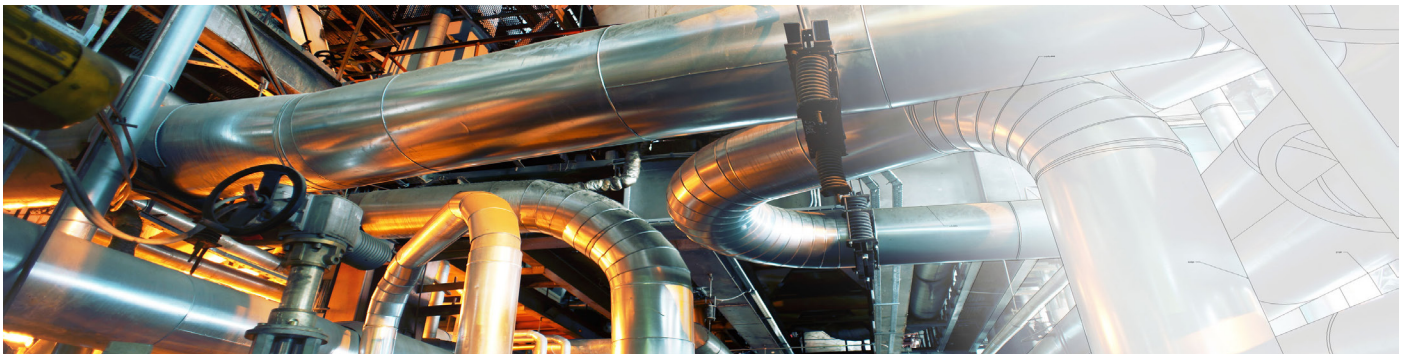
Advanced Heat Engineering

MSc, PgDip, PgCert



Highly skilled and knowledgeable heat engineers are urgently needed to transition our heat systems to a green, sustainable footing. Accredited by the Institution of Mechanical Engineers, the Advanced Heat Engineering MSc will equip you with the state-of-the-art, forward thinking technical knowledge and skills required to help achieve energy efficiency and reduce heat derived environmental pollution. Closely aligned with industry, with real-world case studies and research projects at its core, this course will enable you to develop a successful and rewarding career as an environmentally aware heat engineering professional, able to make a significant contribution towards a greener, net zero future.

Who is it for?

This course is interdisciplinary and designed for engineering graduates, practising engineers or physical science graduates who wish to develop a successful career as an environmentally aware heat systems professional.

The course will equip you with knowledge that can be directly applied to help various sectors with their process heat efficiency, heat systems engineering, competitiveness, energy costs and pollution control standards.

Course structure

- Eight taught modules (40%),
- Group project (full-time students) or dissertation (part-time students) (20%),
- Individual research project (40%).

Informed by industry

The Advanced Heat Engineering MSc is closely aligned with industry to ensure that you are fully prepared for your career.

- Close engagement with the energy sector has produced long-standing strategic partnerships with a wide range of prominent organisations, including Alstom Power, BP, Cummins Power Generation, Doosan Babcock, E.ON, Npower, Rolls-Royce, Shell, Siemens and Total,
- Knowledge gained working with our industrial clients is continually fed back into the teaching programme to ensure that you benefit from the very latest knowledge and techniques affecting industry,
- We have a world-class reputation for industrial-scale research facilities and pilot-scale demonstration programmes in the energy field,
- Our strategic links with industry ensure everything taught on the course is relevant, timely and meets the needs of organisations competing within the energy sector, making our graduates some of the most desirable in the world,
- The course is accredited by the Institution of Mechanical Engineers and The Energy Institute, ensuring professional recognition and relevance to employers.

Future career

There is a considerable, and increasing demand for environmentally aware energy specialists with in-depth technical knowledge combined with practical and management skills. This course will provide knowhow on the low carbon heat and energy systems both at the system and component level, to prepare you as a graduate engineers to meet under-served market requirements.

Whilst we focus our courses on real world commercial situations, preparing you to make rapid and meaningful contributions for you next employer, and improving your employment and career prospects, our courses also prepare you for further studies such as PhDs for those minded towards a career in academic research.

Key information

Duration:
MSc: one year full-time, two to three years part-time.
PgDip, PgCert: one year full-time, two years part-time.

Start date:
Full-time: October.
Part-time: October.

Qualification:
MSc, PgDip, PgCert.

Location:
Cranfield campus.

Entry requirements
A first or second class UK Honours degree in mathematics, physics or an engineering discipline. Other recognised professional qualifications or several years relevant industrial experience may be accepted as equivalent; subject to approval by the Course Director.

Overview of taught modules

Compulsory modules

(all the modules in this list need to be taken as part of this course).

Advanced Heat Exchanger Design
Heat exchangers are critical to a wide variety of engineering applications and power to chemical plants. Any process changes leads to intensive replacement of these heat exchangers, hence this module provides in depth understanding of practically proven heat exchanger technologies and its limitations. This module will provide a good mix of state-of-the-art technologies and novel designs using interactive case studies and rigorous design strategies for an efficient heat exchanger sizing, specification and its operational performance.

Applied Thermal Energy Systems
You will be provided with an in-depth applied knowledge for different thermal energy systems to help spur the next industrial revolution for improving efficiency, reducing water consumption and efficient ways of utilising waste heat streams. During this module you will learn how to develop these integrated schemes and play an important role in thermodynamic modelling, data collection, analysis, and prediction of the performance and control of these advanced/ applied thermal systems.

Computational Fluid Dynamics for Industrial Processes
During this module you will be introduced to the CFD techniques and tools for modelling, simulating and analysing practical engineering problems with hands on experience using commercial software packages used in industry.

District Heat Networks
This module will demonstrate approaches for low carbon heat networks that can incorporate a range of low to zero carbon heat sources. This module will also include sustainable hydrogen production to use it as fuel, heat pump electrification as well as waste heat from various industrial processes. Advancements in heat energy efficiency will be considered for emissions reduction in the performance of public and commercial buildings.

Engineering Project Management
The purpose of this module is to provide you with experience of scoping and designing a project. The module provides sessions on project scoping and planning, including project risk management and resource allocation. A key part of this module is the consideration of ethics, professional conduct and the role of an engineer within the wider industry context.

Industrial Thermal Operations
Heat consumption accounts for a large proportion of greenhouse gas emissions. Industrial and commercial sectors use large quantities of heat in the preparation or treatment of materials used to manufacture goods and to provide services. You will cover a wide variety of recent developments in thermal driven technologies to enhance energy efficiency and to improve environmental performance. In addition, this module also evaluates usage of renewables to provide industrial process heat while replacing fossil fuels use.

Process Design and Simulation
You will be introduced to the modern techniques and computer aided engineering tools for the design, simulation and optimisation of process systems. Via a large share of process simulation and optimisation case studies, the module will enable you to gather the hands-on experience of using the commercial software.

Thermal Energy Systems
This module provides an understanding of the fundamentals of operation, configuration and characteristics of thermal energy systems. You will also learn how to apply these for the design of energy-efficient furnaces and boilers, as well as the key implementation issues of various types of power plant.

Group project

The group project enables you to put the skills and knowledge developed during the taught modules into practice in an applied context, while gaining transferable skills in project management, teamwork and independent research. Projects are often supported by industry and potential future employers value this experience. The group project is normally multidisciplinary and shared across the Energy and Power MSc programme, giving the added benefit of working with students with other specialisms.

Each group is given an industrially relevant problem to solve. During the project you will develop a range of skills including learning how to establish team member roles and responsibilities, project management, and delivering technical presentations. At the end of the project, all groups submit a written report and deliver a poster presentation to industry partners. This presentation provides the opportunity to develop presentation skills and effectively handle questions about complex issues in a professional manner.

Individual project

The individual research project allows you to delve deeper into a specific area of interest. As our academic research is so closely related to industry, it is common for our industrial partners to put forward real practical problems or areas of development as potential research topics. The individual research project component takes place between April and August.

Accreditation and Rankings

This MSc degree is accredited by the Institution of Mechanical Engineers (IMechE) and the Energy Institute.

Institution of MECHANICAL ENGINEERS

energy institute Accredited Course

According to QS World University Rankings 2020, Cranfield is fifth for mechanical, aeronautical and manufacturing engineering education in the UK.

QS WORLD UNIVERSITY RANKINGS 2020
ENGINEERING - MECHANICAL, AERONAUTICAL & MANUFACTURING
TOP 50

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