This MSc deals with the design, operation, optimisation and control of all kinds of chemical, physical, and biological processes through the use of systematic computer-aided approaches. The course equips graduates and practicing engineers with the technical knowledge and skills to solve major engineering challenges at process design, operation, and control stages. It also focuses on the development of concepts, methodologies and models performance prediction of the system to support investment decision-making process. As a result, our graduates are some of the most desirable in the world for recruitment.

Constituting an interdisciplinary research area within the chemical engineering discipline, this course focuses on the use of experimental techniques and systematic computer-aided methodologies for the design, operation, optimisation and control of chemical, physical, and biological processes, from chemical and petrochemical processes to pharmaceutical and food processes.

A distinguished feature of this course is that it is not directed exclusively at chemical engineering graduates. Throughout the years, the course has evolved from discussions with industrial advisory panels, employers, sponsors and previous students. The content is updated regularly to reflect changes arising from technical advances, economic factors and changes in legislation, regulations and standards.

Who is it for?

This course is suitable for engineering and applied science graduates who wish to embark on successful careers as process systems engineering professionals.

The course equips graduates and practising engineers with an in-depth knowledge of the fundamentals of process systems and an excellent competency in the use of state-of-the-art approaches to deal with the major operational and design issues of the modern process industry. The course provides up-to-date technical knowledge and skills required for achieving the best management, design, control and operation of efficient process systems.

Course structure

- Eight taught modules (40%),
- Group project or dissertation: (20%),
- Individual research project (40%).

Informed by industry

Our world-class reputation for industrial-scale research facilities and pilot-scale demonstration programmes in the energy area and close engagement with the energy sector over the last two decades has produced long standing strategic partnerships with the sectors most prominent players including: Alstom Power, BP, Chevron, Conoco Philips, Emerson Process Management, npower, RWE, Shell, Siemens, Total.

Future career

Industry driven research makes our graduates some of the most desirable in the world for recruitment. This MSc can take you onto a challenging career in industry, government or research. The course reflects the strengths and reputation of Cranfield particularly in the energy and management sectors.

Graduates of this course have been successful in gaining employment in the following roles:

- Subsea Engineer
- Telecommunications Engineer
- Process Engineer
- Layout and Material Flow Engineer
- Project & Continuous Improvement Engineer
- Senior System Engineer

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 (or equivalent) in a engineering or applied science discipline. Other recognised professional qualifications or several-years relevant industrial experience may be accepted as equivalent; subject to approval by the Course Directors.
Overview of taught modules

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

**Advanced Control Systems**
The aim of this module is to introduce fundamental concepts, principles, methodologies, and application for the design of advanced control systems for industrial applications.

**Computational Fluid Dynamics for Industrial Processes**
This module introduces the CFD techniques and tools for modelling, simulating and analysing practical engineering problems with hands-on experience using commercial software packages used in industry.

**Management for Technology**
This module covers the importance of technology leadership in driving the technical aspects of an organisations products, innovation, programmes, operations and strategy, especially in today’s turbulent commercial environment with its unprecedented pace of technological development.

**Process Design and Simulation**
This module aims to introduce you 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.

**Process Measurement Systems**
You will learn how to apply a systematic approach to the design of measurement systems for industrial process applications. The fundamental concepts, key requirements, typical principles and key applications of industrial process measurement technology and systems will be highlighted.

**Process Plant Operations**
Providing an overview of the fundamental principles of typical unit operations in process plants.

**Risk and Reliability Engineering**
You will learn about the principles of risk and reliability engineering and associated tools and methods to solve relevant engineering problems in industry. This includes the risk management process and reliability analysis techniques.

**Thermal Systems Operation and Design**
Design of optimum thermal and energy storage systems is one of the key prerequisites to enhance the performance and efficiency of conventional and future energy systems. This module aims to enable you to combine and apply the principles of heat transfer, thermodynamics and fluid mechanics in the design and optimisation of commercial thermal systems. In addition, the module introduces you to a wide range of challenges and opportunities in waste heat recovery and energy storage, and provides you with practical approaches and solutions to enhance the system efficiency.

**Group project**
The Group Project enables you to put the skills and knowledge developed during the course modules into practice in an applied context while gaining transferable skills in project management, teamwork and independent research. The group project is usually sponsored by industrial partners who provide particular problems linked to their plant operations. Projects generally require the group to provide a solution to the operational problem. Potential future employers value this experience.

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 presentation to the industrial partner.

**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.

Recent individual research projects include:
- Optimization frameworks for the design and planning of oil and gas supply chains.
- Operational planning and maintenance of utility systems.
- Optimal design and planning of biomass supply chains.

**Accreditation and Rankings**
This MSc degree is accredited by the Institution of Mechanical Engineers (IMechE).

Cranfield ranks 5th in the UK for mechanical, aeronautical and manufacturing engineering in the QS World University Rankings 2019.

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