignment briefs
- Student authentication declarations
- Assessor decisions on assignments, with feedback given to students
- Verification of assessment decisions.

Examples of records and further information are available here, in the [Pearson Quality Handbook](#).

6.5 Calculation of the final qualification grade

6.5.1 Conditions for the award

Conditions for the award of the HND

To achieve a Pearson BTEC Level 5 Higher National Diploma qualification a student must have:

- completed units equivalent to 120 credits at level 5
- achieved at least a pass in 105 credits at level 5
- completed units equivalent to 120 credits at level 4
- achieved at least a pass in 105 credits at level 4.

Conditions for the award of the HNC

To achieve a Pearson BTEC Level 4 Higher National Certificate qualification a student must have:

- completed units equivalent to 120 credits at level 4
- achieved at least a pass in 105 credits at level 4.

6.5.2 Compensation provisions

Compensation provisions for the HND

Students can still be awarded an HND if they have attempted but not achieved a Pass in one of the 15-credit units completed at level 4, and similarly if they have attempted but not achieved a Pass in one of the 15-credit units at level 5. However, they must complete and pass the remaining units for an HNC or HND as per the unit rules of combination of the required qualification.

Compensation provisions for the HNC

Students can still be awarded an HNC if they have attempted but not achieved a Pass in one of the 15-credit units completed, but have completed and passed the remaining units.

6.5.3 Calculation of the overall qualification grade

The calculation of the **overall qualification grade** is based on the student's performance in all units. Students are awarded a Pass, Merit or Distinction qualification grade, using the points gained through all 120 credits, at Level 4 for the HNC or Level 5 for the HND, based on unit achievement. The overall qualification grade is calculated in the same way for the HNC and for the HND.

All units in valid combination must have been attempted for each qualification. The conditions of award and the compensation provisions will apply as outlined above. All 120 credits count in calculating the grade (at each level, as applicable).

The overall qualification grade for the HND will be calculated based on student performance in Level 5 units only.

Units that have been attempted but not achieved, and subsequently granted compensation, will appear as 'Unclassified', i.e. a 'U' grade, on the student's Notification of Performance, that is issued with the student certificate.

Points per credit

Grade	Points
Pass	4
Merit	6
Distinction	8

Point boundaries

Grade	Point boundaries
Pass	420–599
Merit	600–839
Distinction	840 +

6.5.4 Modelled student outcomes

Pearson BTEC Level 4 Higher National Certificate

				STUDENT 1		STUDENT 2		STUDENT 3		STUDENT 4		STUDENT 5	
	Credits	Level	Grade point	Grade	Unit points	Grade	Unit points	Grade	Unit points	Grade	Unit points	Grade	Unit points
Core 1	15	4	4	P	60	P	60	P	60	D	120	D	120
Core 2	15	4	4	P	60	P	60	P	60	D	120	M	90
Core 3	15	4	4	P	60	P	60	P	60	D	120	M	90
Core 4	15	4	4	P	60	P	60	M	90	M	90	M	90
Core 5	15	4	6	M	90	P	60	M	90	M	90	M	90
Core 6	15	4	6	M	90	P	60	M	90	M	90	M	90
Opt 1	15	4	6	M	90	M	90	D	120	D	120	D	120
Opt 2	15	4	6	M	90	M	90	D	120	D	120	D	120
TOTAL	120				600		540		690		870		810
GRADE					M		P		M		D		M

Pearson BTEC Level 5 Higher National Diploma

				STUDENT 1		STUDENT 2		STUDENT 3		STUDENT 4		STUDENT 5	
	Credits	Level	Grade point	Grade	Unit points	Grade	Unit points	Grade	Unit points	Grade	Unit points	Grade	Unit points
Core 1	15	4	0	P	0	P	0	P	0	D	0	P	0
Core 2	15	4	0	P	0	P	0	P	0	D	0	M	0
Core 3	15	4	0	P	0	P	0	P	0	D	0	M	0
Core 4	15	4	0	P	0	P	0	M	0	M	0	M	0
Core 5	15	4	0	M	0	P	0	M	0	M	0	P	0
Core 6	15	4	0	M	0	P	0	M	0	D	0	U	0
Opt 1	15	4	0	M	0	P	0	D	0	D	0	D	0
Opt 2	15	4	0	M	0	P	0	D	0	D	0	D	0
Core 7	30	5	6	M	180	M	180	M	180	P	120	D	240
Core 8	15	5	6	M	90	M	90	M	90	P	60	D	120
Opt 3	15	5	6	M	90	M	90	D	120	P	60	D	120
Opt 4	15	5	6	M	90	P	60	D	120	P	60	D	120
Opt 5	15	5	6	M	90	P	60	D	120	M	90	M	90
Opt 6	15	5	6	M	90	P	60	M	90	M	90	P	60
Opt 7	15	5	6	M	90	P	60	M	90	M	90	M	90
TOTAL	240				720		600		810		570		840
GRADE					M		M		M		P		D

Opt = Optional

7 Quality assurance

Pearson's quality assurance system for all Pearson BTEC Higher National programmes is benchmarked to Level 4 and Level 5 on the Quality Assurance Agency (QAA) Framework for Higher Education Qualifications (FHEQ). This will ensure that centres have effective quality assurance processes to review programme delivery. It will also ensure that the outcomes of assessment are to national standards.

The quality assurance process for centres offering Pearson BTEC Higher National programmes comprise five key components:

- The approval process
- Monitoring of internal centre systems
- Independent assessment review
- Annual programme monitoring report
- Annual student survey.

7.1 The approval process

Centres new to the delivery of Pearson programmes will be required to seek approval initially through the existing centre approval process and then through the programme approval process. Programme approval for new centres can be considered in one of two ways:

- Desk-based approval review
- Review and approval visit to the centre.

Prior to approval being given, centres will be required to submit evidence to demonstrate that they:

- Have the human and physical resources required for effective delivery and assessment.
- Understand the implications for independent assessment and agree to abide by these.
- Have a robust internal assessment system supported by 'fit for purpose' assessment documentation.
- Have a system to internally verify assessment decisions, to ensure standardised assessment decisions are made across all assessors and sites.

Applications for approval must be supported by the head of the centre (Principal or Chief Executive, etc.) and include a declaration that the centre will operate the programmes strictly, as approved and in line with Pearson requirements.

Centres seeking to renew their programme approval upon expiry of their current approval period may be eligible for the Automatic Approval process, subject to the centre meeting the eligibility criteria set out by Pearson.

Regardless of the type of centre, Pearson reserves the right to withdraw either qualification or centre approval when it deems there is an irreversible breakdown in the centre's ability either to quality assure its programme delivery or its assessment standards.

7.2 Monitoring of internal Centre systems

Centres will be required to demonstrate on-going fulfilment of the centre approval criteria over time and across all Higher National programmes. The process that assures this is external examination, which is undertaken by EEs. Centres will be given the opportunity to present evidence of the on-going suitability and deployment of their systems to carry out the required functions. This includes the consistent application of policies affecting student registrations, appeals, effective internal examination and standardisation processes. Where appropriate, centres may present evidence of their operation within a recognised code of practice, such as that of the QAA for Higher Education. Pearson reserves the right to confirm independently that these arrangements are operating to Pearson's standards.

Pearson will affirm, or not, the on-going effectiveness of such systems. Where system failures are identified, sanctions (appropriate to the nature of the problem) will be applied, in order to assist the centre in correcting the problem.

7.2.1 External Examiners

EEs ensure that Centres are meeting appropriate standards. They are appointed by Pearson and are not members of the programme and assessment team. Their role is essentially that of a moderator, they do not mark work but moderate the decisions made by Internal Verifiers.

They have the right to attend Assessment Boards and are also able to act in an advisory capacity.

External Examination performs the same quality checks as other forms of standards verification. It also ensures that the processes and procedures you have in place are consistent and appropriate for qualifications at higher and professional levels.

Where appropriate, Pearson will seek to appoint EEs who have professional and/or academic experience within the subject area for which they will be examining. In addition, Pearson will prioritise the appointment of EEs who are members of the relevant professional bodies associated with their area of examination.

7.3 Independent assessment review

The internal assessment outcomes reached for all Pearson BTEC Higher National programmes benchmarked to Level 4 and Level 5 of the QAA's FHEQ, are subject to a visit from a Pearson appointed EE. The outcomes of this process will be:

- To confirm that internal assessment is to national standards and allow certification, *or*
- To make recommendations to improve the quality of assessment outcomes before certification is released, *or*
- To make recommendations about the centre's ability to continue to be approved for the Pearson BTEC Higher National qualifications in question.

7.4 Annual Programme Monitoring Report (APMR)

The APMR is a written annual review form that provides opportunity for centres to analyse and reflect on the most recent teaching year. By working in collaboration with centres, the information can be used by Pearson to further enhance the quality assurance of the Pearson BTEC Higher National programmes.

7.5 Annual student survey

Pearson will conduct an annual survey of Pearson BTEC Higher National students. The purpose of the survey is to enable Pearson to evaluate the student experience as part of the quality assurance process, by engaging with students studying on these programmes.

7.6 Centre and qualification approval

As part of the approval process, your centre must make sure that the resource requirements listed below are in place before offering the qualification.

Centres must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualifications.

- Staff involved in the assessment process must have relevant expertise and/or occupational experience.
- There must be systems in place to ensure Continuing Professional Development for staff delivering the qualification.
- Centres must have in place appropriate health & safety policies relating to the use of equipment by staff and students.

- Centres must deliver the qualification in accordance with current equality legislation.
- Centres should refer to the individual unit descriptors to check for any specific resources required.

7.7 Continuing quality assurance and standards verification

We produce annually the latest version of the **Pearson Quality Assurance Handbook**. It contains detailed guidance on the quality processes required to underpin robust assessment and internal verification.

The key principles of quality assurance are that:

- A centre delivering Pearson BTEC Higher National programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering.
- The centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery.
- Pearson makes available to approved Centres a range of materials and opportunities for reviewing internal materials through the assessment checking service. This is intended to exemplify the processes required for effective assessment and provide examples of effective standards. Approved Centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment.
- An approved centre must follow agreed protocols for standardisation of assessors and verifiers, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres. We monitor and support centres in the effective operation of assessment and quality assurance.

The methods we use to do this for BTEC Higher Nationals include:

- Making sure that all centres complete appropriate declarations at the time of approval
- Undertaking approval visits to centres
- Making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- Assessment sampling and verification through requested samples of assessments, completed assessed student work and associated documentation
- An overarching review and assessment of a centre's strategy for assessing and quality-assuring its BTEC programmes.

An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting. Centres that do not fully address and maintain rigorous approaches to quality assurance cannot seek certification for individual programmes or for all BTEC Higher National qualifications.

Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

8 Recognition of Prior Learning and attainment

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether students can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess, and so do not need to develop through a course of learning.

Pearson encourages centres to recognise students' previous achievements and experiences whether at work, home or at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning. RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be valid and reliable.

For full guidance on RPL please refer to the Recognition of Prior Learning policy document available in the support section of our website (<https://qualifications.pearson.com>).

9 Equality and diversity

Equality and fairness are central to our work. The design of these qualifications embeds consideration of equality and diversity as set out in the qualification regulators' General Conditions of Recognition. Promoting equality and diversity involves treating everyone with equal dignity and worth, while also raising aspirations and supporting achievement for people with diverse requirements, entitlements and backgrounds. An inclusive environment for learning anticipates the varied requirements of students, and aims to ensure that all students have equal access to educational opportunities. Equality of opportunity involves enabling access for people who have differing individual requirements as well as eliminating arbitrary and unnecessary barriers to learning. In addition, students with and without disabilities are offered learning opportunities that are equally accessible to them, by means of inclusive qualification design.

Pearson's equality policy requires all students to have equal opportunity to access our qualifications and assessments. It also requires our qualifications to be designed and awarded in a way that is fair to every student. We are committed to making sure that:

- Students with a protected characteristic (as defined in legislation) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to students who do not share that characteristic.
- All students achieve the recognition they deserve from undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Pearson's policy regarding access to its qualifications is that:

- They should be available to everyone who is capable of reaching the required standards
- They should be free from any barriers that restrict access and progression
- There should be equal opportunities for all those wishing to access the qualifications.

Centres are required to recruit students to Higher National qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications, and that the qualification will meet their needs. Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a higher level qualification. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the student within the centre during their programme of study and any specific support that might be necessary to allow the student to access the assessment for the qualification. Centres should consult our policy documents on students with particular requirements.

Access to qualifications for students with disabilities or specific needs

Students taking a qualification may be assessed in a recognised regional sign language, where it is permitted for the purpose of reasonable adjustments. Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications*. Details on how to make adjustments for students with protected characteristics are given in the document *Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units*. See the support section of our website for [both documents](http://qualifications.pearson.com/) (<http://qualifications.pearson.com/>).

10 Higher Nationals Future Homes Design and Construction Units

Unit 1: Individual Project (Pearson-set)

Unit code	R/615/1387
Unit type	Core
Unit level	4
Credit value	15

Introduction

The ability to define, plan and undertake a project is a critical set of skills needed in various roles within the construction industry. Identifying appropriate information and analysing this, to formulate clear results or recommendations, is required to underpin many of the processes that inform construction projects.

The aim of this unit is to support students in using and applying the knowledge and skills they have developed through other areas of their studies to complete and present an individual project. In addition, this unit will provide students with key study skills that will support them in further study.

Students will be able to identify, define, plan, develop and execute a successful project by working through a clear process. They will develop a project brief; outlining a problem that requires a solution, as well as a project specification, the specific requirements of which the final outcome must meet. They will research the problem, undertaking a feasibility study, and consider a range of potential solutions using critical analysis and evaluation techniques to test, select and contextualise their preferred solution. Students will provide a work and time management plan, keeping a diary of all activities, reflecting on their process and their learning throughout the project.

***Please refer to the accompanying Pearson-set Assignment Guide and the Theme Release document for further support and guidance on the delivery of the Pearson-set unit.**

Learning Outcomes

By the end of this unit students will be able to:

1. Formulate a project that will provide a solution to an identified problem
2. Manage a project within agreed timescales and specification; documenting the process throughout
3. Evaluate potential project management solutions
4. Produce a project report and deliver a presentation of the final project outcomes.

Essential Content

LO1 **Formulate a project that will provide a solution to an identified problem**

Project identification

Research methods

Feasibility studies

Brief and specification

LO2 **Manage a project within agreed timescales and specification, documenting the process throughout**

Resources and resource planning

Costs and cost planning

Work plan:

Gantt charts

Project Evaluation and Review Technique (PERT) charts

Critical Path Method (CPM).

Project tracking:

Progress tracking

Milestones.

LO3 **Evaluate potential project management solutions**

PERT analysis

CPM analysis

LO4 **Produce a project report and deliver a presentation of the final project outcomes**

Report formats

Presentation techniques

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
L01 Formulate a project that will provide a solution to an identified problem		L01 L02 D1 Evaluate the relationship between project identification, feasibility and project planning, with consideration of the impact of project scope on time and resources
P1 Select an appropriate construction-based project, giving reasons for your choice P2 Identify the main components of a project specification	M1 Explain why the project specification is of fundamental importance to a successful project outcome	
L02 Manage a project within agreed timescales and specification, documenting the process throughout		
P3 Identify potential resources, costs and timescales P4 Describe a range of appropriate techniques for generating realistic potential solutions	M2 Prepare and update a project management plan, using standard systems of time and resource tracking	
L03 Evaluate potential project management solutions		L03 L04 D2 Appraise your own performance in managing the project; draw conclusions and make recommendations that would further improve your performance in the future
P5 Explore project management strategies to determine suitability for a given project P6 Justify the selection of your preferred solution, making reference to your initial project specification	M3 Compare the outcomes of your initial planned resources, timescales and costs against actual outcomes	
L04 Produce a project report and deliver a presentation of the final project outcomes		
P7 Produce a written report identifying each stage of the project P8 Utilise appropriate forms of referencing and citation in the preparation of a written report P9 Prepare a presentation of your final project outcomes, utilising industry standard software	M4 Present your final project outcomes and recommendations to a selected audience	

Recommended Resources

Textbooks

- BALDWIN, A. (2014) *Handbook for Construction Planning and Scheduling*. London: Wiley-Blackwell.
- BUSSEY, P. (2015) *CDM 2015: A Practical Guide for Architects and Designers*. London: RIBA.
- CIOB (2010) *Guide to Good Practice in the Management of Time in Complex Projects*. London: Chartered Institute of Building.
- GOETSCH, D.L. (2011) *Construction Safety & Health*. London: Pearson.
- KELLY, J. and MALE, S. (1992) *Value Management in Design and Construction: The Economic Management of Project*. London: Taylor & Francis.
- LAWSON, B. (2005) *How Designers Think: The Design Process Demystified*. London: Routledge.
- POTTS, K. and ANKRAH, N. (2014) *Construction Cost Management: Learning from Case Studies*. London: Routledge.
- WYATT, D. (2007) *Construction Specifications: Principles and Applications*. New York: Delmar.

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 4: Construction Practice & Management

Unit 14: Building Information Modelling

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 52: Principles of Housing Economics

Unit 2: Construction Technology

Unit code	Y/615/1388
Unit type	Core
Unit level	4
Credit value	15

Introduction

The basic principles of construction technology have not changed for hundreds of years. However, the materials and techniques used to achieve these basic principles are constantly evolving; to enable the construction industry to deliver better quality buildings. Scarcity of resources and the continuing demand of more sophisticated clients, end users and other stakeholder interests, are driving the construction industry to provide buildings which facilitate enhanced environmental and energy performance, and greater flexibility, in response to ever increasing financial, environmental, legal and economic constraints.

This unit will introduce the different technological concepts used to enable the construction of building elements; from substructure to completion, by understanding the different functional characteristics and design considerations to be borne in mind when selecting the most suitable technological solution.

Topics included in this unit are: substructure, superstructure, finishes, building services and infrastructure components. On successful completion of this unit a student will be able to analyse scenarios and select the most appropriate construction technology solution.

Learning Outcomes

By the end of this unit students will be able to:

1. Explain the terminology used in construction technology
2. Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria
3. Identify the different types of civil engineering/infrastructure technology used in support of buildings
4. Illustrate the supply and distribution of a range of building services and how they are accommodated within the building.

Essential Content

LO1 Explain the terminology used in construction technology

Types of construction activity:

Low, medium and high rise buildings, domestic buildings, for example house, flats and other multi-occupancy buildings, commercial buildings, for example offices and shops, industrial buildings, for example, light industrial and warehouses.

Construction technology terminology:

Loadbearing and non-loadbearing, structural stability, movement and thermal expansion, durability, weather and moisture resistance, aesthetics, fire resistance, sound insulation, resistance to heat loss and thermal transmission, dimensional co-ordination and standardisation, sustainability and scarcity of availability, on-site and off-site construction, legal requirements, buildability, health and safety.

Construction information:

Drawings, specification, schedules, CAD, Building Information Modelling (BIM).

Sustainability:

Supply chain

Lifecycle

'Cradle-to-grave'

'Cradle-to-cradle'

Circular economies.

LO2 Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria

Pre-design studies:

Desk-top, Site Reconnaissance, Direct Soil Investigation techniques.

Substructure functions and design considerations:

Different methods for gathering disturbed and undisturbed samples, influence of soil type on foundation design, including water and chemical content, potential loads, position of trees and the impact on foundations, economic considerations, legal considerations (health and safety work in excavations), building regulations, plant requirements.

Types of foundations:

Shallow and deep foundations, strip and deep strip foundations, pad foundations, raft foundations, piled foundations (replacement and displacement piles).

Types of superstructure:

Traditional construction, framed construction: steel, composite concrete and steel, timber.

Walls; roofs; structural frames; claddings; finishes; services.

Walls:

External walls: traditional cavity, timber frame, lightweight steel.

Cladding: panel systems, infill systems, composite panel systems, internal partition walls.

Roofs:

Pitched and flat roof systems, roof coverings.

Floors:

Ground floors, intermediate floors, floor finishes.

Staircases:

Timber, concrete, metal staircases, means of escape.

Finishes:

Ceiling, wall and floor finishes.

LO3 Identify the different types of civil engineering/infrastructure technology used in support of buildings

Site remediation and de-watering:

Contamination management: cut-off techniques, encapsulation.

Soil remediation: stone piling, vibro-compaction.

De-watering: permanent sheet piling, secant piling, grout injection freezing, temporary techniques, such as pumping, wells, electro-osmosis.

Substructure works:

Basement construction: steel sheet piling, concrete diaphragm walls, coffer dams, caissons, culverts.

Superstructure works:

Reinforced concrete work: formwork, reinforcement, fabrication, concrete, steel.

LO4 Illustrate the supply and distribution of a range of building services and how they are accommodated within the building

Primary service supply:

Cold water

Gas

Electricity.

Services distribution:

Hot and cold water

Single phase and 3-phase electricity

Air conditioning ductwork.

Services accommodation:

Raised access flooring

Suspended ceilings

Partitioning

Rising ducts.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Explain the terminology used in construction technology		LO1 D1 Evaluate how the functional characteristics and design selection criteria impact on the eventual design solution
<p>P1 Describe the differences between residential, commercial and industrial buildings</p> <p>P2 Explain how the functional characteristics and design selection criteria are informed by proposed building use</p> <p>P3 Discuss the ways in which sustainability can be promoted in building projects</p>	M1 Apply the terminology used in construction technology to a given building construction project	
LO2 Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria		LO2 LO3 D2 Prepare a design report identifying superstructure, substructure and civil engineering structures necessary for a given building construction project
<p>P4 Describe the pre-design studies carried out and types of information collected for a given construction site</p> <p>P5 Explain the functional characteristics and design criteria for primary and secondary elements of a building substructure and superstructure</p>	<p>M2 Analyse how site conditions impact on the design of foundations</p> <p>M3 Illustrate how the component parts of an element allow it to fulfil its function</p>	
LO3 Identify the different types of civil engineering/infrastructure technology used in support of buildings		
<p>P6 Describe techniques used for remediating the site prior to construction commencing</p> <p>P7 Describe the types of substructure works carried out by civil engineers</p>	M4 Compare different types of structural frame used to carry the primary and secondary elements of the superstructure	

Pass	Merit	Distinction
<p>LO4 Illustrate the supply and distribution of a range of building services and how they are accommodated within the building</p>		<p>LO4</p>
<p>P8 Describe the supply arrangements for primary services</p> <p>P9 Explain the distribution arrangements for primary services</p>	<p>M5 Demonstrate the elements of the superstructure used to facilitate the primary services</p>	<p>D3 Appraise how the distribution of the primary services impact on the overall design of the building</p>

Recommended Resources

Textbooks

BRYAN, T. (2010) *Construction Technology: Analysis and Choice*, Oxford: Blackwell.

CHARTLETT, A. and MAYBERY-THOMAS, C. (2013) *Fundamental Building Technology*. 3rd ed. Abingdon: Routledge.

CHUDLEY, R. et al. (2012) *Advanced Construction Technology*. 5th ed. Harlow: Pearson Education Limited.

CHUDLEY, R. and GRENNO, R. (2016) *Building Construction Handbook*. 11th ed. Abingdon: Routledge.

FLEMING, E. (2005) *Construction Technology: An Illustrated Introduction*. Oxford: Blackwell.

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 51: Principles of Off-site Construction

Unit 54: Advanced Off-site Construction

Unit 4: Construction Practice & Management

Unit code	R/615/1390
Unit type	Core
Unit level	4
Credit value	15

Introduction

The aim of this unit is to develop and provide students with a holistic understanding of construction practice and management processes. Students will investigate and research the modern construction industry, both from the practical skills embedded within the industry through to its linkage with development on-site and the connection with construction management; including roles within the industry.

The unit compares and investigates small, medium and large construction companies within the market place and how construction processes, for development, have evolved.

Students will also explore how health & safety has evolved within the industry, including how the major stakeholders, from companies to site operatives, have embedded health & safety into their preferred areas of development and careers. In addition, students will explore Building Information Modelling and how it fits into construction processes/sequences ranging from domestic to large-scale and design and build projects.

The knowledge from this unit will provide students with the understanding of modern construction and management; the skills, management of people and projects, and how health & safety have changed the perception of the construction industry.

Learning Outcomes

By the end of this unit students will be able to:

1. Describe the construction industry with reference to company structures and other activities
2. Explain different types of construction companies in the market and their relationships within the tendering process
3. Discuss the key stages in a construction project, and how Building Information Modelling informs the different stages
4. Analyse how the construction industry has developed suitable collaboration strategies in support of greater recognition of health & safety.

Essential Content

LO1 Describe the construction industry with reference to company structures and other activities

Understanding of the construction industry:

Historical development of the construction industry

Professional and other institutes, including societies

Links between professional, technical and skills professionals

Contractor and head office structure

Site structure and organisation

Types of contractual work tendered by companies.

LO2 Explain different types of construction companies in the market and their relationships within the tendering process

Company types:

Professional relationships between companies

Contract tendering

Tender process.

LO3 Discuss the key stages in a construction project, and how Building Information Modelling informs the different stages

Master programmes and contract planning techniques

The role of Building Information Modelling (BIM) in the construction

Modern procurement methods within construction

Sustainability.

LO4 Analyse how the construction industry has developed suitable collaboration strategies in support of greater recognition of health & safety

Key stakeholders in the construction process

BIM and collaboration

Health & safety within the construction industry:

Pre-construction regulations and legislation

Site safety.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Describe the construction industry with reference to company structures and other activities		D1 Critically evaluate how construction companies have developed their structure and business ethos
<p>P1 Explain how the construction industry has developed and encompassed professionalism within its structures</p> <p>P2 Demonstrate the scope and linkage between all parties within a construction organisation</p> <p>P3 Identify the type of contractual work tendered by contractors</p>	<p>M1 Analyse how the construction industry has developed overall in terms of company structures, it's employees and contracted work</p>	
LO2 Explain different types of construction companies within the market and their relationships within the tendering process		D2 Compare the main factors which differentiate between construction companies, contracts and tendering
<p>P4 Identify the different types of construction companies in the market</p> <p>P5 Explain the relationship between different construction organisations</p>	<p>M2 Analyse the catalyst which connects construction companies, including contracts and tendering</p>	
LO3 Discuss the key stages in a construction project, and how Building Information Modelling informs the different stages		D3 Provide a detailed analysis of how the construction industry has evolved in terms of innovative construction methods and contracts
<p>P6 Identify, with examples, modern construction processes and sequences used within today's industry, highlighting the way they respond to sustainability needs</p> <p>P7 Explain contract planning techniques used within micro and macro projects</p> <p>P8 Identify where BIM impacts upon operations and construction companies</p>	<p>M3 Analyse how construction has developed in terms of innovation, designs, and within contracts for micro and macro projects, and the interrelationship with BIM</p>	

Pass	Merit	Distinction
<p>LO4 Analyse how the construction industry has developed suitable collaboration strategies in support of greater recognition of health & safety</p>		<p>D4 Evaluate the impact of health & safety legislation, how it has evolved the drivers for it, and its advantages or weaknesses within construction</p>
<p>P9 Explain how health & safety has now become an integrated part of the construction process</p> <p>P10 Describe the government legislation which has benchmarked health & safety within construction</p> <p>P11 Discuss the role of collaboration and communication in ensuring safe working practices</p>	<p>M4 Demonstrate how the construction industry has benefited through changes in health & safety legislation</p>	

Recommended Resources

Textbooks

GRIFFITH, A. and WATSON, P. (2003) *Construction Management: Principles and Practice*. Hampshire: Palgrave Macmillan.

HARRIS, F. and MCCAFFER, R. (2013) *Modern Construction Management*. Chichester: Wiley-Blackwell.

KYMMELL, W. (2007) *Building Information Modeling: Planning and Managing Construction Projects*. New York: McGraw Hill Professional.

OTTOSSON, H. (2012) *Practical Project Management for Building and Construction*. Boca Raton: CRC Press.

Websites

www.ciob.org.uk Chartered Institute of Building
(General Reference)

www.rics.org Royal Institute of Chartered
Surveyors (General Reference)

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 4: Construction Practice & Management

Unit 22: Group Project (Pearson-set)

Unit 52: Principles of Housing Economics

Unit 14: Building Information Modelling

Unit code	M/615/1400
Unit level	4
Credit value	15

Introduction

The aim of this unit is to provide students with the background knowledge and understanding of Building Information Modelling (BIM) in the context of the construction industry. Students will be introduced to the drivers and benefits associated with BIM, as well as the terminology which surrounds BIM.

Topics included in this unit are: the relationship between design, construction and operation, and the relevance of information management in regard to BIM and how these concepts influence the entire process of the way an asset is managed and maintained.

The knowledge and skills gained in this unit will allow students to understand the importance of Building Information Modelling in the context of current roles and responsibilities that exist within the construction industry, and effectively understand how this may influence future choices in their professional career.

Learning Outcomes

By the end of this unit students will be able to:

1. Discuss the term Building Information Modelling in the context of local, national and global developments in the construction industry
2. Describe the basic concepts surrounding Building Information Modelling
3. Discuss the differences in purpose between Building Information Modelling and its associated outcomes, and traditional forms of construction information
4. Assess ways in which the design and construction process of an asset influences the way that asset is managed and maintained.

Essential Content

LO1 **Discuss the term Building Information Modelling (BIM) in the context of local, national and global developments in the construction industry**

Definition of the term Building Information Modelling

Key terms and definitions that relate to BIM

The differences between traditional methods and a BIM-enabled process

The importance of BIM in the context of the construction industry

The importance of BIM in a global context and the need to export skills

Construction processes that support BIM and how they can save on time and cost

BIM across an asset lifecycle

Managing construction information during across the life of a BIM-enabled project

BIM terminology and abbreviations

LO2 **Describe the basic concepts surrounding Building Information Modelling**

The basic principles of BIM

BIM dimensions: 3D, 4D, 5D, 6D

BIM maturity levels and guidance toward determining how to achieve BIM Level 2

Standards supporting BIM and an overview of other supporting documentation

Technology that supports BIM

The importance of collaborative working in regard to BIM

Information management and BIM

Information delivery and Processes that effectively support BIM

The exchange of information across a project lifecycle

The creation of BIM data: how, why and what

Sharing BIM data effectively

Managing data across differing stages of a project

LO3 Discuss the differences in purpose between Building Information Modelling and its associated outcomes, and traditional forms of construction information

The differences between traditional methods and a BIM-enabled process

The main benefits of BIM

Challenges of BIM

Drivers that support BIM

Enablers of BIM

Waste and inefficiency

Government drivers that support BIM within the wider context

Stakeholder engagement and BIM

Commercial arrangements and BIM

Risks associated to project or organisational BIM implementation

Return on investment and benchmarking across a BIM project

LO4 Assess ways in which the design and construction process of an asset influences the way that asset is managed and maintained

How Building Information Modelling can aid in the design, construction and operation of an asset

The difference between constructing and managing an asset

Whole life vs capital investment

The term Asset Information Model and its relationship to the project information

Updating information effectively for handover of an asset to a facilities management team

Storing, sharing and archiving data through all stages of a project

Managing data effectively to aid in the operational functions

The difference between capital expenditure and operational expenditure, and the difference between the two

Maintenance and operation

Consolidating information effectively across the in-use stages of a project

Roles and responsibilities associated with BIM

Challenges, changes and management

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
<p>LO1 Discuss the term Building Information Modelling in the context of local, national and global developments in the construction industry</p>		<p>D1 Critically analyse the impact of Building Information Modelling on the construction industry and how it can positively affect both the capital and operational phase of a facility</p>
<p>P1 Explain the term Building Information Modelling and how it relates to the construction industry</p> <p>P2 Discuss the key terms and definitions in regard to Building Information Modelling</p>	<p>M1 Analyse the importance of Building Information Modelling in the construction industry</p> <p>M2 Analyse the way that key terms and consistency of these terms should inform all members of a project team</p>	
<p>LO2 Describe the basic concepts surrounding Building Information Modelling</p>		<p>D2 Critically evaluate and create a BIM Execution Plan and understand how BIM Dimensions can influence various elements of a building project</p>
<p>P3 Discuss the key themes surrounding BIM</p> <p>P4 Explain the terms that support BIM Dimensions on a project</p>	<p>M3 Analyse ways in which BIM can be utilised on a building project</p>	

Pass	Merit	Distinction
<p>LO3 Discuss the differences in purpose between Building Information Modelling and its associated outcomes, and traditional forms of construction information</p>		<p>LO3 LO4</p>
<p>P5 Explore the key differences between traditional and Building Information Management (BIM) related processes in relation to construction</p> <p>P6 Discuss how collaborative working can aid and support a BIM process</p>	<p>M4 Analyse how BIM can inform a project outcome for the design team over and above traditional methods</p>	<p>D3 Assess how a BIM-enabled process can result in positive outcomes for an asset owner, over and above traditional methods</p>
<p>LO4 Assess ways in which the design and construction process of an asset influences the way that asset is managed and maintained</p>		
<p>P7 Explain how information is created, managed and used through various stages of a project</p> <p>P8 Explain the roles that are required as part of a BIM-enabled project and how they aid in the development of the project at all stages</p>	<p>M5 Analyse ways in which BIM information is used, shared and managed</p> <p>M6 Evaluate the roles required to successfully deliver a BIM project</p>	

Recommended Resources

Textbooks

EASTMEN, C., TEICHOLZ, P., SACKS, R. and LISTON, K. (2011) *BIM handbook: A Guide to Building Information Modelling for Owners, Managers, Designers, Engineers and Contractors*. 2nd ed. Hoboken, New York: John Wiley and Sons Inc.

FAIRHEAD, R. (2013) *Information Exchanges: RIBA Plan of Work 2013 Guide*. London: RIBA Publishing.

HOLZER, D. (2016) *The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering and Construction*. Hoboken, New Jersey: John Wiley and Sons Inc.

MORDUE, S., PHILP, D. and SWADDLE, P. (2015) *Building Information Modelling for Dummies*. Hoboken, New Jersey: John Wiley and Sons Inc.

SAXON, R. (2016) *BIM for Construction Clients*. London: RIBA Publishers.

SHEPHERD, D. (2015) *BIM Management Handbook*. London: RIBA Publishers.

Websites

www.theb1m.com

The B1M
(General Reference)

www.bimtaskgroup.org

The BIM Task Group
(General Reference)

www.bimtaskgroup.org

The BIM Task Group
'COBie UK 2012'
(General Reference)

www.thenbs.com

NBS
'BIM (Building Information Modelling)'
(General Reference)

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 2: Construction Technology

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 16: Principles of Alternative Energy

Unit code	A/615/1402
Unit level	4
Credit value	15

Introduction

Buildings use about 40% of global energy, 25% of global water and 40% of global resources in their construction and operation. Governments around the world have recognised the importance of tackling energy consumption in the built environment, and have instituted legislation to address these issues. These have often been supported by financial incentives to implement alternative energy systems and processes. They are also governed by rigorous targets and deadlines. Technologies that harness solar, wind and hydro energy are now established systems for generating power and heat. Along with other innovations such as heat pumps and bio-fuel, these are often incorporated into the design for new construction projects.

The aim of this unit is to develop the students' knowledge of current and future energy technologies and to apply that knowledge in analysis and assessment of its effectiveness. Students will also be called upon to apply that knowledge and research to a design activity.

On successful completion of this unit students will be able to research and design alternative energy systems and assess new technologies available to the construction industry.

Learning Outcomes

By the end of this unit students will be able to:

1. Discuss types of alternative energy system, and how they differ from common systems in use today
2. Evaluate the factors that inform the selection of a renewable energy system in relation to a specific installation
3. Present a strategy for a cost effective upgrade to an existing building, utilising an appropriate form of alternative energy
4. Describe ways in which different forms of alternative energy address broader environmental issues and provide sustainable solutions.

Essential Content

LO1 **Discuss types of alternative energy system, and how they differ from common systems in use today**

Existing technologies:

Photovoltaic systems

Wind turbines

Hydro-electrical systems

Combined heat and power

Heat pumps

Solar heating

Biomass

Water re-use.

Advances in construction, installation and maintenance of renewable energy hardware:

Robotics, used for installation, maintenance and optimisation

Optical furnaces, printable solar panels

Liquid metal batteries

Advances in wave power

Sun-tracking solar cells, solar energy harvesting from space

Hydrogen cell technology.

LO2 **Evaluate the factors that inform the selection of a renewable energy system in relation to a specific installation**

External factors:

Effects of weather, light availability and quality

Presence of natural resources needed to drive the system

Political and aesthetic factors, local feeling, planning permissions, regulatory issues.

Technical and design factors:

Client requirements, building structure, access, power output (both electrical and heating), electrical and mechanical components and regulatory requirements.

Cost factors:

Tariffs and tariff calculations, alternative energy installation costs vs cumulative savings.

LO3 Present a strategy for a cost effective upgrade to an existing building, utilising an appropriate form of alternative energy

Monitoring:

Methods of monitoring cost, developing a cost-to-saving paradigm

Methods of monitoring the energy production and savings for the scheme.

Data gathering:

Customer requirements, specification, method statement, project planning.

Installation:

Installation methods for renewable systems.

LO4 Describe ways in which different forms of alternative energy address broader environmental issues and provide sustainable solutions

Political:

Kyoto Agreement, global targets, regional targets, carbon trading.

Environmental:

Effects of CO₂ emissions, greenhouse effect, waste products and management, health issues.

Sustainability:

Projections for availability of non-renewable resources

Hidden sustainability and environmental cost of renewables: manufacture, transportation, installation.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Discuss types of alternative energy system, and how they differ from common systems in use today		D1 Analyse current and advanced renewable technologies, evaluating their effectiveness and impact on the environment as compared to existing non-renewable technologies
<p>P1 Explain the operating principles and purpose of the main types of renewable energy technology in current use</p> <p>P2 Compare renewable technologies to existing non-renewable energy systems</p>	<p>M1 Analyse the operating principles, and environmental impact of, existing and advanced renewable technologies</p>	
LO2 Evaluate the factors that inform the selection of a renewable energy system in relation to a specific installation		LO2 LO3 D2 Critically evaluate the reduction of environmental impact of a project, based on the selection of an alternative energy solution
<p>P3 Evaluate the factors affecting the selection of a renewable energy system</p> <p>P4 Describe advances in renewable energy technology and how they meet the needs of a specific installation</p>	<p>M2 Justify the selection of a renewable energy system</p>	
LO3 Present a strategy for a cost effective upgrade to an existing building, utilising an appropriate form of alternative energy		
<p>P5 Select appropriate renewable technology system for an existing building</p> <p>P6 Present a strategy, for an existing building, to integrate a form of alternative energy</p>	<p>M3 Justify design decisions based on external, cost and design factors</p>	

Pass	Merit	Distinction
LO4 Describe ways in which different forms of alternative energy address broader environmental issues and provide sustainable solutions		D3 Analyse how specific renewable technologies meet the requirements of environmental initiatives such as the Kyoto Protocol, carbon trading and global and local government targets
P7 Describe ways alternative energy technology addresses broader environmental issues	M4 Compare how different environmental technologies address broader environmental and sustainability issues	

Recommended Resources

Textbooks

DUFFY, A, ROGERS, M. and AYOMPE, L. (2015) *Renewable Energy and Energy Efficiency: Assessment of Projects and Policies*. 1st ed. Chichester: John Wiley & Sons.

GRINNELL, S. (2016) *Renewable Energy & Sustainable Design*. 1st ed. Boston: Cengage.

TWIDELL, J. and WEIR, T. (2015) *Renewable Energy Resources*. 3rd ed. Abingdon: Routledge.

Websites

www.altenergy.org Alternative Energy
(General Reference)

www.therenewableenergycentre.co.uk The Renewable Energy Centre
(General Reference)

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 40: Alternative Energy Systems Design & Installation

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 22: Group Project (Pearson-set)

Unit code	D/615/1408
Unit type	Core
Unit level	5
Credit value	30

Introduction

While working in a team is an important skill in construction projects, collaboration goes beyond just teamwork. The success of a project relies not only on the ability of each person in a team to do their work, but on each individual's awareness of how their work relates to the work of others, how to ensure that information is shared effectively and that roles and responsibilities are clear.

Through this collaborative project-based unit, students will explore how to define roles within a collaborative team, recognising the skills (and 'skills gaps') of each member of the group. Together students will work to develop a construction project; based on their research and analysis, in response to the Pearson-set 'theme'.

Content in this unit will typically include role identification and allocation, collaborative structures, human resources management, project management, procurement, tender documentation, information/data sharing, meetings, health & safety, project costing and Building Information Modelling.

***Please refer to the accompanying Pearson-set Assignment Guide and the Theme Release document for further support and guidance on the delivery of the Pearson-set unit.**

Learning Outcomes

By the end of this unit students will be able to:

1. Assess individual and group skills in order to allocate roles within a collaborative team
2. Plan a construction project, based on the Pearson-set theme, in collaboration with others to ensure good practice in resource management, staffing and project scheduling
3. Prepare tender documentation; undertaking work appropriate to a defined role within a team
4. Evaluate own work, and the work of others, in a collaborative team.

Essential Content

LO1 **Assess individual and group skills in order to allocate roles within a collaborative team**

Roles and responsibilities:

Skills auditing

Belbin Team Inventory

Myers Briggs Personality Type Indicator.

Human resources management:

Core job dimensions (skill variety, task identity, task significance, autonomy, feedback)

Job design (job rotation, job enlargement, etc.).

LO2 **Plan a construction project, based on the Pearson-set theme, in collaboration with others to ensure good practice in resource management, staffing and project scheduling**

Project planning:

Setting goals

Defining 'deliverables'

Task definition

Identifying risks/risk management

Communications planning.

Resource management:

Human resources

Physical resources

Supply chain

Waste management.

Project scheduling:

Scheduling tools

Milestones

Blocks.

LO3 Prepare tender documentation; undertaking work appropriate to a defined role within a team

Tender documentation:

Construction drawings

Specifications

Schedules of work

Cost plan

Health and safety legislation

Building Information Modelling.

LO4 Evaluate own work, and the work of others, in a collaborative team

Reflective practice:

Schön's 'The Reflective Practitioner'

Gibbs's 'Reflective Cycle'

Reflection vs Description.

Reflection in practice:

Project lifecycle

Post implementation review.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Assess individual and group skills in order to allocate roles within a collaborative team		D1 Justify the allocation of roles and responsibilities within a team, recognising individual skills and ambitions vs project requirements
P1 Evaluate own skills and the skills of others through skills auditing and review P2 Develop role descriptions and responsibilities within a team	M1 Discuss the allocation of roles within a collaborative team to meet overall project needs	
LO2 Plan a construction project, based on the Pearson-set theme, in collaboration with others to ensure good practice in resource management, staffing and project scheduling		LO2 LO3 D2 Critically evaluate the relationships between project planning and tender documentation, highlighting ways in which tender information responds to project planning
P3 Develop a project plan to ensure successful achievement of completed project P4 Illustrate resource planning (both physical and human) as well as time planning	M2 Interpret events and activities in a project plan in order to indicate milestones, and risks	
LO3 Prepare tender documentation; undertaking work appropriate to a defined role within a team		
P5 Develop construction drawings and specifications P6 Prepare a cost plan P7 Produce a pre-construction health & safety method statement	M3 Evaluate the ways in which Building Information Modelling can provide greater efficiency in collaborative preparation of tender documentation	
LO4 Evaluate own work, and the work of others, in a collaborative team		D3 Critically evaluate the success of a project by considering individual and group working practices in relation to assigned roles and personality profiles
P8 Undertake a continual review of their own work, recording this throughout the project P9 Evaluate their own working practices in relation to that of other members of the team, identifying areas of good practice	M4 Evaluate their own personality profile in relation to your working practices	

Recommended Resources

Textbooks

- BALDWIN, A. (2014) *Handbook for Construction Planning and Scheduling*, London: Wiley-Blackwell.
- BELBIN, M. (2010) *Team Roles at Work*. London: Taylor & Francis.
- BENNETT, J. and PEACE, S. (2006) *Partnering in Construction: A Code of Practice for Strategic Collaborative Working*. Abingdon: Butterworth-Heinemann.
- BOUCLAGHEM, D. (2011) *Collaborative Working in Construction*. London: Spon Press.
- CIOB (2010) *Guide to Good Practice in the Management of Time in Complex Projects*. 3rd ed. Chichester, West Sussex: John Wiley & Sons.
- DAINTY, A. and LOOSEMORE, M. (ed.) (2012) *Human Resource Management in Construction: Critical Perspectives*. Abingdon: Routledge.
- KELLY, J. and MALE, S. (1992) *Value Management in Design and Construction: The Economic Management of Project*. London: Taylor & Francis.
- MYERS, S. and CHILDS, R. (2016) *Understanding Team Roles*. London: Nielson Book Services Limited.
- POTTS, K. and ANKRAH, N. (2014) *Construction Cost Management: Learning from Case Studies*. London: Routledge.
- WYATT, D. (2007) *Construction Specifications: Principles and Applications*. New York: Delmar.

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 14: Building Information Modelling

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 36: Advanced Building Information Modelling

Unit code	L/615/1422
Unit level	5
Credit value	15

Introduction

The aim of this unit is to provide students with an understanding of the detailed processes that support and guide construction professionals within the context of Building Information Modelling (BIM). Students will be able to explore the relevance of BIM in the construction industry and understand how the standards and processes that support BIM will enable better information management across the life of a project.

This unit will also explore and detail the relevant changes to existing documentation and information within a project and how this information is developed across the various stages of a project. There are a series of standards that support BIM and students will begin to determine their relevance and utilise them within a BIM process.

The knowledge and skills provided within this unit will enable students to understand the context of BIM within the construction industry and relate this to further study or the realities of today's workplace. This will enable them to be able to effectively determine the relevance of BIM within the construction industry today and how this may affect future processes.

Learning Outcomes

By the end of this unit students will be able to:

1. Evaluate the processes and procedures that are required in order to successfully implement BIM within the context of an organisation or a project
2. Explore BIM standards and how these support working in the context of a BIM-enabled project
3. Discuss key documentation that may be required for a BIM-enabled project
4. Assess how BIM can ensure data is created, shared, stored, managed and kept accessible to all stakeholders involved in a project.

Essential Content

LO1 Evaluate the processes and procedures that are required in order to successfully implement BIM within the context of an organisation or a project

BIM implementation methodologies available and how these can begin to positively affect the process of design, construction and operation

Identifying organisational or project-specific capability in regard to BIM and how this can be achieved

Implementing BIM within the context of an organisation; drivers and enablers

Implementing BIM within the context of a project; project specific requirements and information requirements

Roles and responsibilities that support BIM working and driven by industry

Managing the exchange of information during all key stages of a project and into occupation of the asset

The importance of information management

Change management principles, both organisational and project-specific.

LO2 Explore BIM standards and how these support working in the context of a BIM-enabled project

Explain how standards are used to allow for a consistent framework on a BIM-enabled project

Explain and list the relevant BIM standards that support BIM in the context of the UK and determine how they can be utilised during a project

Understand the importance of managing the BIM process via guidance by industry standards

The Information Delivery Cycle in the context of PAS 1192-2 or other international standards

Standards that support BIM, both regional and international

The importance of data drops and information exchanges

Security and management of sensitive information surrounding BIM

COBie and BIM; the importance of a consistent framework to share relevant data across a project lifecycle

Asset management and BIM

Facilities management and BIM

Commercial suite of documents supporting BIM (e.g. BIM protocol, BIM and IP and the role of information management).

LO3 Discuss key documentation that may be required for a BIM-enabled project

Understanding the Organisational Information Requirements and their relevance to particular project needs

The Asset Information Requirements that relate to the organisation

The importance of a clearly defined set of Employer's Information Requirements

The terminology surrounding information required within a Built Asset Security Strategy

A BIM Execution Plan

Project Execution Planning and management

The Project Information Model

The Asset Information Model

The importance of contracts and legal requirements in regard to BIM.

LO4 Assess how BIM can ensure data is created, shared, stored, managed and kept accessible to all stakeholders surrounding a project

Validation of data across varying stages of a project and ensuring the information gathered is adequate and correct

Supply chain assessment and skill requirements

Proof of capability and BIM

The standards, methods and procedures that support BIM

Structure of file formats, naming and types

The importance of a Common Data Environment

The Master Information Delivery Plan

Design responsibilities and level of definition

Understanding how to manage a Digital Plan of Work.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
<p>LO1 Evaluate the processes and procedures that are required in order to successfully implement BIM within the context of an organisation or a project</p>		<p>LO1 LO2</p> <p>D1 Critically analyse the importance of a BIM implementation plan that assesses the capability of the organisation in regard to BIM and how effective information delivery can support this in the context of a project</p>
<p>P1 Evaluate the variety of BIM implementation methods that can be undertaken in regard to a project</p> <p>P2 Evaluate the importance of people, processes and technology in regard to BIM implementation</p>	<p>M1 Analyse an example of how BIM can be implemented within an organisation</p>	
<p>LO2 Explore BIM standards and how these support working in the context of a BIM-enabled project.</p>		
<p>P3 Discuss how the use of standards can provide a consistent framework for the implementation of BIM and BIM-enabled systems</p> <p>P4 Evaluate key BIM standards that are recognised globally</p>	<p>M2 Review BIM standards and how these are affecting BIM on a global scale</p>	
<p>LO3 Discuss key documents that may be required for a BIM-enabled project</p>		<p>LO3 LO4</p> <p>D2 Analyse how the use of key documents and processes enabled by these documents can ensure that information is developed and managed intelligently as part of a BIM-enabled project</p>
<p>P5 Discuss the Asset Information Model and how it can be managed and utilised</p> <p>P6 Evaluate the BIM Execution Plan and the importance of ensuring it is clear, concise and easily understood by all members of the design team</p>	<p>M3 Analyse the importance of a BIM Execution Plan and explain how this document is managed, updated and utilised within a BIM project</p>	

Pass	Merit	Distinction
<p>LO4 Assess how BIM can ensure data is created, shared, stored, managed and kept accessible to all stakeholders surrounding a project</p>		
<p>P7 Discuss the term 'Level of Definition' in the context of BIM</p> <p>P8 Assess the importance of defining clear roles and role requirements regarding a BIM project</p>	<p>M4 Analyse the recommended roles and requirements needed in the context of BIM and how these will ultimately aid the development of a project at all stages</p>	

Recommended Resources

Textbooks

EASTMEN, C., TEICHOLZ, P., SACKS, R. and LISTON, K. (2011) *BIM handbook: A Guide to Building Information Modelling for Owners, Managers, Designers, Engineers and Contractors*. 2nd ed. Oxford: John Wiley and Sons Inc.

FAIRHEAD, R. (2013) *Information Exchanges: RIBA Plan of Work 2013 Guide*. London: RIBA Publishing.

HOLZER, D. (2016) *The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering and Construction*. Oxford: John Wiley and Sons Inc.

MORDUE, S., PHILP, D. and SWADDLE, P. (2015) *Building Information Modelling for Dummies*. Oxford: John Wiley and Sons Inc.

SAXON, R. (2016) *BIM for Construction Clients*. London: RIBA Publishing.

SHEPHERD, D. (2015) *BIM Management Handbook*. London: RIBA Publishing.

Websites

www.theb1m.com

The B1M
(General Reference)

www.bimtaskgroup.org

The BIM Task Group
(General Reference)

www.bimtaskgroup.org

The BIM Task Group
'COBie UK 2012'
(General Reference)

www.thenbs.com

NBS
'BIM (Building Information
Modelling'
(General Reference)

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 22: Group Project (Pearson-set)

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 40: Alternative Energy Systems Design & Installation

Unit code	D/615/1425
Unit level	5
Credit value	15

Introduction

The demand for energy – to run electrical devices, heat and cool buildings, and maintain industry – continues to grow and places considerable strain on the natural environment. The pressures of supporting economic growth, while seeking to minimise our environmental impact, has driven the research and development of new sources of energy.

The objective of this unit is to provide students with the knowledge and skills necessary to implement suitable alternative energy technologies and understand their economic, social and environmental benefit within a broader context.

Topics covered in this unit will include: energy systems, solar power systems, energy conservation, passive solar heating, wind energy, ocean energy technologies, hydro and micro-hydro turbines, geothermal energy, air pollution abatement, carbon dioxide sequestration and carbon trading economics.

On successful completion of this unit students will be in a position to be able to assist senior colleagues with alternative energy system design and installation. In addition, students will have the advanced knowledge and skills to progress to a higher level of study.

Learning Outcomes

By the end of this unit students will be able to:

1. Calculate a load duration curve from given data relating to a supply situation
2. Evaluate the principles that underpin the design and installation of alternative methods of power generation and distribution
3. Discuss the social, political, environmental and economic factors related to alternative energy systems
4. Report on the selection of an alternative energy scheme for a given context.

Essential content

LO1 Calculate a load duration curve from given data relating to a supply situation

Calculate the load factor and diversity factor from load curves

Determine a suitable cost of energy

Deduce the load duration curve from the load curve.

LO2 Evaluate the principles that underpin the design and installation of alternative methods of power generation and distribution

Solar power

Passive solar heating

Wind energy technology

Ocean energy technology

Hydroelectric and micro-hydro turbine power

Geothermal energy

Combined heat and power (CHP)

District energy.

LO3 Discuss the social, political, environmental and economic factors related to alternative energy systems

Global warming:

Climatic and atmospheric changes

Air pollution abatement

Carbon dioxide sequestration and carbon trading economics

National policies

International agreement/targets.

LO4 Report on the selection of an alternative energy scheme for a given context

Building types and their needs

Technical aspects

Economical aspects

Social aspects

Environmental aspects.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Calculate a load duration curve from given data relating to a supply situation		LO1 LO2 D1 Define a strategy for alternative power generation, based on optimal load duration
P1 Calculate and draw typical load and load duration curves from given data relating to a supply situation	M1 Illustrate changes in load, over time, for varying supply situations	
LO2 Evaluate the principles that underpin the design and installation of alternative methods of power generation and distribution		
P2 Analyse a given energy generation system in order to define an installation strategy P3 Discuss the installation requirements of a given alternative energy generation system	M2 Compare different systems of power generation in order to select a suitable system	
LO3 Discuss the social, political, environmental and economic factors related to alternative energy systems		LO3 LO4 D2 Justify the selection of an alternative energy system, for a given context, which recognises the social, political and economic factors that influence the selection process
P4 Discuss the ways in which social, political and economic factors influence the discourse around the environment and alternative energy	M3 Evaluate the ways in which global warming and carbon emissions impact on the adoption of alternative energies	
LO4 Report on the selection of an alternative energy scheme for a given context		
P5 Specify an alternative energy generation scheme for a given context P6 Illustrate an alternative energy scheme for a given context, highlighting the key factors informing the selection	M4 Present a comparison of different alternative energy systems in support of the decision for a selected system	

Recommended Resources

Textbooks

GEKIVORKIAN, P. (2010) *Alternative Energy Systems in Building Design*. London: McGraw-Hill.

GREENSOURCE (2008) *The Magazine of Sustainable Design Emerald Architecture: Case Studies in Green Building*. London: McGraw-Hill.

HASELBACH, L. (2010) *The Engineering Guide to LEED – New Construction: Sustainable Construction for Engineers*. London: McGraw-Hill.

LUCKETT, K. (2009) *Green Roof Construction and Maintenance*. London: McGraw-Hill.

MELAVER, M. and MUELLER, P. (2009) *The Green Building Bottom Line: The Real Cost of Sustainable Building*. London: McGraw-Hill.

NICHOLS, A. and LAROS, J. (2009) *Inside the Civano Project: A Case Study of Large-Scale Sustainable Neighborhood Development*. London: McGraw-Hill.

TWIDELL, J. and WEIR, T. (2005) *Renewable Energy Resources*. 2nd ed. London: Routledge.

YUDELSON, J. (2008) *Green Building Through Integrated Design*. London: McGraw-Hill.

YUDELSON, J. (2009) *Greening Existing Buildings*. London: McGraw-Hill.

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 16: Principles of Alternative Energy

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 50: Housing Design & Specification

Unit code	Y/617/1236
Unit level	4
Credit value	15

Introduction

The success of any project relies on the development of a good design and the technical information to allow the project to be built. The aim of this module is to provide the student with an appreciation and awareness of the design process and the information required to communicate the design itself, specify and quantify materials, provide instructions for the assembly and erection, and facilitate precise costing and project management.

Topics included in this module are: construction drawing, detailing, Computer Aided Design (CAD), Building Information Modelling (BIM), schedules, specifications, bills of quantities, information collaboration.

On successful completion students will be able to analyse scenarios, make decisions and produce drawings and specifications to achieve appropriate, creative and innovative home design proposals.

Learning Outcomes

By the end of this unit students will be able to:

1. Discuss the stages of a design process and the types of information required to communicate, share and manage the project process
2. Explain a construction project through analysis of different types of construction information
3. Produce construction drawings, details, schedules and specifications in support of a housing project
4. Present a construction information package, highlighting the coordination between different elements to ensure accuracy.

Essential Content

LO1 Discuss the stages of a design process and the types of information required to communicate, share and manage the project process

Design criteria:

Housing standards

Multiple/single occupancy

Ownership (e.g. Private, social, rental, affordable housing, housing association, cooperative)

Environment/sustainability.

Design process:

Concept design

Design development

Detail design

Construction information

As-built.

Project process:

Feasibility

Design

Construction information

Statutory requirements (e.g. planning permissions, health & safety, building regulations)

Site operations

Variations/architect's instructions

On-site design

Handover

Post-occupancy.

Construction information:

Drawings (e.g. sketches, construction drawings, CAD)

Models

physical models, digital models, BIM data

Specifications

Schedules.

Information sharing:

CAD formats

BIM models

Digital collaboration systems.

LO2 Explain a construction project through analysis of different types of construction information

Information coordination

Clash detection

Specification coordination

LO3 Produce construction drawings, details, schedules and specifications in support of a housing project

Construction drawings:

Site drawings

General arrangement drawings

Consultant Information

Details.

Specifications:

Preliminaries ('Prelims')

Specification types (e.g. outline specification, performance specification, etc.)

Specification sections

Schedules:

Door schedules, window schedules, fixtures/fittings schedules
Schedule of Works.

Statutory information:

Pre-design health & safety plan
Planning applications
Permitted developments
Party Wall Act
Building Regulations.

LO4 Present a construction information package, highlighting the coordination of information between different project stakeholders to ensure accuracy

Project roles/stakeholders:

Client
User/occupier
Architects
Engineers (e.g. structural, mechanical, etc.)
Contractors
 Sub-contractors
Project Managers
Contract Managers
Cost Consultants/Quantity Surveyors
Suppliers
Manufacturers.

Project relationships:

Contractual relationships
Professional collaboration
 Information sharing
 Information management
 Procedures
 Systems.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
<p>L01 Discuss the stages of a design process and the types of information required to communicate, share and manage the project process</p>		<p>L01 L02</p> <p>D1 Critically evaluate the relationship between design and project stages, highlighting the processes and procedures to ensure information accuracy throughout</p>
<p>P1 Describe the stages and activities of a building design process</p> <p>P2 Explain the types of information required throughout the different stages of a project process</p>	<p>M1 Evaluate the relationship between design and project stages and the information sharing requirements in each</p>	
<p>L02 Explain a construction project through analysis of different types of construction information</p>		
<p>P4 Explain construction information to ascertain the requirements of a building project</p> <p>P5 Outline the relationships between drawings, schedules and specifications</p>	<p>M2 Evaluate the importance of clash detection and information coordination</p>	
<p>L03 Produce construction drawings, details, schedules and specifications in support of a housing project</p>		<p>L03 L04</p> <p>D2 Present a critical analysis of construction information, in relation to their coordination and accuracy</p>
<p>P6 Create construction drawings and details using industry-standard tools and techniques</p> <p>P7 Produce specifications and schedules for a given housing project</p>	<p>M3 Prepare specification prelims and schedule of works, in coordination with construction drawings and details</p>	

Pass	Merit	Distinction
<p>LO4 Present a construction information package, highlighting the coordination of information between different project stakeholders to ensure accuracy</p>		
<p>P8 Present construction information to an audience of specialists and non-specialists</p> <p>P9 Explain the coordination and information sharing between different roles and stakeholders in a construction project</p>	<p>M4 Analyse the ways in which different forms of contractual relationships between stakeholders influence flow of information in a construction project</p>	

Recommended Resources

Textbooks

- BELBIN, M. (2010) *Team Roles at Work*. 2nd ed. London: Routledge.
- BUSSEY, P. (2015) *A Practical Guide for Architects and Designers*. London: RIBA Publishing.
- CHING, F.D.K. (2014) *Building Construction Illustrated*. 4th ed. Hoboken, New Jersey: John Wiley & Sons.
- CHUDLEY, R. (2016) *Building Construction Handbook*. 4th ed. London: Routledge.
- CIBSE (2015) *CIBSE Guide A: Environmental Design*. 8th ed, London: CIBSE.
- Construction Specifications Institute (2011) *The CSI Construction Specification Guide*. Hoboken, New Jersey: John Wiley & Sons.
- HUTH, M. (2014) *Understanding Construction Drawings*. 6th ed. Clifton Park, New York: Delmar.
- KALIN, M. and WEYGANT, R.S. (2010) *Construction Specification Writing: Principles and Procedures*. 6th ed. Hoboken, New Jersey: John Wiley & Sons.
- LAWSON, B. (2005) *How Designers Think: The Design Process Demystified*. London: Routledge.
- MURRAY, M. and LANGFORD, D. (2004) *Architects Handbook for Construction*. London: RIBA Publishing.
- WYATT, D. (2007) *Construction Specifications: Principles and Applications*. Clifton Park, New York: Delmar.

Websites

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| www.designingbuildings.co.uk | Designing Buildings
(General Reference) |
| www.thenbs.com | The NBS
Knowledge
(General Reference) |
| www.csinet.org | Construction Specifier International
(General Reference) |
| DezeenDaily.com | Dezeen
(General Reference) |

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 16: Principles of Alternative Energy

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 40: Alternative Energy Systems Design & Installation

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 51: Principles of Off-site Construction

Unit code	D/617/1237
Unit level	4
Credit value	15

Introduction

Construction, in the 21st century, is (in the majority of cases) still carried out along the same principles as medieval construction. Large amounts of material are delivered to a building site where weather conditions and physical constraints can cause not just delays and defects but often unattractive working conditions. Off-site construction offers a range of potential benefits for increasing the efficiency, accuracy and quality of the end product.

In this unit, students will explore different approaches to off-site construction, focused on housing development and delivery. This includes modular construction, factory construction, automation and robotics, and 3D printing. Students will consider the way in which off-site processes and technologies may influence housing design and delivery.

By the end of this unit students will be able to assess potential options for off-site production, in the housing market, and develop design and manufacture strategies to enable housing delivery.

Learning Outcomes

By the end of this unit students will be able to:

1. Explain the different forms of off-site construction and how they provide potential benefits for housing production and delivery
2. Explore the ways that design is influenced by different forms of off-site construction
3. Discuss the benefits of a selected off-site construction method or technology, in relation to efficiency, sustainability and cost of housing delivery
4. Present a proposal, for off-site housing construction; highlighting the benefits of the method for quality, efficiency and cost of delivery.

Essential Content

LO1 Explain the different forms of off-site construction and how they provide potential benefits for housing production and delivery

Forms of off-site construction.

Component-based

Panelised

Unit-based.

Delivery benefits:

Affordability

Sustainability

Reduced material waste

Reduced material transport cost

Better building fabric control/tolerance.

Production benefits:

Quality control

Speed and efficiency of manufacture and assembly

Factory controlled working conditions

Health & safety

Economies of scale (e.g. labour, plant hire, material, waste, purchasing)

Automation.

LO2 Explore the ways that design is influenced by different forms of off-site construction

Non-volumetric pre-assembly:

Pre-assemble units/elements (not volumetric, do not enclose a space on their own)

Pre-assembled cladding panels

Precast concrete sections

Pre-assemble structural steelwork.

Volumetric pre-assembly:

Complete volumetric units

Factory finished units (e.g. bathroom pods, kitchen pods, plant rooms, etc.)

3-D printing.

Volumetric modular units:

Cross Laminated Timber (CLT)

Steel Framing Systems (SFS)

Re-purposing other modular units (e.g. grain silos, shipping containers, etc.).

Panelised off-site construction:

Timber framed panels

Steel framing systems

Sandwich panel systems

Pre-cast concrete panels/sections.

LO3 Discuss the benefits of a selected off-site construction method or technology, in relation to efficiency, sustainability and cost of housing delivery

Efficiency

Time on-site

Consistent and controlled quality

Economics of Scale (labour, materials, purchasing)

Waste minimisation

Safety

Greater control of working conditions

Limited time on-site (hazardous conditions).

Sustainability:

Social

Responding to changing demographics

Flexibility of housing stock

Economic

Potential for lower entry cost into housing market

Better building fabric resulting in lower operating costs

Environmental

Reduced carbon emissions

Reduced transport

More efficient use of materials

Cultural.

Cost of housing delivery:

Potential benefits of off-site construction

Speed of housing delivery

Reduced time and labour on-site

Economics of scale

Economies of multi-skilled labour

Potential challenges of off-site construction

Future labour shortage (growing skills gaps)

Factory set-up costs

Location

Access to labour.

LO4 Present a proposal, for off-site housing construction; highlighting the benefits of the method for quality, efficiency and cost of delivery

Proposal:

Site information

Greenfield, brownfield, rural, urban

Off-site method (e.g. component-based, panelised, unit-based)

Justification

Quality

Efficiency

Cost.

Presentation of proposal:

Research

Proposal

Drawings (e.g. sketches, diagrams, technical information)

Data

Presentation type (e.g. audio-visual, written report, etc.)

Audience

Specialist

Non-specialist

Feedback/reflection.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Explain the different forms of off-site construction and how they provide potential benefits for housing production and delivery		LO1 LO2 D1 Critically analyse the way in which a specific off-site construction method will support the achievement of design outcomes and cost-effective production
P1 Explore the different forms of off-site housing construction P2 Discuss the benefits of off-site construction for housing production and delivery	M1 Compare the benefits and challenges of different types of off-site housing production	
LO2 Explore the ways that design is influenced by different forms of off-site construction		
P3 Discuss the relationship between design and construction P4 Explore the way that specific off-site construction methods may influence design decisions	M2 Evaluate the merits of a specific method of off-site construction in order to support a specific design outcome	
LO3 Discuss the benefits of a selected off-site construction method or technology, in relation to efficiency, sustainability and cost of housing delivery		LO3 LO4 D2 Critically evaluate comments and feedback, in response to a presentation, to inform future off-site construction proposals
P5 Explore a given brief to select a suitable method of off-site construction P6 Discuss how the selected off-site construction method achieves efficiency, sustainability and cost effectiveness for a given brief	M3 Analyse the relationship between design, efficiency, sustainability and cost for a selected off-site construction method; in meeting a given brief	

Pass	Merit	Distinction
<p>LO4 Present a proposal, for a housing design, utilising off-site construction; highlighting the benefits of the method for quality, efficiency and cost of delivery</p>		
<p>P7 Prepare research, analysis and information necessary to support a proposal for off-site construction; in response to a given brief</p>	<p>M4 Justify a position, in response to presentation comments, through the detailed explanation of a strategy</p>	
<p>P8 Present, to a diverse audience, an off-site construction proposal; highlighting the achievement of quality, efficiency and cost effectiveness</p>		

Recommended Resources

Textbooks

COTTERALL, J. and DADEBY, A. (2012) *The Passivhaus Handbook: A Practical Guide to Constructing and Retrofitting Buildings For Ultra-Low Energy Performance*. Cambridge: Green Books.

DUFFY, A. ROGERS, M. and AYOMPE, L. (2015) *Renewable Energy and Energy Efficiency: Assessment of Projects and Policies*. London: John Wiley & Sons.

GRINNELL, S. (2016) *Renewable Energy and Sustainable Design*. Boston: Cengage.

HICKEY, T. (2014) *Designing Sustainable Homes*. Dublin: Gill & Macmillan Ltd.

LAWSON, M. OGDEN, R and GOODIER, C. (2014) *Modularisation in the Construction of Buildings*. London: Taylor & Francis Group.

SINOPOLO, J. (2009) *Smart Building Systems for Architects and Builders*. Oxford: Butterworth-Heinemann.

STIRLING, C. (2003) *Offsite Construction: An Introduction (Good Building Guide)*. London: IHS BRE Press.

Websites

www.buildoffsite.com	Build Offsite (General Reference)
www.trada.co.uk	The Timber Research and Development Association (General Reference)
offsite.lboro.ac.uk	Offsite Construction – Loughborough University (General Reference)
www.therenewableenergycentre.co.uk	The Renewable Energy Centre (General Reference)
www.icevirtuallibrary.com	Institution of Civil Engineers – Virtual Library (General Reference)

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 54: Advanced Off-site Construction

Unit 55: Future Housing Development & Prototyping

Unit 52: Principles of Housing Economics

Unit code	H/617/1238
Unit level	4
Credit value	15

Introduction

This unit is designed to support students to explore the economic factors associated with housing design, construction and development. Students will develop an awareness of the relationship between forms of housing development economic and environmental sustainability, while considering the impact of both design and construction methods on the cost and market viability of housing.

Through this unit students will establish an understanding of the complex relationship between housing, sustainability and economy. There is a particular emphasis on exploring the impact that new technologies and forms of construction may have on housing costs and housing supply.

Learning Outcomes

By the end of this unit students will be able to:

1. Discuss the political, economic, social and environmental factors that influence the housing market
2. Assess the relationship between design, sustainability, construction method and costs, in housebuilding
3. Explore strategies for housing development and delivery that address economic, social, environmental and political challenges
4. Present a housing development and delivery strategy to a diverse audience.

Essential Content

LO1 **Discuss the political, economic, social and environmental factors that influence the housing market**

Housing market:

Supply and demand

Equilibrium

Stakeholders.

Political influences:

Legislation

Taxation

 Tax credits, deductions and subsidies

 Stamp duty

Political uncertainty.

Economic influences:

Investment

Economic indicators (e.g. GDP, RPI, manufacturing activity, employment statistics)

Economic subsidies

Interest rates.

Social influences:

Demographic changes

Social trends

Attitudes.

LO2 **Assess the relationship between design, sustainability, construction method and costs, in housebuilding**

Design/typology:

Single family residential

Multiple occupancy residential

Supported living.

Sustainability:

Material

Energy

Carbon emissions

Waste management

Health and wellbeing

Economic

Infrastructure.

Construction methods:

Traditional 'wet' trades

Non-traditional (e.g. off-site, manufactured, automated, etc.).

LO3 Explore strategies for housing development and delivery that address economic, social, environmental and political challenges

Development:

Private development

Institutional development

Social

Affordable housing

Sites (e.g. green field, brown field, urban, etc.)

Redevelopment/refurbishment/renovation.

Delivery models:

Procurement (e.g. traditional, design and build, management contract, etc.)

Legislative processes

 Planning/zoning

 Building regulations

 Health & safety

 Construction Design Management (CDM).

LO4 Present a housing development and delivery strategy to a diverse audience

Strategy:

Market demand

Location

Housing type

Economic conditions

Development model

Delivery model.

Presentation:

Type (e.g. audio-visual, written report, etc.)

Audience (e.g. professional, non-professional, etc.).

Feedback and reflection

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Discuss the political, economic, social and environmental factors that influence the housing market		LO1 LO2 D1 Critically analyse the relationship between the housing market and the design of housing available; highlighting the way that available designs respond to political, social and environmental challenges
P1 Explain what is meant by, and the key features of, the housing market P2 Discuss the influence of political, economic and social factors on the housing market	M1 Evaluate the relative impact of fluctuations in local and national economies on the housing market	
LO2 Assess the relationship between design, sustainability, construction method and costs, in housebuilding		
P3 Discuss how different housing design approaches respond to sustainability and cost P4 Assess the relationship between construction method and cost in housebuilding	M2 Illustrate the ways that changes in cost, construction method and design may address questions of sustainability	

Pass	Merit	Distinction
<p>L03 Explore strategies for housing development and delivery that address economic, social, environmental and political challenges</p>		<p>L03 L04</p> <p>D2 Critically evaluate a housing development and delivery strategy; that responds to political, social and environmental challenges, reflecting on feedback and comments</p>
<p>P5 Explore different models of residential development, in order to identify their benefits and challenges</p> <p>P6 Assess the ways that different delivery models, and procurement methods, result from approaches to economic, social and environmental challenges</p>	<p>M3 Analyse the way that legislative processes impact on housing development</p>	
<p>L04 Present a housing development and delivery strategy to a diverse audience</p>		
<p>P7 Evaluate a given brief to develop a strategy for housing development</p> <p>P8 Present a housing development and delivery strategy, in response to a given brief</p>	<p>M4 Justify a housing and development strategy, based on clear data and feasibility studies</p>	

Recommended Resources

Textbooks

- BALDWIN, A (2014) *Handbook for Construction Planning and Scheduling*. London: Wiley-Bakewell.
- GRIFFITH, A. (2011) *Integrated Management Systems For Construction: Quality, Environment & Safety*. London: Prentice Hall.
- KELLY, J. and MALE, S. (1992) *Value Management in Design and Construction: The Economic Management of Projects*. London: Taylor & Francis.
- KIRKMAN, R. (2007) *Cost Planning of Buildings*. Oxford: Bakewell.
- MARSH, A. and GIBB, K. (2011) *Housing Economics*. London: Sage Publishing.
- MEEN, G., GIBB, K., LEISHMAN, C. and NYGAARD, C. (2016) *Housing Economics: An Historical Approach*. London: Palgrave MacMillan.
- POTTS, K. and ANKRAH, N. (2014) *Construction Cost Management: Learning from Case Studies*. London: Routledge.
- RYAN-COLLINS, J. and MACFARLANE, L. (2017) *Rethinking the Economics of Land & Housing*. London: Zed Books Ltd.

Websites

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| www.economicsonline.co.uk | Economics Online
(News/General Reference) |
| www.rics.org | Royal Institution of Chartered Surveyors
(News/General Reference) |
| www.ciob.org.uk | The Chartered Institute of Building
(News/General Reference) |

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 4: Construction Practice & Management

Unit 22: Group Project (Pearson-set)

Unit 50: Housing Design & Specification

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 53: Advanced Housing Design & Specification

Unit code	K/617/1239
Unit level	5
Credit value	15

Introduction

Through this unit, students will continue their exploration of the role of design and specification in the production of housing. The emphasis, through Level 5, is to expand the knowledge and awareness of the processes of design, information production and construction, integrating the work of other professionals and consultants, to ensure high-quality design output.

As students collaborate, in this unit and others in Level 5, they will be challenged to integrate and respond to the work of others; seeking to develop strategies and propositions that achieve stakeholder needs by addressing design, technical, environment and cost challenges.

By the end of this unit students will have both a greater awareness of managing their own design process, but also the input of others within the profession. This unit may be delivered in conjunction with others, in Level 5, to provide students with a highly collaborative learning experience that models the professional context in which they will work in the future.

Centres are encouraged to consider integrated approaches to the delivery of units in Level 5. This unit has been developed to support an integrated delivery in combination with *Unit 54: Advanced Off-site Construction* and *Unit 55: Future Housing Development & Prototyping*.

Learning Outcomes

By the end of this unit students will be able to:

1. Review a given site and client brief, to develop a housing design proposition; integrating the work of other professions
2. Prepare building information modelling data and construction information, in support of a housing design proposition
3. Produce specifications and schedules, based on construction information, for a contract tender
4. Present a housing design proposal, to a diverse audience; integrating structural, mechanical and cost information from other professionals.

Essential Content

LO1 Review a given site and client brief, to develop a housing design proposition

Site considerations:

Scale

Location

Traffic/access

Zoning/planning.

Design considerations:

Site/building orientation

Client/user requirements

Site density

Housing type/typology

Procurement Model

Construction method

Health & safety

Building Regulations.

Environmental considerations:

Materials

Energy supply

Heating/ventilation

Material transport

Construction/manufacturing method.

Consultant integration:

Information (e.g. structural, mechanical, cost)

Integration

Clash detection

Value engineering

Design revision.

LO2 Prepare building information modelling data and construction information, in support of a housing design proposition

Drawings:

Presentation drawings

Technical drawings.

Models:

Physical models

Digital models

BIM.

Consultant information:

Structural drawings

Mechanical drawings

BIM

Cost information

Manufacturing information.

LO3 Produce specifications and schedules, based on construction information, for a contract tender

Specification types:

Outline specification

Performance specification

Prescriptive specification

Proprietary specifications.

Schedules:

Door schedules

Hardware schedules

Window schedules

Schedules of work.

Contracts:

Contract type

Standard clauses and conditions

Contract prelims.

LO4 Present a housing design proposal, to a diverse audience; integrating structural, mechanical and cost information from other professionals

Proposal:

Feasibility

Design

Engineering

Cost.

Audience:

Professional

Non-professional

Statutory bodies.

Presentation:

Format (e.g. written report, audio-visual, etc.)

Feedback and reflection.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Review a given site and client brief, to develop a housing design proposition		D1 Critically evaluate the influence of consultant information on a housing design proposition
P1 Identify issues and considerations of site to inform a design proposition P2 Analyse a brief to develop a design proposition, responding to identified issues	M1 Assess the need for different consultants to support the development of a housing proposal	
LO2 Prepare building information modelling data and construction information, in support of a housing design proposition		LO2 LO3 D2 Evaluate the impact of consultants' information on the production of construction information, specifications and schedules
P3 Produce building information data for a housing design proposal P4 Prepare construction drawings and details in support of a housing design proposition	M2 Use building information modelling systems to coordinate information from consultants	
LO3 Produce specifications and schedules, based on construction information, for a contract tender		
P5 Produce specification information based on building information modelling data and construction information P6 Prepare relevant schedules for a contract tender	M3 Compile information required for a contract tender package for an appropriate form of contract	
LO4 Present a housing design proposal and tender package, to a diverse audience; integrating information from other consultants		D3 Reflect on feedback and comments to identify areas of good practice and areas for future improvement in a design proposal
P7 Present a coherent housing design proposal to a diverse audience P8 Integrate the information from consultants in support of a housing design and tender presentation	M4 Defend a design proposal in response to feedback and comment	

Recommended Resources

Textbooks

- BELBIN, M. (2010) *Team Roles at Work*. 2nd ed. Abingdon, Oxon: Routledge.
- BUSSEY, P. (2015) *A Practical Guide for Architects and Designers*. London: RIBA Publishing.
- CHING, F.D.K. (2014) *Building Construction Illustrated*. 4th ed. Hoboken, New Jersey: John Wiley & Sons.
- CHUDLEY, R. and GREENO, R. (2016) *Building Construction Handbook*. 11th ed. London: Routledge.
- CIBSE (2015) *CIBSE Guide A: Environmental Design*. 8th ed. London: CIBSE.
- Construction Specifications Institute (2011) *The CSI Construction Specifications Practice Guide*. Chichester: John Wiley & Sons.
- HUTH, M.W. (2009) *Understanding Construction Drawings*. 5th ed. Clifton Park, New Jersey: Delmar.
- KALIN, M. and WEYGANT, R.S. (2010) *Construction Specification Writing: Principles and Procedures*. Oxford: John Wiley & Sons.
- LAWSON, B. (2005) *How Designers Think: The Design Process Demystified*. London: Routledge.
- MURRAY, M. and LANGFORD, D. (2004) *Architects' Handbook for Construction*. London: RIBA Publishing.
- WYATT, D. (2007) *Construction Specifications: Principles and Applications*. Clifton Park, New Jersey: Delmar.

Websites

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|--|---|
| www.designingbuildings.co.uk | Designing Buildings
(General Reference) |
| www.thenbs.com | The NBS
Knowledge
(General Reference) |
| www.csinet.org | Construction Specifier International
(General Reference) |
| DezeenDaily.com | Dezeen
(General Reference) |

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 16: Principles of Alternative Energy

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 40: Alternative Energy Systems Design & Installation

Unit 50: Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 54: Advanced Off-site Construction

Unit code	D/617/1240
Unit level	5
Credit value	15

Introduction

Building upon their knowledge, developed through *Unit 51 Principles of Off-site Construction*, this unit supports students to expand their knowledge and skill in greater depth and detail.

In this unit, students will explore different approaches to off-site construction. Focusing on the technical features of different methods of manufacturing and logistics, students will develop the knowledge and skills to select appropriate forms of manufacture in support of specific design and delivery aims, concerning housing development and delivery. This includes modular construction, factory construction, automation and robotics, and 3D printing. Students will consider the ways in which off-site processes and technologies may influence housing design and delivery.

By the end of this unit students will be able to evaluate and select strategies for off-site production, to meet technical and design challenges associated with the housing market.

Centres are encouraged to consider integrated approaches to the delivery of units in Level 5. This unit has been developed to support an integrated delivery in combination with *Unit 53: Advanced Housing Design & Specification* and *Unit 55: Future Housing Development & Prototyping*.

Learning Outcomes

By the end of this unit students will be able to:

1. Explore different production models and their application to housing manufacture
2. Analyse how the relationship between material selection and technical processes inform design decisions
3. Develop a strategy for high-volume off-site housing manufacture for a given context
4. Present a strategy for high-volume off-site housing manufacture to meet stakeholder requirements.

Essential Content

LO1 Explore different production models and their application to housing manufacture

Production model:

Lean manufacturing

'Just-in-time' (JIT)

Automotive/assembly line

Mobile factory.

Production challenges:

Material sourcing

Factory/production facility

Logistics

On-site installation

Cost.

LO2 Analyse how the relationship between material selection and technical processes inform design decisions

Material:

Sustainability

Waste

Aesthetics

Supply

Transport.

Technical Process

Manufacturing

Manual assembly

Robotics

3D Printing

Logistics (e.g. transport, assembly, storage, etc.).

Design impact

LO3 Develop a strategy for high-volume off-site housing manufacture for a given context.

Context:

Typology

User requirements

Environment/site

Economy/market

Statutory regulations

Design aims.

Selection criteria:

Volume/demand

Production model

Logistics

Budget

Time/deadline

Market/economy

Sustainability

Procurement

User/stakeholder requirements.

Strategy:

Contextual features

Design response

Material strategy

Sustainability

Production model

Market opportunity

Manufacturing approach.

LO4 Present a strategy for high-volume offsite housing manufacture to meet stakeholder requirements

Stakeholders:

Client

Developer

Government

Housing Association

Manufacturer

Supplier

User.

Presentation:

Mode (e.g. report, audio-visual, video, etc.)

Audience

Professional

Client/stakeholder

Technical

Feedback.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Explore different production models and their application to housing manufacture		LO1 LO2 D1 Critically analyse the way that production model and material selection support a high-volume off-site housing manufacturing strategy that addresses sustainability issues
P1 Discuss the features of different production models in manufacturing P2 Explain the challenges of different production models for housing manufacture	M1 Evaluate the potential benefits that a production model may address specific housing production challenges	
LO2 Analyse how the relationship between material selection and technical processes inform design decisions		
P3 Discuss the issues associated with material supply, sustainability, waste and material use in offsite housing manufacturing P4 Analyse the way in which technical processes inform and influence housing design for manufacture	M2 Assess the design impact of manufacturing and logistics on housing delivery	
LO3 Develop a strategy for high-volume off-site housing manufacture for a given context		LO3 LO4 D2 Critically evaluate a high-volume off-site housing manufacturing strategy that addresses the needs of stakeholders, technical challenges and sustainability
P5 Analyse a given context to determine factors that may inform selection of an offsite production model P6 Develop a strategy for high-volume offsite housing manufacture to address identified factors for a given context	M3 Justify a high-volume off-site housing manufacturing strategy in meeting technical and sustainability challenges	
LO4 Present a strategy for high-volume off-site housing manufacture to meet stakeholder requirements		
P7 Evaluate stakeholders and their requirements P8 Present a coherent strategy for high-volume off-site housing manufacture that meets stakeholder requirements	M4 Defend a high-volume off-site manufacturing strategy through presentation of research and analysis	

Recommended Resources

Textbooks

COTTERALL, J. and DADEBY, A. (2012) *The Passivhaus Handbook: A Practical Guide to Constructing and Retrofitting Buildings for Ultra-Low Energy Performance*. Cambridge: Green Books.

DUFFY, A., ROGERS, M. and AYOMPE, L. (2015) *Renewable Energy and Energy Efficiency: Assessment of Projects and Policies*. London: John Wiley & Sons.

GRINNELL, S. (2016) *Renewable Energy and Sustainable Design*. Boston: Cengage.

HICKEY, T. (2014) *Designing Sustainable Homes*. Dublin: Gill & Macmillan Ltd.

LAWSON, M., OGDEN, R and GOODIER, C. (2014) *Modularisation in the Construction of Buildings*. London: Taylor & Francis Group.

SINOPOLO, J. (2009) *Smart Building Systems for Architects and Builders*. Oxford: Butterworth-Heinemann.

STIRLING, C. (2003) *Offsite Construction: An Introduction (Good Building Guide)*. London: IHS BRE Press.

Website

www.buildoffsite.com	Build Offsite (General Reference)
www.trada.co.uk	The Timber Research and Development Association (General Reference)
offsite.lboro.ac.uk	Offsite Construction – Loughborough University (General Reference)
www.therenewableenergycentre.co.uk	The Renewable Energy Centre (General Reference)
www.icevirtuallibrary.com	Institution of Civil Engineers – Virtual Library (General Reference)

Links

This unit links to the following related units:

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 51: Principles of Off-site Construction

Unit 53: Advanced Housing Design & Specification

Unit 55: Future Housing Development & Prototyping

Unit 55: Future Housing Development & Prototyping

Unit code	H/617/1241
Unit level	5
Credit value	30

Introduction

Prototypes, whether full-scale, models or components of a system, provide means by which design and manufacturing processes can be tested and evaluated. Through the making of prototypes, design, technical and cost issues can be resolved, while at the same time evaluating aesthetic characteristics and market factors.

The unit supports students to bring together their design, technical and process knowledge together in the development of prototypes for future housing.

Centres are encouraged to consider integrated approaches to the delivery of units in Level 5. This unit has been developed to support an integrated delivery in combination with *Unit 53: Advanced Housing Design & Specification* and *Unit 54: Advanced Off-site Construction*.

Learning Outcomes

By the end of this unit students will be able to:

1. Evaluate a design proposition to identify prototyping opportunities
2. Develop prototypes for a manufactured housing solution through iterative testing
3. Create a final house prototype through the integration of resolved component, assembly and system solutions
4. Present a house manufacturing solution based on prototype development and evaluation.

Essential Content

LO1 Evaluate a housing design proposition to identify prototyping opportunities

Design evaluation:

Typology

Material

Method of production

Design aims

Stakeholder requirements

Adaptability/customisation.

Prototypes:

Scale (e.g. model, full-scale)

Component prototype

Assembly prototypes

System prototypes.

LO2 Develop prototypes for a manufactured housing solution through iterative testing

Testing types:

Performance testing (e.g. air infiltration, water ingress, weathering, etc.)

Safety testing (e.g. fire retardant, flame spread, structural, etc.)

Fault-finding

Operational testing.

Test rigs

Testing Centres

Test reporting:

Parameters

Process

Results

Actions.

LO3 Create a final house prototype through the integration of resolved component, assembly and system solutions

Final prototype:

Design modifications
Manufacturing modifications
Materials
Components
Assemblies
Systems.

Production model:

Volume production
Material management
Sustainability.

LO4 Present a house manufacturing solution based on prototype development and evaluation

Solution:

Final design
Solution development process
 Prototyping process
 Testing process
Manufacturing features
Profit (e.g. development cost vs return on cost).

Presenting solution:

Prototype scale (e.g. model vs full-scale, mock-up vs functional)
Reports/results (e.g. cost reports, testing reports, etc.)
Market
 Solution to meet market demand
 Market testing
 Consumer testing.

Presentation:

Audience (e.g. technical, professional, financial, stakeholder)

Format (e.g. written report, audio-visual, etc.)

Supporting/defending

Reference material

Research

Design/testing

Feedback/reflection.

Learning Outcomes and Assessment Criteria

Pass	Merit	Distinction
LO1 Evaluate a housing design proposition to identify prototyping opportunities		LO1 LO2 D1 Critically analyse the results of testing different forms of prototype to refine design propositions and technical developments related to a manufactured housing solution
P1 Evaluate a housing design proposition to determine areas for manufacturing research P2 Identify prototyping opportunities, related to a design proposition, to test manufacturing potential	M1 Analyse the potential benefits of different forms of prototyping in relation to a design proposition	
LO2 Develop prototypes for a manufactured housing solution through iterative testing		
P3 Develop different forms of prototype to test specific features of a design and manufacturing solution P4 Iteratively test different forms of prototype to determine levels of performance, safety and operation	M2 Prepare detailed reports on the results of prototyping and testing to determine actions for iterative development and re-testing	
LO3 Create a final house prototype through the integration of resolved component, assembly and system solutions		LO3 LO4 D2 Critically evaluate the potential success of a house manufacturing solution, based on the data gathered through prototyping and testing components, assemblies and systems
P5 Create a final house prototype, based on development prototypes P6 Discuss the design modifications resulting from prototyping and testing	M3 Analyse the manufacturing modifications required for a final housing prototype to be achieved through a specific production model	
LO4 Present a house manufacturing solution based on prototype development and evaluation		
P7 Present a detailed house manufacturing solution P8 Integrate cost and market information in a house manufacturing solution	M4 Defend a house manufacturing solution based on research, reporting and data	

Recommended Resources

Textbooks

- CIBSE (2015) *CIBSE Guide A: Environmental Design*. 8th ed. London: CIBSE
- FAIRHEAD, R. (2013) *Information Exchanges: RIBA Plan of Work 2013 Guide*. London: RIBA Publishing.
- LYONS, A. (2014) *Materials for Architects and Builders*. 4th ed. Abingdon, Oxon: Routledge.
- MARSHALL, D. and WORTHING, D. (2013) *The Construction of Houses*. 5th ed. Abingdon, Oxon: Estates Gazette.
- MARSHALL, D. and WORTHING, D. (2013) *Understanding Housing Defects*. 4th ed. Abingdon, Oxon: Estates Gazette.
- RILEY, M. and COTGRAVE, A. (2013) *Construction Technology 1: House Construction*. 3rd ed. London: Palgrave Macmillan.
- SINOPOLO, J. (2010) *Smart Building Systems for Architects and Builders*. Oxford: Butterworth-Heinemann.
- SJOSTROM, C. (1996) *Durability of Building Materials and Components. Volume Two: Testing, Design and Stabilisation*. Abingdon, Oxon: Taylor & Francis.

Websites

- | | |
|--|---|
| www.thenbs.com | The NBS
(General Reference) |
| www.cdbb.cam.ac.uk | Centre for Digital Built Britain
(General Reference) |
| www.taschen.com | Prototype Modern Homes
TASCHEN Books |

Links

This unit links to the following related units:

Unit 1: Individual Project (Pearson-set)

Unit 2: Construction Technology

Unit 14: Building Information Modelling

Unit 22: Group Project (Pearson-set)

Unit 36: Advanced Building Information Modelling

Unit 50: Housing Design & Specification

Unit 51: Principles of Off-site Construction

Unit 53: Advanced Housing Design & Specification

Unit 54: Advanced Off-site Construction

11 Appendices

Appendix 1: Glossary of terms used for internally assessed units

This is a summary of the key terms used to define the requirements within units.

Term	Definition
Analyse	<p>Present the outcome of methodical and detailed examination either:</p> <ul style="list-style-type: none"> • breaking down a theme, topic or situation in order to interpret and study the interrelationships between the parts and/or • of information or data to interpret and study key trends and interrelationships. <p>Analysis can be through activity, practice, written or verbal presentation.</p>
Apply	<p>Put into operation or use.</p> <p>Use relevant skills/knowledge/understanding appropriate to context.</p>
Arrange	Organise or make plans.
Assess	Offer a reasoned judgement of the standard/quality of a situation or a skill informed by relevant facts.
Calculate	Generate a numerical answer with workings shown.
Compare	<p>Identify the main factors relating to two or more items/situations or aspects of a subject that is extended to explain the similarities, differences, advantages and disadvantages.</p> <p>This is used to show depth of knowledge through selection of characteristics.</p>
Compose	Create or make up or form.
Communicate	<p>Convey ideas or information to others.</p> <p>Create/construct skills to make or do something, for example a display or set of accounts.</p>
Create/ Construct	Skills to make or do something, for example, a display or set of accounts.
Critically analyse	Separate information into components and identify characteristics with depth to the justification.
Critically evaluate	Make a judgement taking into account different factors and using available knowledge/experience/evidence where the judgement is supported in depth.
Define	State the nature, scope or meaning.
Describe	Give an account, including all the relevant characteristics, qualities and events.

Term	Definition
Discuss	Consider different aspects of a theme or topic, how they interrelate, and the extent to which they are important.
Demonstrate	Show knowledge and understanding.
Design	Plan and present ideas to show the layout/function/workings/object/system/process.
Develop	Grow or progress a plan, ideas, skills and understanding
Differentiate	Recognise or determine what makes something different.
Discuss	Give an account that addresses a range of ideas and arguments.
Evaluate	<p>Work draws on varied information, themes or concepts to consider aspects, such as:</p> <ul style="list-style-type: none"> • strengths or weaknesses • advantages or disadvantages • alternative actions • relevance or significance. <p>Students' inquiries should lead to a supported judgement showing relationship to its context. This will often be in a conclusion. Evidence will often be written but could be through presentation or activity.</p>
Explain	To give an account of the purposes or reasons.
Explore	Skills and/or knowledge involving practical research or testing.
Identify	Indicate the main features or purpose of something by recognising it and/or being able to discern and understand facts or qualities.
Illustrate	Make clear by using examples or provide diagrams.
Indicate	Point out, show.
Interpret	State the meaning, purpose or qualities of something through the use of images, words or other expression.
Investigate	Conduct an inquiry or study into something to discover and examine facts and information.
Justify	<p>Students give reasons or evidence to:</p> <ul style="list-style-type: none"> • support an opinion • prove something is right or reasonable.
Outline	Set out the main points/characteristics.
Plan	Consider, set out and communicate what is to be done.
Produce	To bring into existence.
Reconstruct	To assemble again/reorganise/form an impression.

Term	Definition
Report	Adhere to protocols, codes and conventions where findings or judgements are set down in an objective way.
Review	<p>Make a formal assessment of work produced.</p> <p>The assessment allows students to:</p> <ul style="list-style-type: none"> • appraise existing information or prior events • reconsider information with the intention of making changes, if necessary.
Show how	Demonstrate the application of certain methods/theories/concepts.
Stage and manage	Organisation and management skills, for example, running an event or a Sport pitch.
State	Express.
Suggest	Give possible alternatives, produce an idea, put forward, for example, an idea or plan, for consideration.
Undertake/ carry out	Use a range of skills to perform a task, research or activity.

This is a key summary of the types of evidence used for BTEC Higher Nationals:

Type of evidence	Definition
Case study	A specific example to which all students must select and apply knowledge.
Project	A large scale activity requiring self-direction of selection of outcome, planning, research, exploration, outcome and review.
Independent research	An analysis of substantive research organised by the student from secondary sources and, if applicable, primary sources.
Written task or report	Individual completion of a task in a work-related format, for example, a report, marketing communication, set of instructions, giving information.
Simulated activity/role play	A multi-faceted activity mimicking realistic work situations.
Team task	Students work together to show skills in defining and structuring activity as a team.
Presentation	Oral or through demonstration.
Production of plan/business plan	Students produce a plan as an outcome related to a given or limited task.
Reflective journal	Completion of a journal from work experience, detailing skills acquired for employability.
Poster/leaflet	Documents providing well-presented information for a given purpose.

Appendix 2: Assessment methods and techniques for Higher Nationals

Assessment technique	Description	Transferable skills development	Formative or Summative
Academic graphic display	This technique asks students to create documents providing well-presented information for a given purpose. Could be a hard or soft copy.	Creativity Written communication Information and communications Technology Literacy	Formative Summative
Case study	This technique present students with a specific example to which they must select and apply knowledge.	Reasoning Critical thinking Analysis	Formative Summative
Discussion forum	This technique allows students to express their understanding and perceptions about topics and questions presented in the class or digitally, for example, online groups, blogs.	Oral/written communication Appreciation of diversity Critical thinking and reasoning Argumentation	Formative

Assessment technique	Description	Transferable skills development	Formative or Summative
Independent research	This technique is an analysis of research organised by the student from secondary sources and, if applicable, primary sources.	Information and communications technology Literacy Analysis	Formative
Oral/Viva	This technique asks students to display their knowledge of the subject via questioning.	Oral communication Critical thinking Reasoning	Summative
Peer review	This technique asks students to provide feedback on each other's performance. This feedback can be collated for development purposes.	Teamwork Collaboration Negotiation	Formative Summative
Presentation	This technique asks students to deliver a project orally or through demonstration.	Oral communication Critical thinking Reasoning Creativity	Formative Summative

Assessment technique	Description	Transferable skills development	Formative or Summative
Production of an artefact/ performance or portfolio	This technique requires students to demonstrate that they have mastered skills and competencies by producing something. Some examples are [Sector] plans, using a piece of equipment or a technique, building models, developing, interpreting, and using maps.	Creativity Interpretation Written and oral communication Interpretation Decision-making Initiative Information and Communications Technology Literacy, etc.	Summative
Project	This technique is a large scale activity requiring self-direction, planning, research, exploration, outcome and review.	Written communication Information Literacy, Creativity, Initiative.	Summative

Assessment technique	Description	Transferable skills development	Formative or Summative
Role playing	This technique is a type of case study, in which there is an explicit situation established, with students playing specific roles, understanding what they would say or do in that situation.	Written and oral communication Leadership Information literacy Creativity Initiative.	Formative
Self-reflection	This technique asks students to reflect on their performance, for example, to write statements of their personal goals for the course at the beginning of the course, what they have learned at the end of the course and their assessment of their performance and contribution; completion of a reflective journal from work experience, detailing skills acquired for employability.	Self-reflection Written communication Initiative Decision-making Critical thinking	Summative
Simulated activity	This technique is a multi-faceted activity based on realistic work situations.	Self-reflection Written communication Initiative Decision-making Critical thinking	Formative Summative

Assessment technique	Description	Transferable skills development	Formative or Summative
Team assessment	<p>This technique asks students to work together to show skills in defining and structuring an activity as a team.</p> <p>All team assessment should be distributed equally, each of the group members performing their role, and then the team collates the outcomes, and submits it as a single piece of work.</p>	<p>Collaboration</p> <p>Teamwork</p> <p>Leadership</p> <p>Negotiation</p> <p>Written and oral communication</p>	<p>Formative</p> <p>Summative</p>
Tiered knowledge	<p>This technique encourages students to identify their gaps in knowledge. Students record the main points they have captured well and those they did not understand.</p>	<p>Critical thinking</p> <p>Analysis</p> <p>Interpretation</p> <p>Decision-making</p> <p>Oral and written communication</p>	<p>Formative</p>
Time constrained assessment	<p>This technique covers all assessment that needs to be done within a centre-specified time constrained period on-site.</p>	<p>Reasoning</p> <p>Analysis</p> <p>Written communication</p> <p>Critical thinking</p> <p>Interpretation</p>	<p>Summative</p>

Assessment technique	Description	Transferable skills development	Formative or Summative
Top ten	This technique asks students to create a 'top ten' list of key concepts presented in the assigned reading list.	Teamwork Creativity Analysis Collaboration	Formative
Written task or report	This technique asks students to complete an assignment in a structured written format, for example, a [Sector] plan, a report, marketing communication, set of instructions, giving information.	Reasoning Analysis Written communication Critical thinking, interpretation.	Summative

Appendix 3: Mapping of the Pearson BTEC Higher Nationals in Future Homes Design and Construction against FHEQ Level 5

KEY	
KU	Knowledge and Understanding
CS	Cognitive Skills
AS	Applied Skills
TS	Transferable Skills

The qualification will be awarded to students who have demonstrated:

FHEQ Level 5 descriptor		Future Homes Design and Construction HND Programme Outcome
Knowledge and critical understanding of the well-established principles of their area(s) of study, and of the way in which those principles have developed.	KU1	Knowledge and understanding of the fundamental principles and practices of the contemporary global construction industry.
	KU2	Knowledge and understanding of the external construction environment and its impact upon local, national and global levels of strategy, behaviour, management and sustainability.
	KU3	Understanding and insight into different construction practices, their diverse nature, purposes, structures and operations and their influence upon the external environment.
	KU4	A critical understanding of the ethical, legal, professional, and operational framework within which construction operates.
	KU5	A critical understanding of processes, procedures and practices for effective management of products, services and people.
	KU6	A critical understanding of the evolving concepts, theories and models within the study of construction and the built environment across a range of practical and hypothetical scenarios.

FHEQ Level 5 descriptor		Future Homes Design and Construction HND Programme Outcome
	KU7	An ability to evaluate and analyse a range of concepts, theories and models to make appropriate construction management decisions.
	KU8	An appreciation of the concepts and principles of CPD, staff development, leadership and reflective practice as methods and strategies for personal and people development.
Ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context.	CS1	Apply knowledge and understanding of essential concepts, principles and models within the contemporary global construction industry.
	AS1	Evidence the ability to show client relationship management and develop appropriate policies and strategies to meet stakeholder expectations.
	AS2	Apply innovative construction ideas to develop and create new products or services that respond to the changing nature of the construction industry.
	AS3	Integrate theory and practice through the investigation and examination of practices in the workplace.
	AS4	Develop outcomes for clients/businesses using appropriate practices and data to make justified recommendations.
	CS2	Develop different strategies and methods to show how resources (human, financial and information) are integrated and effectively managed to successfully meet objectives.

FHEQ Level 5 descriptor		Future Homes Design and Construction HND Programme Outcome
Knowledge of the main methods of enquiry in the subject(s) relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of study.	CS3	Critically evaluate current principles of the construction industry, and their application to problem-solving.
	CS4	Apply project management tools/techniques for reporting and planning, control and problem solving.
	KU9	Knowledge and understanding of how the key aspects of construction and engineering influence the development of people and businesses.
	CS5	Critique a range of construction information technology systems and operations and their application to maximise and successfully meet strategic objectives.
	KU10	An understanding of the appropriate techniques and methodologies used to resolve real-life problems in the workplace.
An understanding of the limits of their knowledge, and how this influences analysis and interpretations based on that knowledge.	TS1	Develop a skill-set to enable the evaluation of appropriate actions taken for solving problems in a specific construction context.
	TS2	Self-reflection, including self-awareness; the ability to become an effective self-student and appreciate the value of the self-reflection process.

Typically, holders of the qualification will be able to:

FHEQ Level 5 descriptor		Future Homes Design and Construction HND Programme Outcome
Use a range of established techniques to initiate and undertake critical analysis of information, and to propose solutions to problems arising from that analysis.	TS3	Competently use digital literacy to access a broad range of research sources, data and information.
	CS6	Interpret, analyse and evaluate a range of construction data, sources and information to inform evidence-based decision-making.
	CS7	Synthesise knowledge and critically evaluate strategies and plans to understand the relationship between theory and real-world construction scenarios.
Effectively communicate information, arguments and analysis in a variety of forms to specialist and non-specialist audiences and deploy key techniques of the discipline effectively.	TS4	Communicate confidently and effectively, both orally and in writing both internally and externally with construction professionals and other stakeholders.
	TS5	Communicate ideas and arguments in an innovative manner using a range of digital media.
	AS5	Locate, receive and respond to a variety of information sources (e.g. textual, numerical, graphical and computer-based) in defined contexts.
	TS6	Demonstrate strong interpersonal skills, including effective listening and oral communication skills, as well as the associated ability to persuade, present, pitch and negotiate.
Undertake further training, develop existing skills and acquire new competences that will enable them to assume significant responsibility within organisations.	TS7	Identify personal and professional goals for Continuing Professional Development (CPD) in order to enhance competence to practice within a chosen construction field.
	TS8	Take advantage of available pathways for Continuing Professional Development (CPD) through higher education and Professional Body Qualifications.

Holders will also have:

FHEQ Level 5 descriptor		Future Homes Design and Construction HND Programme Outcomes
The qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and decision-making.	TS9	Develop a range of skills to ensure effective team working, independent initiatives, organisational competence and problem-solving strategies.
	TS10	Reflect adaptability and flexibility in approach to construction; showing resilience under pressure and meeting challenging targets within given deadlines.
	TS11	Use quantitative skills to manipulate data, evaluate and verify existing theory.
	CS8	Evaluate the changing needs of the construction industry and have confidence to self-evaluate and undertake additional CPD as necessary.
	TS12	Emotional intelligence and sensitivity to diversity in relation to people and cultures.

Appendix 4: Pearson BTEC Higher Nationals in Future Homes Design and Construction – Programme Outcomes for Students

Unit	Knowledge and Understanding										Cognitive Skills								Applied Skills					Transferrable Skills											
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x	x	x	x					x	x							x			x	x					x		x			
2	x	x	x				x				x					x					x												x		
3		x	x	x	x		x				x	x		x	x		x	x		x	x	x	x	x	x	x	x	x		x	x		x		x
14	x	x	x			x					x		x		x	x				x	x	x	x			x						x		x	
16	x	x	x	x		x	x		x	x	x					x	x			x		x	x	x			x	x						x	
22			x		x			x				x		x								x		x	x		x		x			x	x		x
36	x	x	x			x					x		x		x	x				x	x	x	x			x						x		x	
40	x	x	x	x		x	x			x	x		x		x	x	x			x	x	x	x	x		x		x						x	
50	x	x	x		x	x	x			x		x	x		x	x	x			x	x	x	x	x		x	x							x	
51			x		x	x	x			x	x	x	x		x	x				x	x	x	x	x			x							x	
52	x	x	x	x		x	x		x		x	x	x			x				x		x	x									x			
53	x	x	x		x	x	x			x		x	x		x	x	x			x	x	x	x	x		x	x							x	
54			x		x	x	x			x	x	x	x		x	x				x	x	x	x	x			x							x	
55			x		x	x				x	x	x	x	x	x	x	x			x	x		x	x		x	x	x				x	x	x	

Appendix 5: Transferrable Skills Mapping

Unit	Cognitive Skills					Intra-personal Skills					Interpersonal Skills				
	Problem Solving	Critical Thinking/ Analysis	Decision Making	Effective Communication	Digital Literacy	Numeracy	Creativity	Plan Prioritise	Self- management	Independent Learning	Self-reflection	Team Work	Leadership	Cultural Awareness	Interpersonal Skills
1	X		X	X	X			X	X	X	X				x
2		X			X	X			X	X					
3		X	X			X		X		X				X	
14		X		X	X	X	X	X				X		X	
16	X	X	X	X	X	X	X	X							
22	X	X	X	X			X	X	X	X	X	X	X		X
36		X		X	X									X	
40	X	X	X	X		X		X		X				X	
50	X	X	X	X			X	X	X	X		X			
51	X	X			X	X		X	X	X		X	X		
52		X							X	X				X	

	Cognitive Skills					Intra-personal Skills					Interpersonal Skills				
Unit	Problem Solving	Critical Thinking/ Analysis	Decision Making	Effective Communication	Digital Literacy	Numeracy	Creativity	Plan Prioritise	Self- management	Independent Learning	Self-reflection	Team Work	Leadership	Cultural Awareness	Interpersonal Skills
53	X	X	X	X			X	X	X	X		X	X	X	
54	X	X	X		X	X		X	X	X		X	X		X
55	X	X	X	X		X	X	X	X			X	X		X

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