UNIVERSITY OF BIRMINGHAM

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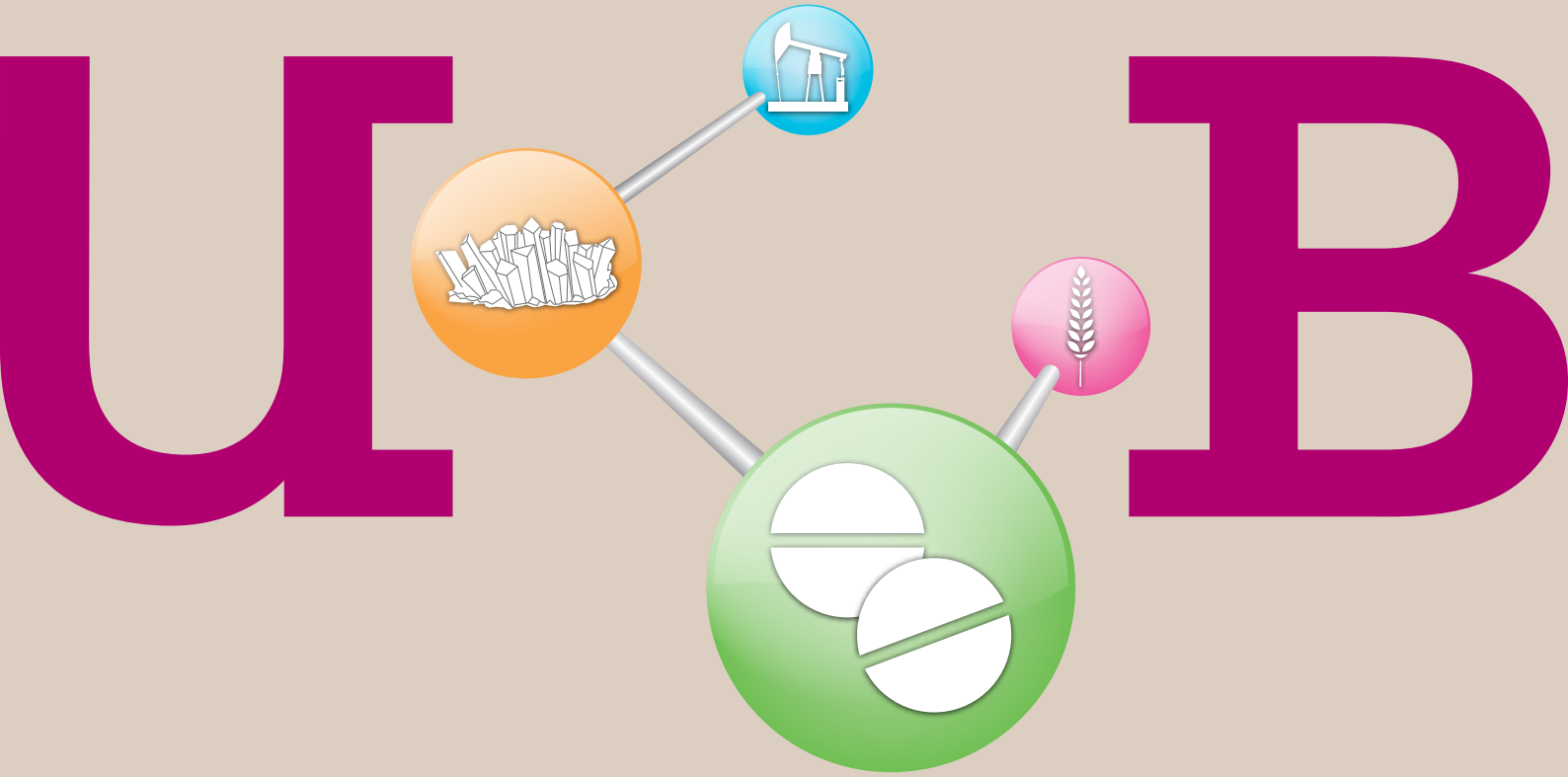
Degrees in Chemical Engineering



The future of Chemical Engineering lies in the production of molecules and materials which enhance our everyday lives for example foods and personal products, drug molecules targeted to specific parts of the body, and new energy systems to reduce emissions. Our progressive new courses in Chemical Engineering place our undergraduates at the forefront of these exciting new challenges...

Professor Mark Simmons, Head of Chemical Engineering

Challenge what you know

School of Chemical Engineering

Degrees in Chemical Engineering

Chemical Engineering is key to many issues affecting our quality of life. Industry is increasingly focused on high value chemicals and products which deliver the right molecule to the right place at the right time.

Such products 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 makes 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 from the testing of novel catalyst formulations and reactor designs for the development of waste-free chemical reactors (reaction engineering), the processing of heavy oil to maintain the world's energy supplies, the development of processes to produce chemicals from waste, the understanding of how mixing and heating affects the flavour and texture of foods (food processing), the culturing of cells in order to construct replacement parts of the human body (tissue engineering), to the 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 areas 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 which shows us to be in the top 5 Chemical Engineering schools in the UK and that a large proportion of our research is judged to be world leading and internationally excellent.

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

The School was recently awarded the Queens Anniversary Prize for Higher Education in recognition of our pioneering research in micro-structured materials and outstanding track record in collaborative research and training with UK and multinational companies included in process engineering.

Chemical Engineering at Birmingham combines teaching from lecturers who are global experts in their field, together 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, Cadburys (Kraft), Unilever, AstraZeneca, GlaxoSmithKline.

Chemical Engineering is dynamic and evolving and 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

Excellent reputations in teaching and research. Our School is highly placed in the Guardian and Times League Tables and is currently in the top five Chemical Engineering Schools for research in the country.

- 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 14 professors and 26 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

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.

Emma Roberts, MEng in Chemical Engineering

Emma spent two summers in industry; one with Unilever working at Colman's mustard and another with BP in Hull. She is now an 'Inspire Graduate Engineer' with BP.

'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 in Chemical Engineering

University Year 1	University Year 2	University Year 3	University Year 4
All programmes □ Modelling concepts and tools □ Fluid flow, thermodynamics and heat transfer □ Chemical engineering design and professional skills □ Chemical and biochemical processes □ Chemistry for chemical engineers and **Single Honours (H800, H810, H801, HV10, H802, HW10)** □ Properties and applications of materials □ Electrical, electronic and computer systems □ Language or other option or **Joint Honours with Business Management (H8ND, H8N1, H8N2, H8N3)** □ Introduction to financial analysis □ Business organisation and management □ Introduction to economics □ International economy or **Energy Engineering (H803, HH81, H890, H891)** □ Introduction to Energy Engineering	**All programmes** □ Functional products □ Reactors and catalysis □ Process systems □ Principles of process control □ Mass, heat and momentum transport □ Process integration and unit operations and **Single Honours (H800, H810, H801, HV10, H802, HW10)** □ Computing for design □ Product design exercise □ Language or other option or **Joint Honours with Business Management (H8ND, H8N1, H8N2, H8N3)** □ Financial decision making □ Introduction to marketing □ Human resources management □ International business or **Energy Engineering (H803, HH81, H890, H891)** □ Electrical power and renewable energy □ Sustainable development At the end of year 2, students on with industrial experience programmes can spend a year away from the university gaining work experience.	**All programmes** □ Processing for formulation □ Chemical engineering thermodynamics □ Multiphase systems □ Environmental engineering and life cycle analysis □ Design project and **Single Honours (H800, H810, HV10, H802)** □ Process and project management □ Language or other option or **Joint Honours with Business Management (H8ND, H8N1, H8N2, H8N3)** □ Supply chain management □ Corporate finance □ Strategic management or **International Study (H801, HW10)** □ Year abroad in an overseas University or **Energy Engineering (H803, HH81, H890, H891)** □ Sustainable construction □ Environmental risk assessment □ Energy economics □ Multidisciplinary energy project	**MEng Programmes only** *Core* □ Advanced reaction systems A □ Advanced transport processes □ Systems modelling *Options – choose from* □ Modern genome based bioscience □ 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 □ Powder handling and processing □ Hygienic food processing □ Developing food structure through thermal processing □ Minerals engineering – A modern perspective and **Single Honours (H810, H801, H802, HW10)** □ Chemical engineering research project □ International and industrial economics □ Entrepreneurial and small business studies or **Joint Honours with Business Management (H8N2, H8N3)** □ Chemical engineering research project □ International and industrial economics □ Entrepreneurial and small business studies or **Joint Honours with Energy Engineering (HH81, H891)** □ Energy policy and case studies □ Mechanical power transmission □ Individual energy project *Programmes subject to change.

Above: Coniston

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.

In the first and second years of the programme, the basic fundamental principles of Chemical Engineering are taught: this covers how materials mix, separate and change state, the design and operation of chemical reactors, the control of processes and how the structure of the products produced influence their 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 particular chemical process, which is championed by an industrial partner. You work in small teams to complete the design project and are given the opportunity to make site visits and quiz the industrial champion during the design process.

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 can take a Research Project and work within 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.

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 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 covered.

Features specific to each programme

H801 and HW10 Chemical Engineering with International Study programmes. Students spend an academic year outside the UK studying at a prestigious University either in English, 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, HW10, H890 and H891 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, Cadbury (Kraft), 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.

H803, HH81, H890 and H891 Chemical and Energy Engineering programmes

The energy modules provide a breadth of coverage of the electrical, civil, economic, sustainable and mechanical issues surrounding energy provision with opportunities in project work to study a specific area in considerable depth. Within the programme there are also embedded elements that complement the energy modules from other engineering disciplines.

H8ND and H8N2 Chemical Engineering with Business Management

The management part of this programme is taught mainly by the Birmingham Business School within the University. This gives a firm grounding in business strategy, marketing and business development, organisation and management systems, finance and accounting, business law, quality and essential aspects of entrepreneurship and enterprise. You learn through lectures, workshops and case studies, culminating in a major business project.

Comments from students

'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 and 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 and Gamble plc

'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 meeting the School, staff, students and facilities (which were more than adequate), 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 taking this teaches you how it is applied practically in the 'real world'.'
Olivia Kong, International Student from Sabah in East Malaysia

Entry requirements

All MEng courses

AAA*

All BEng course

AAA*

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

IChemE
Institution of Chemical Engineers

The International Baccalaureate requirement is >36 points for BEng and MEng courses and should include Chemistry and Mathematics at HL.

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

Joint Honours Programmes

- H8ND BEng Chemical Engineering with Business Management
- H8N2 MEng Chemical Engineering with Business Management (both programmes joint with the Business School)
- H803 BEng Chemical and Energy Engineering
- HH81 MEng Chemical and Energy Engineering
- H890 BEng Chemical and Energy Engineering with Industrial Study
- H891 MEng Chemical and Energy Engineering with Industrial Study
- H8N1 BEng Chemical Engineering with Business Management
- H8N3 MEng Chemical Engineering with Business Management with Industrial Study

Other

- H892 Chemical Engineering Foundation Year

Learn more
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This brochure 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 dropped and new ones offered in their place.