UNIVERSITY OF BIRMINGHAM | SCHOOL OF CHEMICAL ENGINEERING

CHEMICAL ENGINEERING

Degrees in Chemical Engineering

Chemical Engineering is key to solving many issues affecting our quality of life. We support many areas of industry, increasingly focused on high-value chemicals and products which deliver the right molecule to the right place at the right time.

2ND IN THE UK FOR CHEMICAL ENGINEERING
(GUARDIAN LEAGUE TABLE 2018)

We invent new products, it may be a molecule added to an aviation or automotive fuel to improve engine performance and economy or the components within a chocolate bar that make it taste delicious. Chemical engineers design and operate safe and economic processes which make novel products and materials with minimum environmental impact. A chemical engineer is concerned with product development, production and delivery.

At Birmingham, our staff and research students work on a diverse range of projects including;

- Testing of novel catalyst formulations and reactor designs for the development of waste-free chemical reactors (reaction engineering)
- Processing of heavy oil to maintain the world's energy supplies
- Development of processes to produce chemicals from waste
- Understanding of how mixing and heating affects the flavour and texture of foods (food processing)
- Culturing of cells in order to construct replacement parts of the human body (tissue engineering)
- Engineering of cells to make drugs and the development of improved formulations for their delivery (pharmaceutical manufacture)

Our undergraduates get involved with these projects throughout their time with us, which equips them with knowledge of the latest exciting developments in these fast-moving fields and enables them to continue to develop their expertise in their future careers.

Chemical Engineering at Birmingham

Birmingham has one of the largest concentrations of Chemical Engineering expertise in the UK, with a reputation that is second to none in learning, teaching and research. This reputation is reflected by our rating for research, we are in the top 5 Chemical Engineering schools in the UK, with a large proportion of our research judged to be world-leading and internationally excellent.

Our teaching expertise is reflected by our consistently high placing in *the Guardian* League Table, where for consecutive years we have been placed third. We consistently achieve excellent results in the National Student Survey (NSS).

The School was awarded the Queen's Anniversary Prize in 2011 for Higher Education in recognition of our pioneering research in micro-structured materials and an outstanding track record in collaborative research and training with UK and multinational companies involved in process engineering.

Chemical Engineering at Birmingham combines teaching from lecturers who are global experts in their field, with leading-edge teaching facilities and laboratories to enhance the learning experience for our students. We also have strong links with key employers who provide projects and work placements for our students and regularly recruit our graduates, including Procter & Gamble, BP, ConocoPhilips, ExxonMobil, Mondelez, Unilever, AstraZeneca and GlaxoSmithKline.

Chemical Engineering is dynamic and evolving. We produce graduates who can function in today's fast changing industrial marketplace as well as giving our students a solid technical background, our graduates are highly numerate and have skills in problem solving, team working, communication and Information Technology. These skills are developed throughout the course and students have the opportunity to attend a weekend team-building course at Coniston in the Lake District. Our graduates go on to achieve in a variety of successful careers both within and outside the chemical industry.

Features and facilities

- A multi-million-pound investment in new state-of-the-art buildings with purpose built laboratories
- All courses accredited by the Institution of Chemical Engineers (IChemE)
- A broad degree programme to meet the requirements of a diverse modern chemical industry
- A long history of graduates achieving board level in major companies
- Advanced computational equipment, excellent library and e-library facilities
- A large department with 17 professors and over 35 teaching staff in total
- Integrated international study opportunities throughout the world
- Industrial experience available as part of the degree course
- A campus environment, with adjacent accommodation

'Both my work and placements helped to put my studies in context and make informed career decisions. The course I took gave me an excellent foundation for a career in chemical engineering; good lab work in the first few years really put the lectures in context. An emphasis was placed on how engineering applies to the real world, which was exactly what I was looking for in a degree course. Industrial experience taught me a lot about time management, working in a team and being flexible; and the course gave me an excellent foundation for my career with BP.'

EMMA ROBERTS,
MEng CHEMICAL ENGINEERING GRADUATE

University Year 1	University Year 2	University Year 3	University Year 4
All programmes *Core* ■ Modelling concepts and tools ■ Chemical and biochemical processes ■ Chemistry for engineers ■ Properties and applications of materials ■ Introduction to transport phenomena ■ Process design and analysis ■ Reaction, equilibria and thermodynamics ■ Widening horizons module	**All programmes** *Core* ■ Liquid mixing in industrial systems ■ Reactors and catalysis ■ Process systems and principles of process control ■ Mass, heat and momentum transport ■ Process integration and unit operations ■ Computing for design ■ Product design exercise **Options** – *choose from* ■ Sustainable development ■ Advanced Conventional Energy ■ Collaborative interdisciplinary projects At the end of Year 2 (BEng and MEng) or Year 3 (MEng), students on an industrial experience programme can spend a year away from the University gaining work experience.	**All programmes** *Core* ■ Processing for formulation ■ Chemical engineering thermodynamics ■ Multiphase systems ■ Environmental engineering and life cycle analysis ■ Design project ■ Process and project management **Options** – *choose from* ■ Plant optimisation ■ Petrochemical engineering ■ Collaborative interdisciplinary projects or **International Study (H801, HW10)** ■ Year abroad in an overseas university	**MEng Programmes only** *Core* ■ Advanced reaction systems A ■ Advanced transport processes ■ Systems modelling ■ Chemical engineering research project *Options – choose from* ■ Advanced reaction systems B ■ Plant design and manufacturing principles in (bio) pharmaceutical production ■ From bench to market, development of pharmaceutical drug products ■ Design and development of drug delivery systems ■ Hygienic food processing ■ Minerals engineering – A modern perspective ■ Chemical nanoengineering ■ Food structure for performance *Programmes subject to change.

Careers in chemical engineering

Career prospects for our graduates are excellent and varied. Most graduates work as chemical engineers in the oil, chemical, pharmaceutical, biotechnological and food and drink sectors. Some students go into careers in accountancy, or in the City or IT industries; others go on to postgraduate study.

Key features

Chemical engineering is a diverse subject and our programmes are designed to produce chemical engineers with a broad knowledge of the subject, whilst giving the opportunity to specialise in aspects which interest the individual the most.

Above: Team building at Coniston

In the first and second years of the programme, the basic fundamental principles of Chemical Engineering are taught. This covers: mixing, separation and change of state; the design and operation of chemical reactors and other unit operations; the design and implementation of process control. You will also start to appreciate how the process affects product structure and how this in turn influences product function. IT and transferable skills are developed and experience is gained in the use of computer packages including Computer Aided Design (CAD), MATLAB, and process simulation packages. Underpinning Mathematics, Chemistry and Biology is embedded into all courses at the point where the understanding is needed, enabling you to relate closely to and see the relevance of the taught material. You are encouraged to take responsibility for your own learning and development via directed learning, project work, enquiry-based learning and case studies.

In the third year of the programme, all students undertake a Design Project to design a specific and realistic chemical process, championed by an industrial partner. Students work in small teams over two semesters and are given the opportunity to make site visits and quiz the industrial champion as the design progresses. The Design Project gives students the opportunity to demonstrate their chemical engineering skills as they take ownership of the entire design process, coming up with their own solutions to real and complex problems. In the fourth year, an advanced core is taught.

A wider selection of options allows you to specialise further in aspects of the core material of interest to you. You undertake a Research Project, working with the research groups within the School to gain an appreciation of how the subject is developing at the cutting edge.

Formulation of complex products often involves advanced reaction methods and you are taught how catalysts work and the types of reactors in which particular catalysts may be most effective, particularly if the reaction involves more than one phase. This includes design of multifunctional multiphase reactors including trickle beds, monoliths and fluidised beds with application to selective reactions where by-products need to be minimised.

'My sponsors (Shell) gladly supported my choice to pursue a BEng in Chemical Engineering at one of the top universities in the UK, the University of Birmingham. After seeing the School and facilities and meeting the staff and students, I felt right at home and so at ease. I am only too grateful to the ever-ready lecturers and undergraduate office staff. The programme gives a solid foundation on engineering fundamentals and teaches you how it is applied practically in the "real world".'

OLIVIA KONG, BEng CHEMICAL ENGINEERING
INTERNATIONAL STUDENT FROM SABAH IN EAST MALAYSIA

Advanced studies are made on the flow of multiphase mixtures including interactions with surfaces, where reactions or change of phase may be occurring. Complex flows such as these involve use of advanced mathematical tools; computer-based methods such as Computational Fluid Dynamics (CFD) are introduced. Advanced mathematical techniques relating to the control and operation of a chemical plant are also covered.

Students are given the opportunity to learn about modern genome-based bioscience and Biochemical Engineering; the School has a long history of teaching and research in these increasingly important areas. The commercial production and exploitation of micro-organisms, enzymes and hormones, including fermentation, sterilisation and purification are also covered.

Specific programme features
H801 and HW10 Chemical Engineering with International Study programmes.
Students spend an academic year outside of the UK studying at a prestigious university either in an English-speaking country, such as Brisbane, Melbourne, McGill (Montreal), Singapore or one of the Universitas 21 group; or at a non-English speaking University such as Madrid, Rome, Berlin or Nancy.

HV10, H802 and HW10 Chemical Engineering with Industrial Experience
Students on this programme can spend up to a year in industry at the end of their second year. Major multinational companies such as Shell, ExxonMobil, BP, Mondelez, Unilever, Procter & Gamble, Pepsico, EDF, GlaxoSmithKline, AstraZeneca and British Sugar, businesses in the City as well as smaller companies such as Aspentech, CalGavin and Croda, currently offer work experience.

'The reputation of Chemical Engineering at Birmingham and the School's strong links with industry mean that many companies, particularly the large multinationals, offer sponsorship to high calibre students. Proctor & Gamble offered me a vacation placement in the summer of my second year. Relevant work experience can improve job prospects and give you an idea as to what type of work you might want to apply for.'

EMMA PEARCE,
PROCTOR & GAMBLE PLC

LEARN MORE

Dr Anita Ghag
Tel: +44 (0)121 414 5333
Email: ug-admis-chem-eng@bham.ac.uk
www.birmingham.ac.uk/chemical

IChemE
Institution of Chemical Engineers

FACT

ALL PROGRAMMES ARE ACCREDITED BY ICHEME

ENTRY REQUIREMENTS

All MEng courses
AAA*

All BEng courses
AAA*

Applicants should include Advanced Level Mathematics and Chemistry. If not taking M1, A level Physics should be offered.

The International Baccalaureate requirement is BEng/MEng – 7,6,6 at Higher Level including Mathematics and Chemistry at Higher Level grade 6 with a minimum of 32 points overall.

Qualifications under other examination systems are also acceptable. Students who do not have the appropriate qualifications for direct entry into one of the above accredited chemical engineering degree programmes can first study on the Foundation Year (H892). See the information sheet on the Foundation Year. Our current offer for this course is BBB.

UCAS codes and programmes available
Single Honour Programmes
- H800 BEng Chemical Engineering
- H810 MEng Chemical Engineering
- H801 MEng Chemical Engineering (International Study)
- HV10 BEng Chemical Engineering with Industrial Study
- H802 MEng Chemical Engineering with Industrial Study
- HW10 MEng Chemical Engineering with International and Industrial Study

Other
- H892 Chemical Engineering Foundation Year

This leaflet was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be discontinued and new ones offered in their place.

UNIVERSITY OF BIRMINGHAM | Edgbaston, Birmingham, B15 2TT, United Kingdom
www.birmingham.ac.uk

Designed and printed by
UNIVERSITY OF BIRMINGHAM | creativemedia