

# Product Design Engineering BEng (Hons)

## COURSE DETAILS

- A level requirements: [ABB](#)
- UCAS code: HW24
- Study mode: Full-time
- Length: 3 years

## KEY DATES

- Apply by: [31 January 2024](#)
  - Starts: 23 September 2024
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## Course overview

Product Design Engineering BEng (Hons) brings together the traditional discipline of design engineering and new product development. The result is a truly modern engineering degree that provides you with a solid technical grounding in engineering that prepares you for a successful career in industry.

## INTRODUCTION

You'll study core engineering subjects such as solid mechanics, fluid mechanics, thermodynamics, materials and electronics and computer programming. Alongside, you'll learn product design techniques such as design communication, human factors, product development and project management. These foundations will give you an understanding of the science that underpins product design engineering.

Then, you'll move on to advanced engineering science, working on complex design engineering projects that reflect real-life in industry. Unique to this programme is a 300-hour individual product design engineering project on a topic of your choice, demonstrating design and engineering knowledge as well as practical design skills.

## WHAT YOU'LL LEARN

- Fundamental product design techniques
  - Work on complex real-life design engineering projects
  - 300-hour individual product design engineering project on a topic of your choice
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# Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

## YEAR ONE

In year one you will study the core engineering subjects that provide fundamental knowledge of engineering science alongside product design techniques that underpins the practice of product design engineering.

### COMPULSORY MODULES

#### **SOLIDS AND STRUCTURES 1 (ENGG110)**

**Credits: 15 / Semester: whole session**

This module aims to introduce students to the fundamental concepts and theory of how engineering structures work to sustain loads. It will also show how stress analysis leads to the design of safer structures. It will also provide students with the means to analyse and design basic structural elements as used in modern engineering structures.

#### **ENGINEERING MATHEMATICS (MATH198)**

**Credits: 22.5 / Semester: whole session**

MATH198 is a Year 1 mathematics module for students of programmes taught in the School of Engineering, e.g. Aerospace, Civil, Mechanical or Industrial Design Engineering. It is designed to reinforce and build upon A-level mathematics, providing you with the strong background required in your engineering studies and preparing you for the Year 2 mathematics module MATH299 (Mathematics engineering II). In the first semester, the foundations are laid: differential calculus, vector algebra, integration and applications. Semester two covers complex numbers, differential equations, Laplace transformations and functions of two variables

#### **INTRODUCTION TO STRUCTURAL MATERIALS (ENGG108)**

**Credits: 7.5 / Semester: semester 1**

This module introduces students to important mechanical properties of metallic alloys, polymers, ceramics, construction materials and composites used in engineering industry. It also introduces the mechanical testing techniques used to measure such properties, the common mechanisms of materials and component failure in use, and some appreciation of materials processing. The laboratory sessions are designed to familiarise students with engineering laboratory methods and procedures, as well as providing an experience of hands-on mechanical testing techniques.

## **ELECTRICAL CIRCUITS FOR ENGINEERS (ELEC121)**

**Credits: 7.5 / Semester: semester 1**

To provide students with a basic understanding of electronics from first principles covering analogue and electromechanical systems. Basic circuits and theory will be introduced including the use of semiconductor devices such as diodes and transistors. Electromechanics will be developed to provide the student with a fundamental knowledge of the principles of DC and AC machines, transformers and linear actuators

## **ELECTROMECHANICAL SYSTEMS (ENGG121)**

**Credits: 7.5 / Semester: semester 2**

To provide students with a basic understanding of modelling and simulation techniques. Mathematical modelling and graph theory will be introduced to develop practical skills in the modelling and designing of different types of systems including electromechanical systems.

## **INTRODUCTION TO PROGRAMMING (ENGG185)**

**Credits: 7.5 / Semester: semester 1**

This module introduces students to the basic concepts and principles of elementary statistics and programming. It explains the purposes and advantages of analysing data collected specifically to solve problems in engineering, reviews available software tools and programming languages used to formulate and answer basic engineering questions. It draws on examples from applications across the range of School of Engineering program areas.

## **DESIGN COMMUNICATION (ENGG115)**

**Credits: 7.5 / Semester: semester 2**

This module provides students with essential foundational skills in effective hand sketching, visualisation, and final presentation of design ideas. Students are instructed in principles, examples, and demonstrations regarding the use of a variety of design communication media and techniques, for the purposes of conceiving, developing and presenting product design ideas.

## **ENERGY SCIENCE (ENGG116)**

**Credits: 15 / Semester: whole session**

To develop an understanding of the basic principles of fluid mechanics, the laws of thermodynamics, and an appreciation of how to solve simple engineering problems. To develop skills in performing and reporting simple experiments.

## **PROFESSIONAL ENGINEERING: A SKILLS TOOLKIT (ENGG111)**

**Credits: 30 / Semester: whole session**

This module aims to provide students with an interesting and engaging project that will help them to immediately relate the material being taught, both within and without this module, to a practical problem that is identifiable to their engineering discipline, thus reinforcing its relevance to the topic.

The module:

- 1) Seeks to provide students with an early understanding of the preliminary design processes
- 2) Will introduce students to formal engineering drawing and visualisation
- 3) Will expose the students to group work and the dynamics of working in a team
- 4) Will expose students to the complexity of an engineering design task
- 5) Will enable students to develop data analysis and plotting skills
- 6) Will embody an approach to learning that will engage the students for the remainder of their lives
- 7) Seeks to provide students with an early understanding of the detail design and manufacturing process
8. Will introduce students to industry standard computer aided engineering drawing tools and practice
9. Will enable students to develop report writing and oral presentation skills
10. Will provide students with a basic understanding of engineering components and mechanisms
11. Will embody an approach to learning that will engage the students for the remainder of their lives

*Programme details and modules listed are illustrative only and subject to change.*

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## **YEAR TWO**

In year two you will continue to study core engineering subjects solidifying the fundamental knowledge of engineering science in these subjects.

### **COMPULSORY MODULES**

#### **PRODUCT DEVELOPMENT 2 (ENGG220)**

**Credits: 15 / Semester: whole session**

Following on from Y1, this module aims to further develop the student understanding of product development. In an open-ended studio setting, students will build on Y1 learning and further gain an understanding and appreciation of getting from an idea to a finished product. Successful students will be able to develop and articulate ideas in the form of sketch work and traditional model prototypes to an intermediate level. This will be assessed through project work.

## **HUMAN FACTORS IN PRODUCT DESIGN: THEORY (ENGG222)**

**Credits: 7.5 / Semester: semester 1**

The module will introduce students to anthropometric and ergonomic concepts, and to the capabilities and constraints of the physical, cognitive and cultural makeup of human beings. Successful candidates will have acquired knowledge and understanding of how human factors affects the design and development of new products.

## **HUMAN FACTORS IN PRODUCT DESIGN: PRACTICE (ENGG224)**

**Credits: 7.5 / Semester: semester 2**

This module follows on from the prerequisite module, Human Factors: Theory, this module will continue to develop anthropometric and ergonomic concepts, and the capabilities and constraints of the physical, cognitive and cultural makeup of human beings. Successful candidates will have acquired knowledge and understanding of how human factors affect the design and development of new products.

## **ENGINEERING MATHEMATICS II (MATH299)**

**Credits: 7.5 / Semester: semester 1**

To introduce some advanced Mathematics required by Engineers, Aerospace Engineers, Civil Engineers and Mechanical Engineers. To assist students in acquiring the skills necessary to use the mathematics developed in the module.

## **MANAGING PRODUCT DEVELOPMENT (MNGT205)**

**Credits: 7.5 / Semester: semester 1**

The module teaches the management of new product development. It is taught in a traditional lecture style culminating in an exam.

Successful students will have acquired knowledge and understanding at a broad level of the process and how it is executed in a modern industrial environment.

## **ENGINEERING DESIGN (MECH212)**

**Credits: 15 / Semester: whole session**

Professional Engineering can be defined as the application of science in the solution of problems and the development of new products, processes and systems. It is vital that all Engineering graduates have a solid design education; and this module is a core part of that.

In Year 1 students are introduced to the basic tools and techniques involved in engineering design.

In this module students are taught the basics of design theory in a lecture setting; but crucially they are required to apply this learning in a 24-week group project to design an innovative engineering product.

Students are given a design brief and are "coached" through product design specification; creative conceptual design; detailed design; 3D CAD modelling; design for manufacture, assembly and environment; and materials selection.

The module also enables students to develop and practice teamwork, communication, project management and problem solving skills.

## **THERMODYNAMICS (MECH217)**

**Credits: 15 / Semester: whole session**

Steam, standard air and refrigeration cycles

## **SOLIDS & STRUCTURES 2 (ENGG209)**

**Credits: 15 / Semester: whole session**

This module aims to introduce students to techniques for load and displacement analysis of simple structures.

## **PRODUCT FORM AND MATERIALS (ENGG226)**

**Credits: 7.5 / Semester: semester 2**

This module aims to introduce students to materials and manufacturing issues at the core of industrial design practice. Students will develop an appreciation of how materials positively and negatively influence people's perception, appreciation and experiences of designed products. Students will also gain an understanding of the key considerations involved in turning ideas for product form into manufacturable components. An active learning approach will be taken, where students engage in practical exercises and projects to develop their knowledge and skills.

## **MATERIALS PROCESSING AND SELECTION I (MATS214)**

**Credits: 7.5 / Semester: semester 1**

This module introduces the main materials processing and manufacturing techniques used to shape metals. It also introduces technologies used to modify the surface properties of metal components, and heat-treatment procedures used to change materials' mechanical properties.

## **MATERIALS PROCESSING AND SELECTION II (MATS210)**

**Credits: 7.5 / Semester: semester 2**

This module covers non-metallic materials and materials selection. The students will understand the processing, microstructure and properties of ceramic, polymer and composite materials. The students will also learn how to derive materials performance indices and select materials for mechanical design.

## **PROJECT MANAGEMENT (MNGT202)**

**Credits: 7.5 / Semester: semester 1**

Project Management is a core skill for professional engineers of all types and a sound education in this subject area is required by the professional accrediting bodies. The knowledge and skills developed in this module will equip students for their future UG project work and for their careers ahead.

This module teaches students the theory of fundamental techniques in project management, risk management, and cost management.

In this modules student undertake a group "virtual project" in which they undertake all stages of project management involved n a major construction projects. The five virtual project tasks require students to apply their theoretical learning; and they provide an opportunity to develop key professional skills.

*Programme details and modules listed are illustrative only and subject to change.*

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## **YEAR THREE**

In year three, you move on to study advanced engineering science and work on complex design engineering projects that reflect real-life in industry.

### **COMPULSORY MODULES**

#### **INDIVIDUAL DESIGN PROJECT (INDD341)**

**Credits: 30 / Semester: whole session**

The Year 3 Individual Design Project; 300 hours student work over 2 semesters; 3 assessment stages: (1) Project Plan and Literature Review (PPLR) – 10%; (2) Interim presentation and viva – 20%; (3) Final report, viva and artefact – 70% .

## **PRODUCT DESIGN GROUP PROJECT (ENGG340)**

**Credits: 15 / Semester: whole session**

This module aims to draw together all the knowledge, understanding and skills acquired on the undergraduate industrial design programme into a single 'capstone' project. Working in groups, students will conceptualise, design and develop a product to the point of initial prototype. This will be assessed through group project work.

## **PRODUCT DEVELOPMENT 3 (ENGG320)**

**Credits: 15 / Semester: whole session**

Following on from Y1 and Y2, this module aims to further develop the student understanding of product development. In an open-ended studio setting, students will build on Y1 and Y2 learning and further gain an understanding and appreciation of getting from an idea to a finished product. Successful students will be able to develop and articulate ideas in the form of sketch work and traditional model prototypes to an advanced level. This will be assessed through project work.

## **ADVANCED MODERN MANAGEMENT (MNGT352)**

**Credits: 7.5 / Semester: semester 1**

The Aims of this module are as follows:

To introduce the student to various aspects of advanced modern management.

To develop a knowledge and understanding of modern management tools.

To stimulate an appreciation of management and its importance in organisational success.

## **MATERIALS DESIGN (MATS303)**

**Credits: 7.5 / Semester: semester 2**

To develop an understanding of the important factors in materials selection and process selection for engineering components' design and manufacture. To develop skills in communication, investigative research, experimental techniques, and team-working, including presentation skills associated with technical posters and wikis.

## **HEAT TRANSFER (MECH301)**

**Credits: 15 / Semester: semester 2**

The aim of this module is to give the students a good understanding of the basic mechanisms of heat transfer and to equip them to solve significant engineering problems.

They will also learn about different designs of heat exchanger and how to carry out performance/design calculations.



## **MECHATRONICS (MECH316)**

**Credits: 7.5 / Semester: semester 1**

This module aims to provide students with an appreciation of the challenges related to the design of Mechatronics systems.

Both hardware and software integration issues will be studied within this module.

General design principles will be introduced first and learning will focus on the popular Arduino platform.

## **MANUFACTURING SYSTEMS (MNFG321)**

**Credits: 15 / Semester: semester 1**

This module investigates how Manufacturing Systems function, considering the interaction of the Manufacturing Systems with external and internal constraints. The module gives special emphasis to the use of Computer Integrated Manufacturing in Manufacturing Systems. A comprehensive overview is given starting with interactions with the Global economy before considering the effects at company and factory level. It then considers the function of Manufacturing Systems within the factory and company level and how this is driven by the function of the machines on the shop floor. It therefore gives a holistic view of how manufacturing systems function at all levels and how the levels interact.

## **MANAGEMENT OF DESIGN (MNGT313)**

**Credits: 7.5 / Semester: semester 2**

To enable students to develop a general understanding of a wide range of aspects of the design function in a manufacturing company and its management, and in particular a comprehensive understanding of the design process.

*Programme details and modules listed are illustrative only and subject to change.*

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## **HOW YOU'LL LEARN**

We are leading the UK's involvement in the international [Conceive-Design-Implement-Operate \(CDIO\)](#) initiative – an innovative educational framework for producing the next generation of engineers.

Our degree programmes encompass the development of a holistic, systems approach to engineering. Technical knowledge and skills are complemented by a sound appreciation of the life-cycle processes involved in engineering and an awareness of the ethical, safety, environmental, economic, and social considerations involved in practicing as a professional engineer.

You will be taught through a combination of face-to-face teaching in group lectures, laboratory sessions, tutorials, and seminars. Our programmes include a substantial practical component, with an increasing emphasis on project work as you progress through to the final year. You will be supported throughout by an individual academic adviser.

## **HOW YOU'RE ASSESSED**

Assessment takes many forms, each appropriate to the learning outcomes of the particular module studied. The main modes of assessment are coursework and examination. Depending on the modules taken, you may encounter project work, presentations (individual and/or group), and specific tests or tasks focused on solidifying learning outcomes.

## **LIVERPOOL HALLMARKS**

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

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# Careers and employability

Our research-led teaching ensures that we incorporate the latest advances in cutting-edge engineering research and our graduates have found employment in a wide range of international industries and organisations.

Recent graduates have gone on to work for companies in the following industries:

- Engineering and Infrastructure: ABB Ltd, Arup, Atkins, Balfour Beatty, Bentley, Corus, Halcrow, Laing O'Rourke, Mott Macdonald, Mouchel, Ramboll, Royal Haskoning, Siemens, Tarmac.
- Aerospace and Aviation: Airbus, British Airways, Jaguar Land Rover, Rolls Royce.
- Construction and Project Management: Costain, Metronet Rail.
- Defence and Military: BAE Systems, British Army, RAF (Royal Air Force), Royal Navy.
- Energy and Utilities: BMI, National Grid Transco, National Nuclear Laboratory, United Utilities.
- Government organizations: Government organisations (not specifically listed), Highways Agency, Network Rail.
- Glass and Materials: Pilkington.
- Technology and Research: QinetiQ.

**4 IN 5 OF OUR ENGINEERING STUDENTS FIND THEIR MAIN ACTIVITY AFTER GRADUATION MEANINGFUL.**

*Graduate Outcomes, 2018-19.*

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# Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

## TUITION FEES

<b>UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)</b>	
Full-time place, per year	£9,250

<b>International fees</b>	
Full-time place, per year	£27,200

*Fees are correct for the academic year 2024/25*

Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support. [Learn more about tuition fees, funding and student finance.](#)

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## ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This may include a laptop, books, or stationery. All safety equipment, other than boots, is provided free of charge by the department.

Find out more about the [additional study costs](#) that may apply to this course.

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## SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to provide tuition fee discounts and help with living expenses while at university.

Check out our [Undergraduate Global Advancement Scholarship](#). This offers a tuition fee discount of up to £5,000 for eligible students starting an undergraduate degree from September 2024. There's also [the Liverpool Bursary](#) which is worth £2,000 per year for eligible students.

[Discover our full range of undergraduate scholarships and bursaries](#)

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# Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	Requirements <a href="#">About our typical entry requirements</a>
A levels	<p>ABB including Mathematics and a second Science.</p> <p>Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is <b>BBB</b> with <b>A</b> in the EPQ.</p> <p>You may automatically qualify for reduced entry requirements through our <a href="#">contextual offers scheme</a>.</p> <p>If you don't meet the entry requirements, you may be able to complete a foundation year which would allow you to progress to this course.</p> <p>Available foundation years:</p> <ul style="list-style-type: none"><li>• <a href="#">Engineering Foundation BEng (Hons) (4 year route including a Foundation Year at Carmel College)</a></li></ul>
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	<p>Mathematics and a second science.</p> <p>Applicants following the modular Mathematics A Level must be studying A Level Physics or Further Mathematics as the second science (or must be studying at least one Mechanics module in their Mathematics A Level).</p> <p>Accepted Science subjects are Biology, Chemistry, Computing, Economics, Electronics, Environmental Science, Further Mathematics, Geography, Geology, Human Biology, Physics, Statistics and Design &amp; Technology – Product Design.</p> <p>For applicants from England: For science A levels that include the separately graded practical endorsement, a "Pass" is required.</p>

<b>Your qualification</b>	<b>Requirements</b> <a href="#">About our typical entry requirements</a>
BTEC Level 3 Subsidiary Diploma	Acceptable at grade Distinction alongside BB in A Level Mathematics and a second science.
BTEC Level 3 Diploma	Distinction Distinction in relevant BTEC considered alongside A Level Mathematics grade B. Accepted BTECs include Aeronautical, Aerospace, Mechanical, Mechatronics and Engineering.
BTEC Level 3 National Extended Diploma	Not accepted without grade B in A Level Mathematics.
International Baccalaureate	33 overall, including 5 at Higher Level Mathematics and Physics.
Irish Leaving Certificate	H1, H2, H2, H2, H3, H3, including H2 in Higher Mathematics and Higher Second Science. We also require a minimum of H6 in Higher English or O3 in Ordinary English.
Scottish Higher/Advanced Higher	Pass Scottish Advanced Highers with grades ABB including Mathematics and a second science.
Welsh Baccalaureate Advanced	Acceptable at grade B alongside AB in A Level Mathematics and a second science.
Cambridge Pre-U Diploma	D3 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade A M2 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade B Global Perspectives and Short Courses are not accepted.
Access	Considered if taking a relevant subject. 42 Level 3 credits at Distinction, including 15 Level 3 credits in Mathematics is

<b>Your qualification</b>	<b>Requirements</b> <a href="#">About our typical entry requirements</a>
	required. GCSE English and Mathematics grade C/4 or above also required.
International qualifications	Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the <a href="#">University of Liverpool International College</a> , means you're guaranteed a place on your chosen course.

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## ALTERNATIVE ENTRY REQUIREMENTS

- If your qualification isn't listed here, or you're taking a combination of qualifications, [contact us](#) for advice
- [Applications from mature students](#) are welcome.

**THE ORIGINAL**

**REDBRICK**