

Pearson BTEC Level 4 Higher National Certificate in Civil Engineering

1. Construction Design Project (Pearson-set)

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 unit is to help students to appreciate and be aware 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 unit are: project phases; construction drawing; detailing; Computer Aided Design (CAD); Building Information Modelling (BIM); schedules; specifications; bills of quantities; information collaboration. On successful completion of the unit, students will be able to analyse scenarios, make decisions and produce drawings and specifications to achieve appropriate, creative and innovative home design proposals

2. The Construction Environment

The construction industry is one of the major contributors to CO₂ emissions. Also, the way that buildings are designed, constructed and maintained means they have an ongoing impact on the environment. Similarly, as a major employer, the industry has an ongoing impact on the working conditions of those in the sector and the way that people are educated, trained and supported through their careers. In this unit, students will explore the make-up and the impact of the construction industry on the environment and society. By exploring the roles and relationships of individuals and organisations in the construction sector, students will gain an overview of the organisational and the personal ways in which the sector works to continue to improve the built environment and limit its impact on the environment, while maintaining economic sustainability and growth.

3. Science & Materials

This unit aims to support students to make material choices to achieve the desired outcomes of a brief. This is approached from the perspective of materials being fit for purpose; as defined by testing standards and properties, but also by consideration of the environmental impact and sustainability. Awareness of health & safety is considered alongside the need to meet legislative requirements. The topics covered in this unit include: health and safety; storage and use of materials; handling and problems associated with misuse and unprotected use; environmental and sustainable

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consideration in material choices; human comfort performance parameters. Material choice is developed through the understanding of testing procedures to establish conformity to standards and define performance properties. The performance of materials to satisfy regulations and provide appropriate comfort levels is addressed through design and calculations.

4. Mathematics for Construction

The aim of this unit is to develop students' knowledge and understanding of the mathematical principles and theories that underpin many aspects of construction technology, structures and materials. Students will be introduced to mathematical methods and statistical techniques so that they can analyse and solve problems in a construction engineering context. Topics included in this unit are: trigonometry and algebraic mathematical techniques; matrices; statistical techniques; differential and integral calculus; binomial and normal distribution; dimensional analysis; arithmetic progressions; vector analysis. On successful completion of this unit, students will be able to employ mathematical methods in a variety of contextualised examples; use analytical and computational methods to evaluate and solve engineering construction problems; interpret data using statistical techniques and apply calculus techniques. Students will gain crucial employability skills such as critical thinking, problem solving, analysis, reasoning and data interpretation.

5. Civil Engineering Technology

This unit explores the role of professional civil engineers, their essential involvement in the construction and maintenance of infrastructure, and the key technologies they apply. The technologies and processes of civil engineering in the development of highways, bridges and substructures are crucial in supporting contemporary societies. Topics included in this unit are: earthwork activities; temporary and permanent dewatering procedures; methods and techniques used to create substructures, highways and superstructures and the common hazards; technical problems and solutions associated with modern civil engineering activities.

6. Principles of Structural Design

Buildings, bridges, roads and many other types of man-made structures are critical to the economic and social wellbeing of our society. We rely on these structures to provide us with suitable spaces and infrastructure to support our daily lives. In this unit, students will explore the fundamental principles of structural design, codes of practice and standards required to construct safe, effective static structures commonly used in

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today's building and infrastructure projects. Topics included in this unit are: methods and techniques used to determine bending moments and shear forces in simply supported steel and reinforced concrete beams; deflection in simply supported steel beams; axial load carrying capacity of steel and reinforced concrete columns.

7. Tender & Procurement

This unit aims to give students the knowledge they need to be able to select a procurement route and an appropriate tendering method in the awarding of a project to a main contractor. Students will learn how to prepare a tender package in procuring a contractor for a client's work. Many different procurement methods are available to achieve this: from open to closed systems. Topics included in this unit are: tendering constraints and information; the documentation needed to send out a tender; the factors that affect procurement; the procurement methods that can be used to select a contractor.

8. Geotechnics & Soil Mechanics

This unit explores the essential relationship between the things we construct and the capacity of the ground to support these constructions. The ability to understand, analyse and develop solutions related to soil and rock is a key aspect of the design and construction of buildings and infrastructure. Topics included in this unit are: rock type; soil description and classification; methods and techniques used when undertaking site investigations and laboratory testing; determination of soil properties; the importance of these geotechnical procedures and resultant findings to civil engineers.