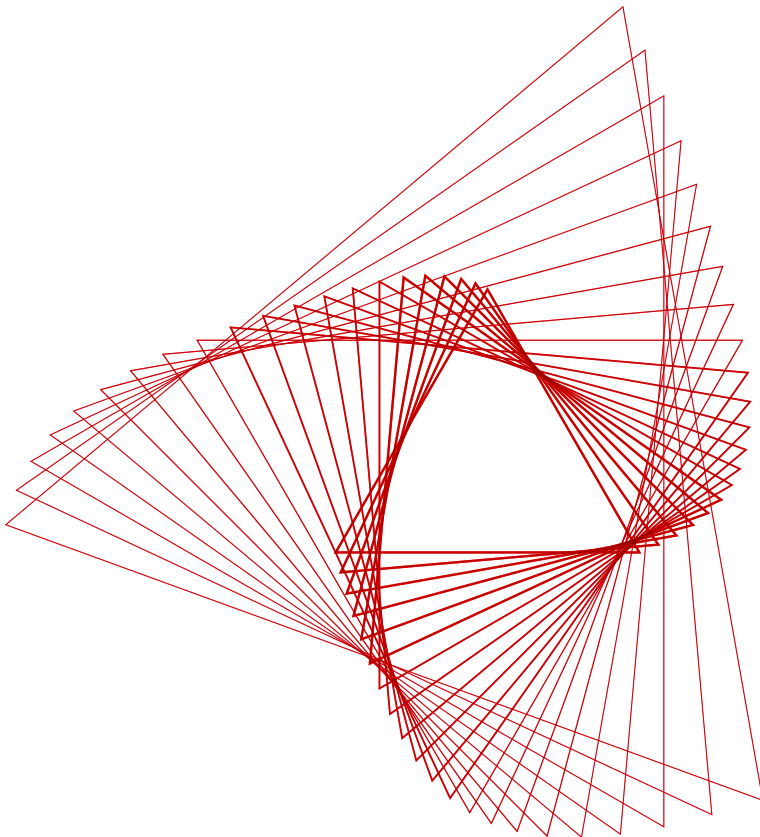


Petroleum and Renewable Energy Systems Engineering

Postgraduate Programmes 2010



Petroleum and Renewable Energy Systems Engineering

MSc

Petroleum Downstream Technology

There is no doubt that people are going to be dependent on oil-based transport fuels and chemical products for the foreseeable future. Those employed in this industry are challenged with an ever-increasing need to improve the efficiency of their processes.

Refining capacity for the upgrading of heavy oil is set to increase over the coming years, with many new units planned or under construction. The petrochemical industry as a whole is facing a major demographic challenge, as the average age of those with engineering expertise is increasing. As a result of these factors there is a growing shortage of fresh engineers with relevant skills in this business area.

This programme aims to address this problem by supplying modules that are highly relevant to the effective operation and management of refineries and downstream petrochemical plant.

As well as possessing excellent technical skills, the modern downstream engineer requires economic and business skills, augmented by skills in leadership and management. This MSc addresses all three skill sets.

The programme has been specifically tailored to provide individuals with the skills needed to operate as an effective leader and decision maker in the petrochemical refining and downstream processing industries. Challenges to be met by the industry include increased adaptability to feedstock quality variation, improvements to operational efficiency and compliance with ever-tightening product quality specifications, emissions constraints and safety legislation.

The great strength of the programme stems from the synergistic collaboration between KBC and the Chemical Engineering Department at the University of Surrey. KBC is a well established independent consultancy and provider of services to the refining and petrochemical industry with many years of experience. Chemical Engineering at the University of Surrey is renowned for its excellence in teaching and research.

This is an MSc delivered by professionals for professionals.

Module Overview

The full programme comprises eight taught modules and a research project. Each taught module will involve preparatory reading, attendance at the University for five days of tuition and a work-based assignment to be submitted for assessment post-tuition.

The research project would normally be conducted at the company and would be directly relevant to the employer's business, whilst also meeting the University's standards for an MSc thesis. All work-based information will remain confidential. The MSc thesis will remain confidential and unpublished for up to ten years if required.

Production Optimisation 1

This module provides participants with an understanding of oil and product market economics, the key global crude, feedstock and product flows, global supply and demand of crude and products, along with other key determinants such as transportation routes and costs, and the evolution of petroleum product quality specifications.

Production Optimisation 2

This module provides delegates with an overview of the typical technologies employed in oil refining, petrochemical production and lubricant manufacturing facilities.

Maintenance, Reliability and Safety

This module brings together effective maintenance strategies and process safety through description of predictive and preventive maintenance processes, routine maintenance scheduling best practices using a risk management approach, and major plant turnaround plan development and execution.

Energy Optimisation and Hydrocarbon Loss Minimisation

This module explores effective tools and methods to support benchmarking and optimising plant energy consumption and measuring, reporting and reducing environmental impact.

Production Information and Control

This module addresses key features of these systems, presents best practices in the definition of model-based performance monitoring systems and explores the fundamentals of advanced and multivariable control systems. Direct experience of these concepts is provided through hands-on use of process simulation.

Continuous Improvement

This module provides participants with the tool-kit and methodology to develop continuous improvement strategies and implement them within their plant.

Capital Project Development

This module explains effective capital project development processes, best practices and tools, and examines the impact of applying these on project financial returns and risk mitigation.

Leadership, Management and Human Performance

This module examines key leadership and management strategies required for safe and profitable plant operation and performance. Key skills are developed using dynamic teaching methods, including a hands-on pilot plant exercise that enables individuals to apply these best practices within a realistic operating environment.

Research Project

The research project is based on industrial implementation of any aspect of the taught modules, or a piece of conventional research on a topic allied to the programme. This will be conducted away from the University. Guidance during the project is available by contact with experienced tutors. The research project will be undertaken after completion of all the taught modules.

Other Programmes You May Be Interested In

- Information and Business Systems Engineering
- Information and Process Systems Engineering
- Process and Environmental Systems Engineering
- Process Systems Engineering

Factfile

Typical entry requirements

A good first degree in Chemical Engineering, Mechanical Engineering or equivalent.

Practitioners with suitable qualifications and relevant experience in engineering, science or technology are also welcome to apply.

Programme structure

The MSc degree is awarded for the successful completion of all modules and a research project. Postgraduate Certificates can be awarded for successful completion of any four taught modules. Alternatively a Postgraduate diploma can be awarded for successful completion of all eight taught modules.

Programme length

Minimum recommended time for completion of the MSc is three years, (based on four modules per year plus a research project in the third year). The maximum time for completion is six years.

Start dates

October

Programme Director

Dr Jamie Cleaver

KBC Programme Director

John Young

Contact Details

For general enquiries:

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E: pg-enquiries@surrey.ac.uk

www.kbc.at.com

For admissions enquiries:

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...the Masters degree will make a unique contribution to the continuing professional development in the field of petroleum downstream technology and will benefit from the synergies created through the collaboration of the University with KBC.

University Validation Board

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MSc

Petroleum Refining Systems Engineering

Developed in response to the worldwide shortage of qualified engineers in the relevant industries, this programme is suitable for graduates in an engineering, science or technology subject with an interest in pursuing a successful career in the energy or petrochemical sectors.

This programme will equip you with the essential knowledge and skills required to work as an engineer in the oil, gas and petrochemical sectors. The key learning outcomes are an understanding of oil refining and associated downstream processing technologies, operations and economics; process safety and operations integrity; and methods for the optimal design of process systems.

The compulsory modules combine petroleum refining (technologies, operations and economics) and systems engineering (modelling and simulation, optimisation, and process design and integration). In addition, optional modules provide opportunities to learn about the general economics of the energy sector, oil exploration and production, as well as renewable energy systems. This combination allows you to gain a breadth of knowledge and keep abreast of the rapid changes taking place in the energy sector.

All of the programme's taught modules are delivered by highly experienced experts, including Surrey engineering and economics academics as well as specialist external lecturers.

Furthermore, study of the various aspects of petroleum refining will be augmented by unique work assignments at a virtual oil refining and chemical company.

Compulsory Modules

Refinery and Petrochemical Processing

This module provides an understanding of refining and immediate downstream petrochemical processing. Specifically, you will gain a holistic understanding of refinery systems and the family of hydrocarbon products (and their individual processing steps and corresponding technologies), and grasp the principles for improving refinery economics.

Process Safety and Operations Integrity

This module provides an understanding of the principles for analysing and tackling major hazards and operational problems in refineries and petrochemical plants. Specifically, you will become aware of major types of operational and safety problems, and understand the causes and consequences of individual types of problems, as well as the ways of handling them. You will also master the methods of HAZOP and HAZAN and be able to apply the principles of operations integrity management.

Process and Energy Integration

This module develops an understanding of process integration, highlighting solution strategies for the synthesis of energy recovery networks in the context of the overall flowsheets of processing plants and utility systems. The principle and methods apply to refinery, petrochemical and other processes.

Process Modelling and Simulation

This module provides an introduction to the concepts and tools for mathematical modelling and simulation of refinery, petrochemical and other process systems. Specifically, you will acquire knowledge on types of modelling tools and gain experience of applying the standard simulation tools commonly employed in the industrial workplace.

Process Systems Design

This module develops your understanding of how to systematically synthesise and design refinery, petrochemical and other process systems. It will cover process synthesis and integration technologies that reduce the costs and environmental impact of chemical plants, with a particular focus on reaction and separation.

Optimisation and Decision Making

This module develops an understanding of the technology available for optimising process systems, business models and operations. You will be provided with state-of-the-art versions of modelling and optimisation approaches in order to understand both the potential and the limitations of available techniques.

Dissertation

This project provides an opportunity for you to pursue a single topic in depth and to demonstrate evidence of research potential for the Masters award. You are encouraged to either research a new concept or apply existing technology in a new field. A number of dissertations are carried out in collaboration with industry. Through this module, you will be able to approach an open-ended topic to research new ideas and experiment with new technologies.

Optional Modules

- Petroleum Exploration and Production
- Energy Economics and Technology
- Economics of International Oil and Gas
- Renewable Energy
- Sustainable Development
- Research Methods

Other Programmes You May Be Interested In

- Information and Business Systems Engineering
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Typical entry requirements

A good honours degree or an overseas equivalent in an engineering, science or related subject. Practitioners with suitable qualifications and relevant experience in engineering, science or technology are also welcome to apply.

Programme length

12 months full-time

Planned intake

Up to 25

Start date

October

Funding

Some overseas students can apply for a CSSS award if in possession of a First class honours degree or equivalent in engineering.

Programme Director

Dr Aidong Yang

Contact Details

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“Our combination of modules allows you to gain a breadth of knowledge and keep abreast of rapid changes taking place in the energy sector.”

MSc

Renewable Energy Systems Engineering

Developed in the context of the rapid development of the renewable energy industry, this programme is suitable for graduates from engineering, science or other relevant subjects with an interest in pursuing a successful career in research, technological development and management, and commercialisation of renewable energy systems.

The programme investigates both renewable energy and systems technologies in order to produce scientific researchers and engineers who are competent in the R&D and engineering tasks applicable to the renewable energy and sustainable development sectors.

The key learning outcomes are a global understanding of the major types of renewable energy technologies, in-depth knowledge of the technology for biomass-based renewable energy, and knowledge and skills in systems modelling and optimisation.

The compulsory modules explore both renewable energy technologies and systems engineering. The latter complements the former and aims to enhance your skill set, particularly with respect to systems modelling, analysis and optimisation, which are important for turning renewable energy concepts into successful technologies, systems and policies.

The optional modules provide you with opportunities to learn about energy sector economics, supply chain management and sustainable development to further broaden your relevant knowledge. All of the programme's taught modules are delivered by highly experienced experts, including University of Surrey academics and specialist external lecturers.

Compulsory Modules

Renewable Energy

The module provides a systematic understanding of current knowledge, problems and insights in the field of renewable energy technologies and enables you to evaluate renewable energy technologies, develop critiques and propose solutions. It covers the production, collection and storage of different types of renewable energy, including solar, wind, biological, geothermal, hydro, tide and wave, and fuel cells.

Biomass Processing Technology

This module provides an in-depth understanding of the processes and technologies for sustainable use of biomass in producing energy and chemical products. You will acquire knowledge of first- and second-generation biofuel production processes, understand the concept of bio-refineries, and examine the integration of biomass-based production and conventional oil refining.

Renewables Technology and Business Seminars

This series of presentations from external industrial, governmental and academic speakers keeps you informed of the latest achievements in renewable energy development, as well as the current and future challenges and major ongoing efforts in this field.

Process Modelling and Simulation

This module provides a systematic introduction to the concepts and tools for mathematical modelling and simulation of chemical, thermochemical and biochemical process systems. Specifically, you will acquire knowledge on types of modelling tools and gain experience in applying the standard simulation tools commonly employed in industrial workplaces.

Process Systems Design

This module develops your understanding of how to systematically synthesise and design process systems. It will cover process synthesis and integration technologies that reduce the costs and environmental impact of chemical plants, with a particular focus on reaction and separation.

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Optional Modules

- Supply Chain Management
- Process and Energy Integration
- Energy Economics and Technology
- Economics of International Oil and Gas
- Sustainable Development
- Research Methods

Other Programmes You May Be Interested In

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Programme length

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Every effort has been made to ensure the accuracy of the information contained in this brochure at the time of going to press. The University reserves the right, however, to introduce changes to the information given including the addition, withdrawal or restructuring of degree programmes.

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