



Civil Engineering

Civil engineers focus on the design, construction, and maintenance of the physical and naturally built environment. Working in collaboration with architects, urban planners, environmental scientists, and other professionals, civil engineers create and maintain infrastructure that meets the needs of communities while safeguarding future generations.

Students are introduced to global challenges, such as the Climate Emergency and the United Nations Sustainable Development Goals, and the necessary cultural changes needed at every level, including materials selection, design and construction thinking. The programme has several interdisciplinary design projects, where the students work with students of other built environment disciplines. There is hence a focus on buildings and structures and their impacts on the environment. The programme integrates structural engineering, environmental engineering (within and outside buildings), geotechnical engineering and transportation engineering. The focus is on sustainability and innovation, providing students with a well-rounded education and the skills necessary to address the complex challenges of the modern world.

Modules year 1	
Module Title	Module description and context
Mathematics and statistics	This module focuses on the development of conceptual understanding of the physical world, including engineering artefacts and natural environmental processes, through mathematics. It aims to strengthen and extend students' understanding of core mathematical concepts used in the solution of engineering problems and in the analysis of data.
Engineering principles	Here you will get an introduction to the foundational principles of statics and dynamics. It explores the different types of stresses that materials undergo and how these materials respond under the influence of such stresses. The module extends its focus to statically determinate structures, and their behaviour under various stress conditions.
Civil engineering materials and soils	The primary objective of this module is to provide students with a comprehensive understanding of the materials used in civil engineering and construction. The emphasis is on knowledge and understanding of embodied carbon in materials, and environmental and sustainable considerations relating to their source, manufacture, use and disposal.
Surveying and drawing	Here you will gain skills centred around surveying, setting out, data analysis and drawing. The module encompasses both manual and digital aspects of surveying, providing a comprehensive skill set for aspiring professionals in civil engineering and related fields.
Interdisciplinary Design Project 1	You will begin to develop skills in design through a series of design tasks that require the development of a range of options to solve a design problem. You will introduce the ways that professionals work collaboratively in design.

Modules year 2	
Module Title	Module description and context
Architectural engineering systems	The aim of this module is for the student to understand the principles of thermodynamics, sustainable building management, natural ventilation methods, and renewable energy generation. The module will equip you with the fundamental knowledge and skills required to analyse, design, and integrate various sustainable practices into building management.
Structural analysis and design	Here you will learn about structural design processes in concrete, masonry, timber, and steel, emphasizing elastic structural analysis methods and virtual forces. Students gain proficiency in analysing elastic indeterminate structures and understanding loadings and structural stability. The module links to Interdisciplinary Design Project 2, enabling students to apply theoretical and analytical skills in a real-world context.
Soil mechanics	Student will explore the soil mechanics and its applications in Civil Engineering. The module covers the fundamental principles governing soil behaviour, site investigation methodologies, and the laboratory testing of soils.
Fluid mechanics	This module covers the principles governing the behaviour of fluids and their applications in engineering. It introduces students to fluid statics and dynamics, the equations that govern fluid flow and the design of open channels and pipe, and hydraulic machines.
Interdisciplinary Design Project 2	The project will cover a multi-faceted design problem of a building or part of one. You will develop holistic design thinking, further embed approaches that are sustainable and carbon neutral, continue with self-reflection and collaborative practices with other disciplines.

Modules year 3	
Module Title	Module description and context
Further structural analysis	This module is a specialised exploration into advanced structural analysis techniques. The primary aim is to gain the necessary knowledge, understanding, and skills to analyse and solve complex problems around multi-variable structural systems. This includes an in-depth focus on both statically determinate and indeterminate structures, with an extended emphasis on the analysis of plates.
Geotechnical engineering design	Here you will focus on design processes for foundations, retaining walls, and slopes. You will gain in-depth knowledge and skills essential for designing resilient, effective and stable support systems within the broader context of civil engineering projects. This module builds upon knowledge acquired in earlier modules: Structural Analysis and Design, and Geotechnics.
Transport and water infrastructure design	You will focus on the theoretical foundations of highway and railway geometric design and construction. The emphasis is on providing for sustainable travel. It is designed to give students the knowledge and skills required to design transport alignments including horizontal and vertical geometry.
Investigative project	This project is an individual investigative project on a matter connected with civil engineering chosen by the student. It should in some way relate to or encompass, matters connected with the climate crisis and/or UN Sustainable Development Goals.
Interdisciplinary Design Project 3	Here you will further develop the skills to design larger more complex scale-built environment artefacts for a specific development site. The project will require research about the background to the site, and developments in construction practices and techniques.

Modules year 4 for the MEng programme only

Module Title	Module description and context
Construction project management	The aim of this module is to provide understanding and knowledge of all stages of the construction management processes from project inception to finish. It will cover an understanding and knowledge base around principles, theories, and practical applications of project management in the construction industry.
Structural dynamics and earthquake engineering	Students will develop a deep understanding of vibration phenomena in structures, skills in employing theoretical and computational methods to predict and evaluate the dynamic response of structures, and skills in seismic analysis and design codes.
Advanced materials	The module offers an in-depth exploration into the advanced behaviours of materials. The student will develop an in-depth understanding of material innovations and will be introduced to methods for assessing embodied carbon and sustainability in the context of materials choice.
Geotechnical and geo-environmental engineering	Here you will learn about the potential and limits of geotechnical models. You will develop a deep understanding of soil stress and strain modelling, enhance skills in numerical methods, and extract valuable lessons from geotechnical engineering failures. This module further extends to encompass geo-environmental engineering, considering the interaction between geotechnical processes and the environment.
Interdisciplinary Design Project 4	Students will work in groups and individually to produce a design solution for a design brief, around issues in connection with sustainability, ethics and equality, diversity and inclusion. The engineering problem allocated to each group will be selected to allow collaborative working across different civil engineering disciplines and beyond that to different construction disciplines.

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