Programme
Guide

International Year One (IY1) Engineering

ONCAMPUS
Achieve more.

Programme Details

Who is this programme designed for?

This programme is designed for international students who do not quite have the academic grades and/or English level to start the first year of an undergraduate degree in the UK, but have a stronger profile than a Undergraduate Foundation Programme student.

All students who successfully complete the IY1 are guaranteed progression to Year 2 of a engineering-related undergraduate degree. This programme is set at level 4, and is equivalent to the first year of an undergraduate engineering degree in the UK.

How long will I study for?

This programme lasts one academic year (nine months). The year is divided into three terms of approximately 10 weeks. On average, you will undertake between 17 and (up to) 23 hours of classroom-based study per week.

Please note: Minimum and maximum hours are estimated, hours may vary depending on the student's academic and English level and may be adjusted throughout their course.

English Language forms up to six hours of your timetable, is compulsory for students who are below the required level for progression, and will be integrated into the teaching of academic subjects as well as being taught separately if you need additional support.

Students who are at or above the required English level for progression are likely to follow a reduced timetable.

You will be expected to timetable self-study hours in addition to the classroom-based hours.

What will I study?

Students on the Mechanical, Biomedical and Electrical Engineering routes at **ON**CAMPUS Hull will study English and six engineering based modules including:

Mathematics for Engineers, Fundamentals of Engineering, Practical Skills for Engineers, Programming and Control, Thermofluids and the Engineering Global Challenge.

How will I be assessed?

You will be assessed at regular intervals throughout the programme to ensure you are making the progress required to successfully complete the programme.

Final assessments for each module will take place in the relevant term. Assessment methodologies are aligned to those that are experienced in a university environment, and include project work, essays, presentations and unseen examinations.

Modules

Modules taught at ONCAMPUS Hull are as shown in the table below. All students will have English incorporated into their study plan.

	ONCAMPUS HULL
Fundamentals of Engineering	✔
Practical Skills for Engineering	✔
Mathematics for Engineers	✔
Thermofluids	✔
Engineering Global Challenge I	✔
Programming and Control	✔

Mathematics for Engineers Module

This module provides you with knowledge of the characteristics of a range of functions and techniques appropriate to engineering, developing expertise in analysis, interpretation and solution of problems.

Starting from the concept of operations between numbers, these concepts are formalised through algebra and given engineering focus through functions and operations. The number base is broadened to include complex numbers which provides the means to solve more difficult mathematical problems. Sequences and series are included, and vectors and matrices are used to formalise solution techniques appropriate to 2D and 3D engineering problems.

Learning Outcomes

01

Recall and use mathematical notation, rules and definitions

AC1.1 Use mathematical language and notation accurately

AC1.2 Recall and use rules and formulae

AC1.3 Understand that mathematical expressions can often be written in more than one form to suit purposes

02

Know a range of mathematical methods and be able to communicate solutions effectively

AC2.1 Demonstrate a sound understanding of mathematical methods outlined in the module content

AC2.2 Use logical reasoning and precise statements to create and present mathematical arguments

AC2.3 Use appropriate diagrams and sketches to create and present mathematical arguments

AC3.4 Present steps of the method clearly within answers

03

Select and apply the correct technique(s) to solve any given problem, drawing conclusions and explaining reasoning

AC3.1 Interpret mathematical language to understand problem requirements

AC3.2 Demonstrate the use of judgement for appropriate tools and techniques to solve any given problem

AC3.3 Show understanding of coherence and progression in maths by connecting methods

AC3.4 Assess the validity of answers and reject solutions based on constraints

AC3.5 Offer explanations for, or interpretations of solutions

TextBooks:

Croft, A. *et al. (2017) Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers.* 5th edn. Harlow: Pearson Education Limited.


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Fundamentals of Engineering Module

This module provides the first introduction to key principles and concepts of engineering. It aims to introduce you to the basic principles of electricity and your application to circuit analysis, and the fundamental principles of digital electronics and digital circuits. This module aims to provide you with the expertise to use the principles of forces, moments, loading, deformation, and basic stress analysis concepts, within the context of mechanical engineering. Recognise materials that are commonly used in technological environments and explain their properties. Interpret the design intent of pre-existing devices and conduct simple design tasks.

Learning Objectives

01

Apply the fundamental principles of electricity to simple electrical circuits

AC1.1 Use appropriate methodology to answer scientific questions and solve scientific problems

AC1.2 Present steps of the method clearly and accurately within answers

AC1.3 Cross transfer knowledge from Practical skills module on same topic

02

Solve and propose solutions for defined mechanical engineering problems and systems from a range of engineering contexts

AC2.1 Apply knowledge and understanding of scientific ideas, processes, techniques, and procedures to given mechanical problems

AC2.2 Explain and interpret solutions in the context of the original problem based on mechanical system diagrams

AC2.3 Show understanding of coherence in mechanical and electronic system by connecting ideas and methods from different topics

03

Use the fundamental principles of engineering to solve problems

AC3.1 Demonstrate understanding of a wide range of theoretical concepts for both electronic and mechanic engineering

AC3.1 Use appropriate apparatus/methods to solve exam-based questions.

TextBooks:

Sclater, N. (2011) *Mechanisms and Mechanical Devices: Sourcebook.* 5th edn. USA: The McGraw-Hill Companies, Inc.

Hibbeler, R.C. (2016) *Engineering Mechanics: Statics.* 14th edn. Harlow: Pearson Education Limited.

Robertson, C.R. (2008) *Fundamental Electrical and Electronic Principles.* 3rd edn. Oxford: Newnes, Elsevier.

Practical Skills for Engineers Modules

Practical skills and the ability to construct and evaluate circuits are essential elements on an engineering degree. This module seeks to introduce these skills. In particular, it aims to provide you with the:

Core professional skills required for and by Engineers.

Essential hands-on experience of practical work to develop your experimental and construction skills within a laboratory environment.

Ability to analyse and present experimental results.

Ability to design and simulate electric and electronic circuits.

Ability to design and build mechanical components.

Essential study skills necessary to study successfully at university.

Learning Outcomes

01

Perform laboratory experiments in a safe and efficient manner

AC1.1 Collect, record and analyse experimental data in a laboratory daybook and present the outcomes using set formal reports.

AC1.2 Use appropriate methodology to answer scientific questions and solve scientific problems.

AC1.3 Recall and use correct formulae and equations to plot graphs for experimental data.

AC1.4 Present steps of the method clearly and accurately within laboratory report

02

Design, simulate and test basic electric and electronic circuits and suggest improvements that can be made, including explaining and interpreting solutions in the context of the circuit's analysis

AC2.1 Transfer critical thinking to simulation software (LTSpice) and make a connection between a sample made in electronic lab to a sample working in simulation software.

AC2.2 Test and record the outcome from simulation (LTSpice software) and design in a consistent approach.

AC2.3 Suggest improvements that can be made based on final results data.

03

Design and construct printed circuit boards using Eagle CAD software

AC3.1 Demonstrate basic understanding of Eagle CAD software.

AC3.2 Draw basic circuits using Eagle CAD.

04

Demonstrate practical skills to manufacture a set of components that can be assembled to produce a functional product

AC4.1 Work safely around heavy machinery in the mechanical workshop

AC4.2 Design and assemble a functional product.

AC4.3 Follow instructions from technicians in a mechanical workshop environment.

AC4.4 Work as a group with other peers in a mechanical workshop environment.

TextBooks:

Hughes, E. et al. (2016) *Electrical & Electronic Technology.* 12th edn. Harlow: Pearson Education Limited.

Kirkup, L. (1995) *Experimental Methods: An Introduction to the Analysis and Presentation of Data.* John Wiley & Sons Australia, Ltd.

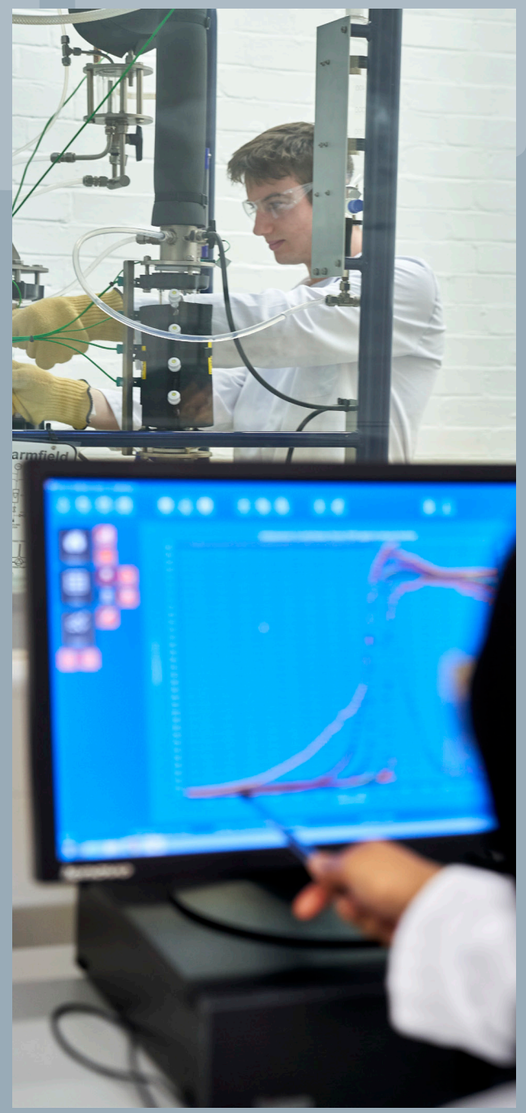
Programming and Control Module

This module aims to provide a basic introduction to techniques for solving differential equations and introduce elements of microprocessor hardware and software. The module will provide you with:

Familiarity with the functions and commands using MATLAB and SIMULINK.

An introduction to the Syntax of the C language and how it is used through programming exercises.

Knowledge of digital logic functions and structures required to identify the purpose of programs and make corrections to the code.



Learning Outcomes

01

Demonstrate an understanding of MATLAB functions and m-file coding

AC1.1 Evaluate function commands, selecting and applying the correct notation and input

AC1.2 Deduce errors in m-file coding by inspection and suggest improvements

AC1.3 Critique the different approaches and functions that can be applied to solve problems

AC1.4 Apply knowledge of customisation options for graphing tools to present 2D and 3D graphs with a required format

AC1.5 Apply understanding of matrices, vectors and arrays to support efficient calculations

02

Apply appropriate methodologies to create SIMULINK simulations of numerical solutions for calculus and vector equations

AC2.1 Select and apply the correct blocks and customisation options to simulate a function

AC2.2 Apply knowledge of MATLAB to create custom embedded functions to make calculations in SIMULINK more efficient

AC2.3 Demonstrate that inputs and outputs can be transferred between MATLAB and SIMULINK

03

Examine the Syntax of the C language and compare its use through programming exercises

AC3.1 Outline the names and explain the use of commands used in C programming

AC3.2 Demonstrate an awareness of the required stages of code development, compilation and debugging

AC3.3 Identify the purpose of a program by applying knowledge of syntax

AC3.4 Critically evaluate errors and inefficiencies in an example code and suggest corrections to make improvements to the code

04

Develop the knowledge of digital logic structures to identify the purpose of a function and critique example coding

AC4.1 Identify and explain the meaning and purpose of combinational logic gates

AC4.2 Calculate the outcomes of combinational logic functions such as multiplexers and adders

AC4.3 Represent numerical values in digital formats such as Binary and Hex by following algorithms

AC4.4 Evaluate the outcomes of algorithms or programmes using sequential logic functions

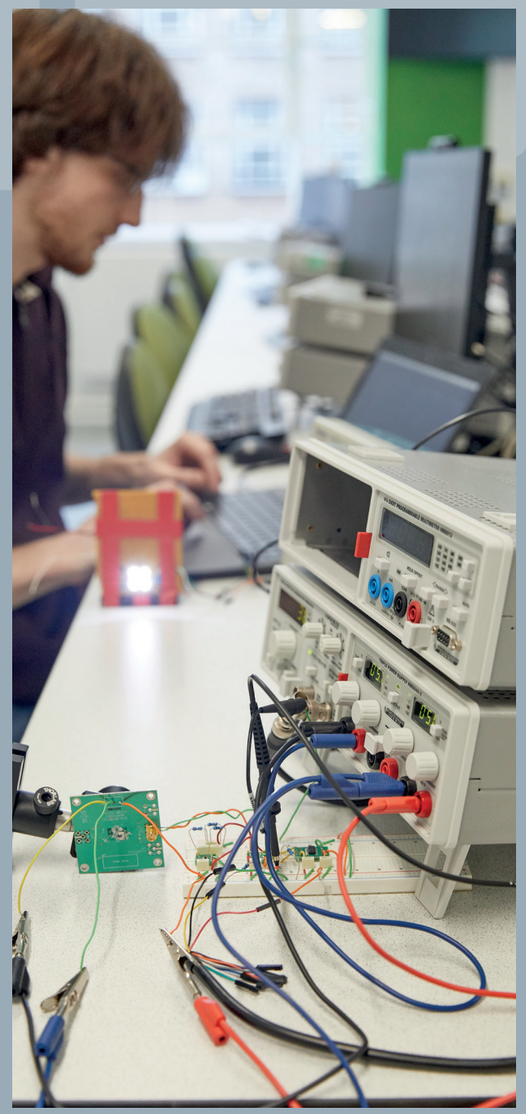
TextBooks:

Moore, H. (2011) *MATLAB for Engineers.* 3rd edn. Harlow: Pearson Education Limited.

Thermofluids Module

This module aims to provide you with the knowledge, comprehension and hands-on experience of using a range of mathematical functions and techniques appropriate to engineering and the application of Engineering Thermodynamics to engineering processes.

In particular, this module aims to provide you with the expertise to use Engineering Thermodynamics to determine the thermodynamic outcome of a range of engineering processes and apply mathematical techniques to solve engineering problems.



Learning outcomes

01

Recognise, explain, and use the laws of thermodynamics to solve engineering problems

AC1.1 Recall and use rules and formulae for Zeroth ,1st and 2nd Law of Thermodynamics and temperature measurement.

AC1.2 Understand and explain Thermodynamic cycles and applications and be able to give examples of such systems.

AC1.3 Recognise and explain basic concept and definition of any system within thermodynamics laws.

02

Recognise, explain, and use the laws of fluid mechanics to solve engineering problems.

AC2.1 Recall and use rules and formulae for dimensionless analysis.

AC2.2 Use appropriate diagrams and sketches to create and present fluid mechanic systems.

AC2.3 Present steps of the method clearly within answers.

03

Apply knowledge and understanding to solve problems involving subject contexts

AC3.1 Convert thermodynamics problems written in contexts into mathematical processes

AC3.2 Offer explanations for, or interpretations of, solutions in the context of the original problem

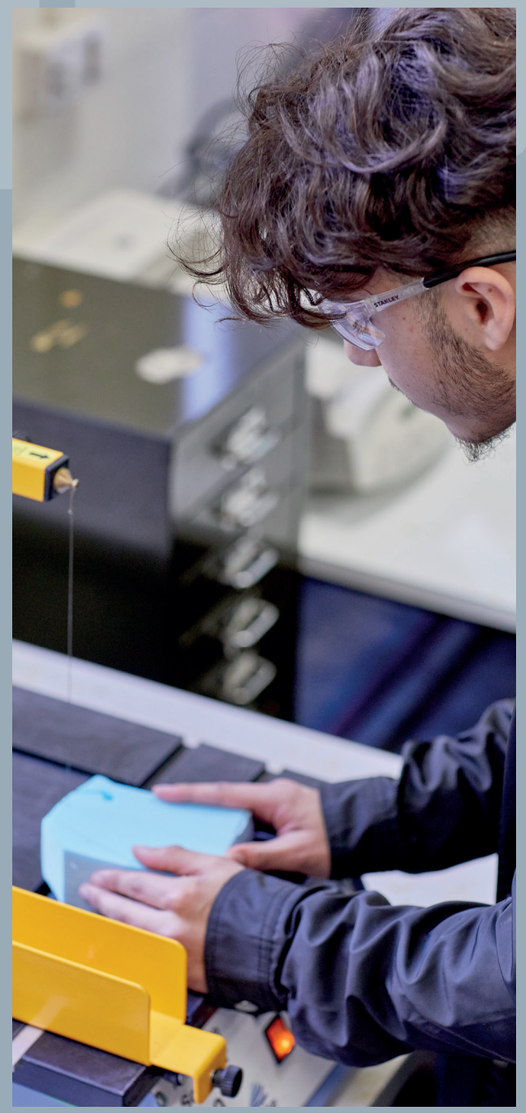
TextBooks:

Reisel, J.R. (2021) *Principles of Engineering Thermodynamics.* 2nd edn. Boston: Cengage.

Çengel, Y.A. and Cimbala, J.M. (2018) *Fluid Mechanics: Fundamentals and Applications.* 4th edn. New York: McGraw-Hill Education.

Engineering Global Challenge 1 Module

This module provides you with knowledge of the characteristics of a range of functions and techniques appropriate to engineering, developing expertise in analysis, interpretation and solution of problems. You will develop your understanding of Engineering Global Challenge for solving real engineering problems and project management. It will also give you the opportunity to apply your knowledge to real-life contexts and prepares them for future undergraduate studies across multiple disciplines with group project approach.



The module will:

Introduce the concept of an interdisciplinary 'global challenge'

Enable you to develop and practise key study skills

Introduce basic concepts of health and safety, ethics, inclusivity, and risk management

Enable you to develop IT skills appropriate to further study in an engineering context.

Introduce computer aided design techniques to develop core skills.

Learning Outcomes

01

Provide evidence of how to identify hazards and risks and describe processes for ensuring safe operating procedures to make effective use of the 3D printing laboratory

AC1.1 Explain the basic concepts of health and safety, ethics, inclusivity and risk management.

AC1.2 Complete a risk assessment in accordance with the university's policies.

AC1.3 Evaluate the material properties, precision and efficiency of 3D printed designs.

02

Identify and describe roles within engineering project teams and help to plan and manage a given project as part of a team

AC2.1 Develop and practise study skills, including taking effective notes from lectures and seminars, organising personal and private study time, learning independently, time management.

AC2.2 Develop interdisciplinary team working and leadership skills, and project planning and management skills.

AC2.3 Peer assess the practice of other team members' approach to the project by applying your learning

03

Apply computer aided design techniques to design and model components

AC3.1 Demonstrate basic competence in the use of SolidWorks software.

AC3.2 Develop IT skills appropriate to further study in an engineering context

04

Develop written and spoken communication skills appropriate to first year Engineering students

AC4.1 Explain the concept of an interdisciplinary 'global challenge' in written and spoken form.

AC4.2 Write a report that explains the approach taken to non-subject specialists

AC4.3 Summarise the main findings and identify areas for improvement

TextBooks:

Mantel, S.J. et al. (2011) *Project Management in Practice: International Student Version.* 4th edn. John Wiley & Sons.

Nicholas, J.M. and Steyn, H. (2016) *Project Management for Engineering, Business and Technology.* 5th edn. Routledge.

Example Timetable

Please note this is an example timetable and will vary for every student. Students should anticipate lessons starting earlier than 9am or later than 5pm. Students will be expected to allocate self study and revision hours within their timetable which will be given at the start of the academic term.

	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
Mon	Fundamentals of Engineering	Fundamentals of Engineering		Lunch	Practical Skills for Engineers	Practical Skills for Engineers		
Tues		Practical Skills for Engineers	Practical Skills for Engineers	Lunch	English	English		
Wed	Practical Skills for Engineers	English	English	Lunch	Fundamentals of Engineering	Fundamentals of Engineering		
Thur		Fundamentals of Engineering	Fundamentals of Engineering	Lunch	English	English		Practical Skills for Engineers
Fri	**Personal Tutorial**	Practical Skills for Engineers	Practical Skills for Engineers	Lunch	Fundamentals of Engineering	Fundamentals of Engineering		

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