MANCHESTER
1824
The University of Manchester

Chemical Engineering and Analytical Science

UNDERGRADUATE BROCHURE 2015

www.manchester.ac.uk/ceas

The facts

Manchester was the birthplace of chemical engineering

Largest chemical engineering school in the UK

Close industry links give our graduates excellent job prospects and earning potential

Purpose-built building with fantastic teaching and research facilities

Flexible courses with a common first year, allowing you to switch between specialisms

> Manchester is the best place to study chemical engineering. Awesome lecturers, modern labs, and enquiry-based learning and peer-assisted study sessions help to mould every potential chemical engineer to the best he or she can be in the future
>
> **Shobana Simon Manickam**
> **MEng Chemical Engineering with Industrial Experience**

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Introducing

Manchester

Our University

Making things happen

Influential, forward-thinking and down-to-earth, we'll give you an amazing university experience rooted in a rich academic heritage. We turn enthusiasm into achievement and ground-breaking theory into innovative practice.

We accomplish feats of global significance, from splitting the atom, to giving the world graphene—the two-dimensional wonder material that is one atom thick, but 200 times stronger than steel.

With more Nobel laureates on our staff than any other UK university, and strong links to industry and public services, we vitalise our undergraduate courses with pioneering research.

Learn more about us:
www.manchester.ac.uk

Our city

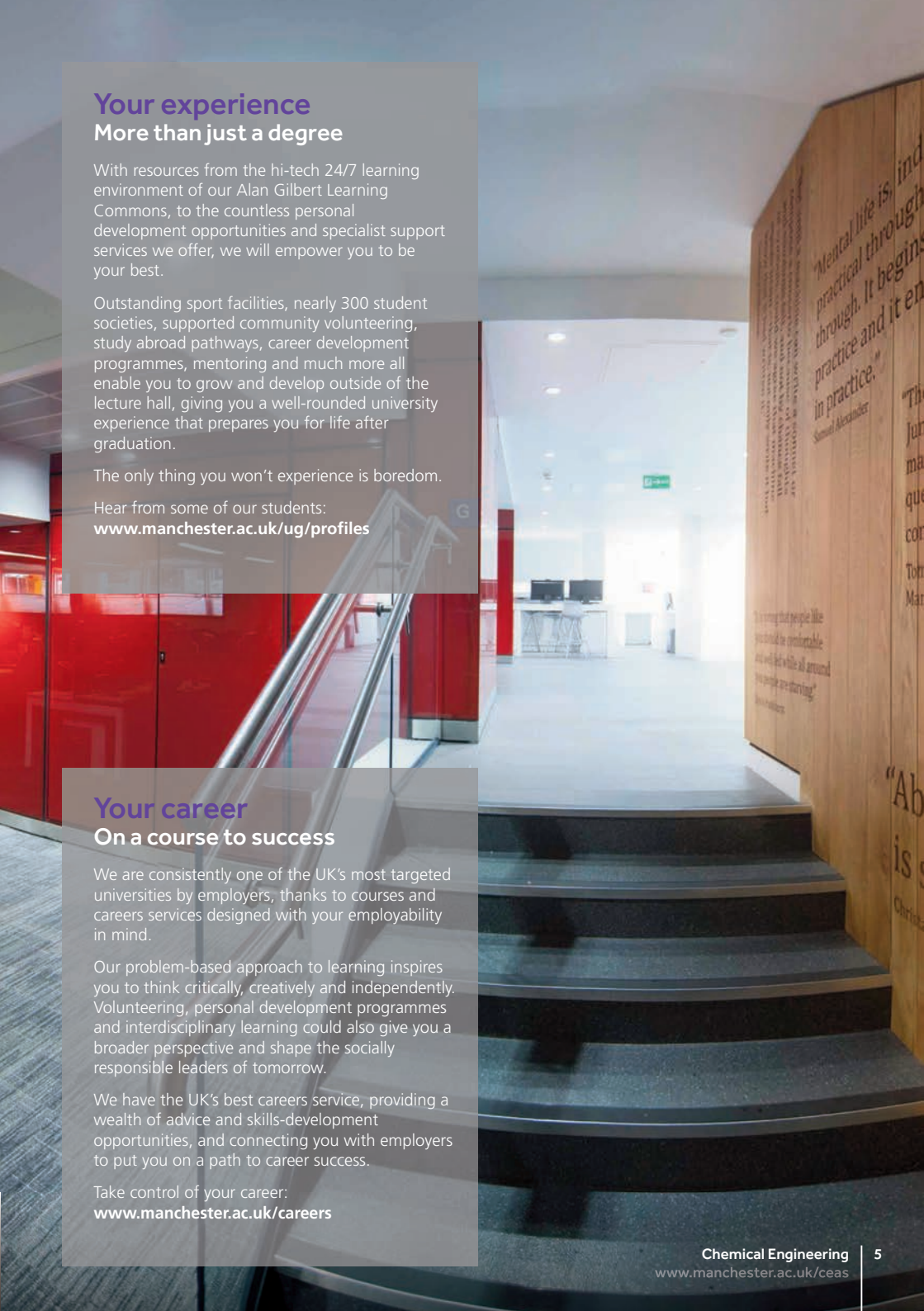
Always moving forward

Manchester lives on the edge of tomorrow, ever a step ahead in science, industry, media, sport and the arts. The Mancunian character—exemplified by the city's central role in the industrial revolution—strives for excellence and originality in all walks of life.

This is a city of many accents, having become a cosmopolitan magnet for students and professionals eager to experience its can-do attitude, independent spirit and cultural wealth.

Never content to live on past glories, Manchester has a passion for progress. Join us at the heart of Britain's most popular student city.

Discover what makes Manchester unique:
www.manchester.ac.uk/cityofmanchester



Your experience
More than just a degree

With resources from the hi-tech 24/7 learning environment of our Alan Gilbert Learning Commons, to the countless personal development opportunities and specialist support services we offer, we will empower you to be your best.

Outstanding sport facilities, nearly 300 student societies, supported community volunteering, study abroad pathways, career development programmes, mentoring and much more all enable you to grow and develop outside of the lecture hall, giving you a well-rounded university experience that prepares you for life after graduation.

The only thing you won't experience is boredom.

Hear from some of our students:
www.manchester.ac.uk/ug/profiles

Your career
On a course to success

We are consistently one of the UK's most targeted universities by employers, thanks to courses and careers services designed with your employability in mind.

Our problem-based approach to learning inspires you to think critically, creatively and independently. Volunteering, personal development programmes and interdisciplinary learning could also give you a broader perspective and shape the socially responsible leaders of tomorrow.

We have the UK's best careers service, providing a wealth of advice and skills-development opportunities, and connecting you with employers to put you on a path to career success.

Take control of your career:
www.manchester.ac.uk/careers

Chemical Engineering at Manchester

Our students consistently tell us that our School of Chemical Engineering and Analytical Science is a very friendly place to study. We have around 600 undergraduate students, plus a thriving postgraduate community, all of whom benefit from our distinguished reputation and our high standards of teaching and research.

In the most recent teaching quality assessment by the Higher Education Funding Council for England, we achieved an excellent 22 out of 24 – one of the highest scores awarded in the country. In the most recent Research Assessment Exercise (2008), 85% of our research was described as 'world-leading' or 'internationally excellent', with the remainder being 'internationally recognised', which puts Chemical Engineering at Manchester at the forefront of research quality.

We have close links with industry and our distinguished reputation means that our former students are very well regarded. Our graduates are the most sought after by employers in industry and business. The most recent National Signposts to Employability Survey (Performance Indicator Project) found that employers prefer to recruit our former students over any other engineering graduates in the UK.

Why Manchester?

- Distinguished history in chemical engineering at the birthplace of the subject as an academic discipline
- Reputation as a world leader in industrially relevant research and teaching in chemical engineering and related subjects
- Range of prestigious scholarships, open to all nationalities, that reflects the popularity of our graduates with industry
- A step towards a career in chemical engineering—rated as the second highest paid graduate job in a poll by The Times newspaper

A Chemical Engineering degree from The University of Manchester will give you great choice in your future career and a significant advantage when you start to look for a job. As the birthplace of the discipline of chemical engineering, we have a long tradition of innovation and excellence. Here, George E Davis delivered the first series of lectures on the subject in 1887 and published the first-ever chemical engineering book.

Chemical Engineering at Manchester

Study Resources and Facilities

New building

In November 2012, the School moved to a brand new, £12 million teaching building. This building houses state-of-the-art computer clusters, an undergraduate teaching laboratory, a bespoke enquiry-based-learning suite and a new pilot hall designed for chemical engineering in the 21st century.

Benefits of our pilot-industrial scale laboratory include: in-house industrial experience as part of the course; an enhanced understanding of theory; practical experience of safety issues; practical insight into start-up and shutdown principles; and experience of writing technical reports.

We also have several smaller-scale laboratories, where you learn how to plan and undertake experiments, evaluate and operate laboratory equipment, appreciate the safety requirements, and analyse experimental data using graphical and statistical methods.

> I am from Singapore and came to Manchester because it has an excellent reputation. I am enjoying the course and the way lectures are conducted. I particularly like the way that the whole teaching environment is much more informal than at home. All the lecturers have been very helpful and friendly.
>
> **Abigail Ee, student**
> **BEng Chemical Engineering**

> I am from Seattle, USA. I decided to study chemical engineering as I liked chemistry at school, but it was too small a subject – I wanted to apply it to a wider context. I was looking for a place that didn't just teach theory – I liked the look of the pilot-scale laboratory and wanted to get in there. Also, the lecturers on the course are people at the forefront of research.
>
> **Daniel Lipin, student**
> **MEng Chemical Engineering with Industrial Experience**

IT

You will have access to computer clusters across the campus and in halls of residence, as well as more than 180 computers in our School dedicated to Chemical Engineering students.

Library

You will use our University Library, one of the largest academic libraries in Britain, with more than four million books and journals. This includes general and specialist materials, as well as a variety of electronic resources.

Scholarships and bursaries

A range of scholarships and bursaries are available for students who choose to study chemical engineering at The University of Manchester.

Several industrial scholarships are available once you have started the course.

Further details are available from:
www.ceas.manchester.ac.uk/study/undergraduate/scholarships-and-sponsorships/sponsorships
or on request from our admissions team.

For international students, our School will award up to ten Morton Scholarships for International Excellence, worth up to £4,000 (£1,000 per year of the course), for those international students who demonstrate overall academic excellence. The University's Faculty of Engineering and Physical Sciences also offers scholarships of £2,000 per year for well-qualified international undergraduate students. For details of eligibility, see:
www.manchester.ac.uk/eps/undergraduate/faculty-scholarships

Course details

Chemical Engineering BEng 3yrs
UCAS Code H800

Chemical Engineering MEng 4yrs
UCAS Code H801

Chemical Engineering with Biotechnology MEng 4yrs
UCAS Code H8C5

Chemical Engineering with Industrial Experience MEng 4yrs
UCAS Code H803

Chemical Engineering with Environmental Technology MEng 4yrs
UCAS Code H8F8

Chemical Engineering (Business Management) MEng 4yrs
UCAS Code HN82

Chemical Engineering (Energy and Environment) MEng 4yrs
UCAS Code H8F4

Entry requirements

GCSE or equivalent
C English Language

GCE A-level / unit grades
A*AA-AAA including Maths and a science subject

GCE AS-level acceptability
Acceptable only in combination with A-levels or Advanced Highers

GCE A-level double award
The double award is welcomed; applicants should contact us for further information

GCE AS-level double award acceptability
Acceptable only in combination with A-levels or Advanced Highers

BTEC National Diploma
Acceptable only in combination with A-levels

Welsh Baccalaureate (inc A-levels)
PPass and A*A – AA including Maths and a science subject

Scottish Advanced Highers
AAA including Maths and a science subject

Scottish Highers
Acceptable only in combination with A-levels or Advanced Highers

Irish Leaving Certificate
AAAAB including Maths and a science subject

International Baccalaureate
39-37 points with at least 18 points at Higher Level including grade 6 or above in HL Maths and a science subject

English language requirement

IELTS 6, TOEFL 540, internet-based TOEFL 80 (minimum of 20 in each component), computer-based TOEFL 207

Other subjects
General Studies and Key Skills welcomed, but will NOT form part of the standard offer

Chemical Engineering with Chemistry MEng 4yrs

UCAS Code H8F1

Entry requirements

GCSE or equivalent
C English Language

GCE A-level / unit grades
AAA Including Maths and Chemistry

GCE AS-level acceptability
Acceptable only in combination with A-levels or Advanced Highers

GCE A-level double award
The double award is welcomed; applicants should contact us for further information

GCE AS-level double award acceptability
Acceptable only in combination with A-levels or Advanced Highers

BTEC National Diploma
Acceptable only in combination with A levels

Welsh Baccalaureate (inc A-levels)
Acceptable only in combination with A levels

Scottish Advanced Highers
AAA including Maths and Chemistry

Scottish Highers
Acceptable only in combination with A-levels or Advanced Highers

Irish Leaving Certificate
AAAAB including Maths and Chemistry

International Baccalaureate
37 points with at least 18 points at Higher Level, including grade 6 or above in HL Maths and Chemistry

English language requirement
IELTS 6, TOEFL 540, internet-based TOEFL 80 (minimum of 20 in each component), computerbased TOEFL 207

Other subjects
General Studies and Key Skills welcomed, but will NOT form part of the standard offer

Chemical Engineering

Chemical Engineering with Study in Europe MEng 4yrs

UCAS Code H810

Entry requirements

GCSE or equivalent
C English Language

GCE A-level / unit grades
AAA. This should include Maths, a science subject and the language to be studied (German, French, or Spanish)

GCE AS-level acceptability
Acceptable only in combination with A-levels or Advanced Highers

GCE A-level double award
The double award is welcomed; applicants should contact us for further information

GCE AS-level double award acceptability
Acceptable only in combination with A-levels or Advanced Highers

BTEC National Diploma (A-Level grade B equivalent in German, French, Spanish)
Acceptable only in combination with A levels

Welsh Baccalaureate (inc A-levels)
(A-Level grade B equivalent in German, French, Spanish) Pass and AA including Maths and a science subject

Scottish Advanced Highers
AAA including Maths, a science subject and the language to be studied (German, French, or Spanish)

Scottish Highers
Acceptable only in combination with A-levels or Advanced Highers

Irish Leaving Certificate
AAAAB including Maths, a science subject and the language to be studied (German, French or Spanish)

International Baccalaureate
37 points with at least 18 points at Higher Level, including grade 6 or above in HL Maths, a science subject and the language to be studied abroad (German, French, or Spanish)

English language requirement
IELTS 6, TOEFL 540, internet-based TOEFL 80 (minimum of 20 in each component), computer-based TOEFL 207

Other subjects
General Studies and Key Skills welcomed, but will NOT form part of the standard offer

What is Chemical Engineering

Chemical engineering is sometimes called 'process' or 'manufacturing' engineering. It concerns the science, technology and management involved in making the materials and products society needs. These include substances such as oils, acids and solvents, used to create everyday essentials like plastics, drugs, fuels and foodstuffs. Without chemical engineers, we wouldn't have chocolate, beer, painkillers, antibiotics, paper, ink, detergents, petrol, paint, toothpaste, or plastic bags.

Chemical engineers are widely employed by major manufacturing companies and are among the highest paid of the engineering fields. They generally work in industry, generating profit for companies by adding value to raw materials in a safe and cost-effective way.

Their job can focus on any part of the process. Examples include:

- Designing and selecting equipment
- Solving process problems
- Carrying out financial calculations
- Designing procedures to ensure safety and minimise environmental impact
- Managing a team of operators
- Researching new products.

Engineering operations include everything from extracting raw materials to generating energy; from manufacturing intermediate materials and producing finished goods to disposing of waste.

What will I learn?

The technical aspects of chemical engineering revolve around managing the behaviour of materials and chemical reactions. This means predicting and manipulating compositions, flows, temperatures and pressures of solids, liquids and gases.

You will discover how to understand chemical, physical and biological processes using mathematical equations, as well as, on the more practical side, learning about the equipment and techniques used by industry for large-scale manufacturing.

At Manchester, business, safety and environmental issues are also studied in some depth. You learn skills that will be of great use to you in your future career, such as team-working, problem-solving, communication and the use of information technology.

How does chemical engineering compare to chemistry?

Chemists design chemical reaction routes to produce desirable products or processes, working on a molecular level. Chemical engineers then find ways to put these into practice in a cost-effective and safe way on an industrial scale, using real equipment to move, mix, react, heat up, cool down and separate materials.

How does this relate to subjects studied at school?

In Physics and Mathematics courses at school you will have learned basic heat-transfer (eg, conduction, convection and radiation) and calculations of motion and momentum. From Chemistry classes you have probably carried out process operations – such as distillation and filtration – on a small scale, and you may have studied the gas laws and factors influencing chemical reaction rates. These are some of the issues that chemical engineers study in depth.

For more information about chemical engineering, see the Institution of Chemical Engineers website: **www.whynotchemeng.com**

Chemical Engineering

Studying the BEng Chemical Engineering course at The University of Manchester has been most enriching and enjoyable. The skills and experience gained from the course have formed a solid foundation to my future career. I really enjoyed the problem-based learning aspect of the course, as it provided me with many opportunities to solve complex engineering problems individually and as a team. I also benefited from the PASS (Peer Assisted Study Sessions) programme, both as a participant and as a leader. The teaching and supporting staff were always very supportive, approachable and willing to help.

Well known and internationally recognised, the School of Chemical Engineering and Analytical Science has excellent links with industry. I was privileged to have an internship with Foster Wheeler during my second-year summer holidays. The practical experience and exposure has proved to be invaluable.

Manchester is no doubt an excellent city to live in, having all the buzz of a city, yet it enchants with its warmth and charm. With its vibrant and diverse student population, there are huge opportunities to network and to forge friendships with students from different cultures and backgrounds. I have made many friends from all over the world!

Looking back over the past years at Manchester, I would recommend any student to study Chemical Engineering at The University of Manchester. The doors of opportunities as a professional engineer are wide; so come, learn and enjoy!

Ei Sheen Lau, graduate
BEng (Hons) Chemical Engineering

Career opportunities

Our graduates are in great demand for all kinds of jobs – and not just in the chemical engineering sector. This is because we encourage you to develop skills during your course that are valued by employers from a diverse range of industries; these include verbal and written communication skills, problem-solving ability, numeracy, business awareness and group-working.

Jobs in the chemical engineering sector

Chemical engineering jobs exist in all kinds of industries: food and drink; pharmaceuticals; energy; oil and gas; water; chemicals; materials such as plastics, metals and ceramics; and products such as toiletries, fertilisers and detergents. They are also involved in assessing health, safety and environmental issues.

In other words, you could do anything from working out how to manufacture life-saving vaccines, to creating a revolutionary new type of ice-cream, to managing a project for the treatment of wastewater.

Information technology is also very important. You could be using sophisticated computer-aided design (CAD) and virtual reality software to simulate what will happen, for example, when you design a process to manufacture a product such as toothpaste.

The types of jobs within these sectors are varied and include: design of products; research and development; construction and installation of industrial plant; manufacturing and production; project management; sales and marketing; finance; policy-making; and management. Many chemical engineering graduates reach senior managerial positions and it's not unusual to find them on the boards of large multinational companies.

Jobs outside the chemical engineering sector

Chemical engineering graduates have easily transferable skills and the ability to take an overview of a situation. For this reason, they are in demand in the areas of management, finance, accountancy, marketing, banking, information technology, computing and consultancy.

Employment worldwide

There are many opportunities for chemical engineers around the world. You could be located in Africa, working on providing basic facilities for communities; or in the USA, contributing to the design and manufacture of advanced materials for spacecraft.

Wherever you are based, there will be opportunities for travel as part of the job.

How much will I earn?

The 2010 Institute of Chemical Engineers (IChemE) Salary Survey revealed that the average starting salary for a chemical engineer is £29,500 a year (£31,300 for those working in the oil sector). The average wage for chemical engineers aged 25 to 29 is £38,600 a year, rising to £62,500 for those in their late 30s. Chemical engineers in their late 40s earn on average £82,600 a year and £86,800 in their 50s. For those aged between 60 to 65,who have typically risen to very senior positions, the average salary is £87,800 a year.

For more information and sector specific data, you can find the IChemE salary calculator on the IChemE website: **www.icheme.org**

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The environment plays a crucial role in the day-to-day lives of everyone across the globe—and humankind continues to adversely affect all aspects of it. This ranges from water pollution all the way to climate change. As chemical engineers, we have a real opportunity to make a difference across industries and work towards overcoming these environmental challenges. I chose to study Chemical Engineering with Environmental Technology to gain the knowledge and insight so I could do just this.

The course consisted of various course units that explored many different aspects of environmental technologies, such as green solvents, law and regulations, aerial emissions and aqueous systems. The units explored the history, philosophy and application of each technology, which provided me with excellent background knowledge. I also learnt new skills, such as dispersion modelling and life cycle assessments, and had the opportunity to really engage with specialists during group discussions.

One of the most amazing aspects of the course is how incredibly relevant I still find it. Thanks to the knowledge I acquired and the skills I developed, I was successful in applying for a job with an environmental engineering consultancy. I now find that barely a day goes by without me using not only core chemical engineering skills, like mass and energy balances, but also some of the things I learnt in environmental technologies. I often have to advise clients of different technologies and understand the laws and regulation surrounding them. Even just knowing basic background details is a real boost and it helps me to navigate around my projects much more easily.

I think it is fair to say that without studying Chemical Engineering with Environmental Technology, I wouldn’t have the job that I enjoy so much today.

”

Robert Swales, graduate
BEng (Hons) Chemical Engineering

Chemical Engineering

All our Chemical Engineering Courses

We offer nine undergraduate courses. In our flexible system, you have until the start of your second year to decide in which area you would like to specialise. This means that you don't need to choose your specialist area until you have had a chance to find out more.

All courses have professional recognition and are accredited by IChemE.

You will study a range of core topics, incorporating:

- Fundamentals of chemical engineering
- Supporting maths and science
- Process design, including a design project in each year
- Laboratory work throughout the course, including some in the pilot-scale laboratory
- Information technology, including the use of computers both as office tools and for computer-aided design.

IChemE accreditation

All our chemical engineering courses have professional recognition and are accredited by IChemE. This means that after gaining appropriate industrial experience, graduates may apply for corporate membership and gain professional recognition as a Chartered Engineer (CEng).

Chartered status is a benchmark of professionalism that many chemical, biochemical and process engineers aspire to. Engineers with chartered status earn, on average, £15,000 more per year than their non-chartered colleagues.

Achieving chartered status typically requires four years' experience employed in a relevant post, which can include time worked on industrial placements undertaken while at university.

How can I gain chartered engineer status?

MEng courses take one year longer than the BEng to complete, which gives you the opportunity to study a specialist subject in more depth. An MEng qualification from Manchester will also help you to gain CEng status.

If you gain an accredited BEng (Hons) rather than MEng (Hons) degree, you will have to provide evidence of further learning after graduation before you can achieve IChemE chartered status. This further study could be achieved during your career through work-based learning, a masters qualification (MSc), or a chemical engineering PhD.

Core chemical engineering topics

Year 1

Course units cover topics including physical and organic chemistry, engineering maths, thermodynamics, heat transfer, fluid mechanics and information technology. Case studies, project work and laboratories develop additional material on process design and economics, reaction engineering and environmental issues.

Year 2

Course units cover topics including design of separation processes, reaction engineering, materials science, biochemistry, engineering maths, environmental science and technology. Case studies, project work and laboratories develop additional material on process modelling, multiphase processing, process control and biochemical engineering.

Year 3

Course units cover topics including polymers, biotechnology, fine chemicals, risk analysis, advanced reaction engineering, process dynamics and control. Case studies, project work and laboratories develop additional material, including process synthesis, design and economics, process safety and sustainable development.

Specialist subjects

On the MEng courses, you can choose to study a specialist subject in greater depth. Specialist themes are: advanced chemical engineering science, business management, environmental technology, biotechnology, chemistry, or a language (French, German, or Spanish), including studying at a university in Europe (explained in more detail later in this brochure).

You also have the option of gaining experience in industry for one year.

I recently graduated from The University of Manchester with a First Class MEng in Chemical Engineering. The experience and skills I gained during the four years allowed me to achieve great results and obtain an excellent graduate job.

Following the straight MEng course allowed me to focus on academic work during the university year and manufacturing internships in the summer holidays. This way I obtained relevant industrial experience without sacrificing the extra technical detail (and fun!) obtained from four years of full-time study. It also allowed me to undertake an individual research project in my fourth year, rather than write a dissertation based on an industrial placement. This project provided me with the skills to conduct independent research and manage my time effectively.

I currently work as a Supply Leader at Procter & Gamble (the world's largest consumer goods company, which owns brands such as Pringles, Pantene, Bold, Duracell and Gillette). Although I do not regularly use the extensive technical knowledge I gained during my course as other graduate process engineers might do, I apply many other skills that I developed while studying the straight MEng course.

For example, the ability to understand a problem, locate the root cause and develop a solution is integral to every graduate job and is developed and reinforced throughout the four-year degree. The ability to lead and work in a team of people with different styles of thinking, from very different backgrounds, is very important in multinational corporations. The second- and third-year design and laboratory projects and fourth-year group work undertaken on the straight MEng course helped me to develop this ability and apply it successfully to the workplace.

I would thoroughly recommend the four-year straight MEng course. The wide range of experiences allows each student to determine what they enjoy, are good at and want to pursue as a career.

Alex Matten, graduate
MEng (Hons) Chemical Engineering

Chemical Engineering

During the first two years of my course, I studied French alongside the core Chemical Engineering course; this led on to me studying my third year abroad in Toulouse, where I studied Process Engineering.

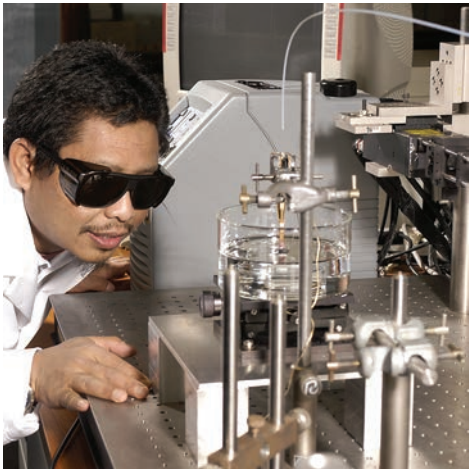
While in Toulouse, I took lectures and tutorials in French, as well as laboratory projects. At the end of the year I was also given the opportunity to spend six weeks working with some of the postgraduates at the school, helping with their research projects.

Doing the Study in Europe course enabled me to continue to study a language that I had enjoyed doing at A-level and to improve my ability to a point where I would be confident in being able to use what I have learnt in a professional setting. The year abroad also gave me an idea of how a different education system works; it meant that I got to know and work with people from France and all around the world. I found living abroad, at times, challenging, but this has now given me more confidence.

I hope that in the future I will be able to travel further. I hope to be able to find a job that allows me to work around Europe, or even further afield. Often foreign languages are asked for in job advertisements, so I hope this will help me to find employment.

Finally, and possibly most importantly, the year abroad was a great opportunity to enjoy spending a year meeting loads of people from around the world and to enjoy the sunshine of southern France!

Kevin Eade, graduate
MEng (Hons) Chemical Engineering with Study in Europe



BEng Chemical Engineering (3YRS)

If you want the option of completing your course in just three years, then this course, leading to the award of BEng (Hons), may be for you. It includes all the core course units, as well as developing skills such as problem-solving, communication and working in teams. All the chemical engineering subjects that employers will be looking for are covered.

MEng Chemical Engineering (4YRS)

This Honours course enables you to gain a deeper understanding of advanced chemical engineering science. This is for you if you want to become an expert in pure chemical engineering and learn about the subject in more detail.

You study the specialist course units in the third and fourth years, alongside the core chemical engineering subjects. You undertake a detailed research project in your fourth year.

Specialist subject areas:

Interface and colloid science, biochemical engineering, adsorption and ion exchange, advanced mathematical methods and computer aided process design.

MEng Chemical Engineering with Business Management (4YRS)

Chemical engineers can play many roles in industry and, if you want to be in a position to make things happen, you may move into management. A high proportion of our graduates have successful management careers. Many senior managers were initially trained as chemical engineers.

This is the first course of its kind in the UK and will improve the career prospects of graduates within the chemical engineering sector. It can also enhance your opportunities to follow other career paths in areas such as finance, consulting, marketing and accountancy.

You can decide to make business management your specialist subject by choosing to study the introductory course unit in your second year. You then study the specialist units in the third and fourth years, alongside core chemical engineering. You undertake a detailed research project in your fourth year.

Specialist subject areas:

Tools and techniques for enterprise, managing projects, marketing, advanced technology enterprise and managing business operations.

MEng Chemical Engineering with Environmental Technology (4YRS)

Four-year MEng (Hons) chemical engineers can make a real difference to the environment by reducing pollution, minimising waste, creating more efficient manufacturing processes and using clean technology.

The preservation and improvement of our environment is becoming increasingly important.

Chemical engineers solve pollution problems and develop industrial processes that are less harmful to the environment. Specialists in environmental technology can find employment in industry, in the regulatory authorities and, increasingly, as consultants.

You can decide to make environmental technology your specialist subject by choosing to study the introductory course unit in your second year. You then study the specialist units in the third and fourth years alongside core chemical engineering. You undertake a detailed research project in your fourth year.

Specialist subject areas:

Sustainable industry and development, waste water treatment, distributed and renewable energy systems, greenhouse gas and combustion emissions and energy generation systems.

> “I enjoyed Physics, Chemistry and Mathematics at school and decided that I wanted to do something with the applications of these subjects, rather than just the theory. The course is a good balance between theoretical and hands-on experience. I enjoy the laboratories and design projects and my fourth-year research project will also be laboratory-based.”
>
> **Adam Cowling, student**
> **MEng Chemical Engineering**

Chemical Engineering

MEng Chemical Engineering with Biotechnology (4YRS)

Biochemical engineering is the subject through which the science of living organisms and systems is translated into economic and safe products and processes. Its applications are in the fields of healthcare, nutrition and the environment. Some examples are the manufacture of medicines, the use of genetic engineering to treat illnesses, food processing, treating industrial and human waste and finding ways of using renewable resources.

You can decide to make biotechnology your specialist subject by choosing to study the introductory course unit in your second year. You then study the specialist units in the third and fourth years, alongside the core chemical engineering subjects. You undertake a detailed research project in your fourth year.

Specialist subject areas:

Introduction to biotechnology, fundamentals of life sciences, biochemical engineering, biorefinery engineering and bioprocessing.

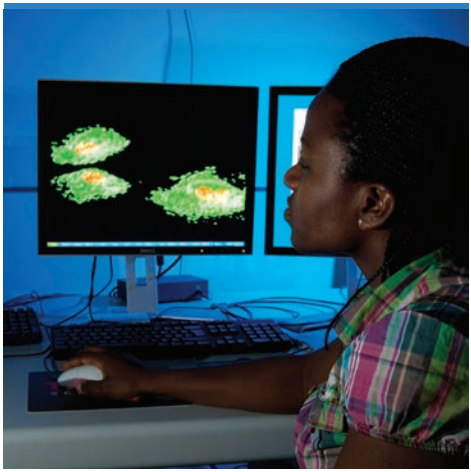
MEng Chemical Engineering with Chemistry (4YRS)

This course will give you an insight into understanding processes from the molecular level up to industrial scale and enable you to learn the chemistry behind the manufacturing processes. The skills of the chemical engineer and the chemist are brought together in order to design and manufacture products as far-ranging as petrochemicals, pharmaceutical tablets, inkjet printing modules, deodorant sticks, hair products and chocolate.

The chemistry course units are introduced in your first year with an introductory course unit. The second, third and fourth years of the course introduce specialist chemistry subjects, which are studied alongside core chemical engineering. You undertake a detailed research project in your fourth year.

Specialist subject areas:

Organic chemistry, molecular simulation, spectral analysis, greenhouse gas and combustion emissions and polymer chemistry.



> I like the laboratories and practical work, which show how chemical engineering is used in practice.
>
> **Liane Turner, student**
> **MEng Chemical Engineering**

MEng Chemical Engineering with Industrial Experience (4YRS)

Would you like to spend the third year of your course learning skills and gaining experience in industry – and be paid a salary at the same time? For the third year of this course, a company will employ you on single or multiple projects in areas such as process and plant evaluation, design, construction and operation. During the year, you keep a logbook/career development diary, produce a dissertation in the form of a book and give a poster presentation about your experience.

While working in industry, you can expect to experience the following:

- Enhanced, in-depth and leading-edge chemical engineering
- Extended, broadening study of chemical engineering and other science, technology and non-engineering subjects, such as business, or language
- Enhanced and extended skills, such as project work, design work, or industrial applications

It is expected that during the placement you will have the opportunity to participate in the company staff development scheme and learn about the following:

- Safety, health and environment issues in industry
- Achieving targets and objectives
- Efficiency and cost-effectiveness
- Company organisation and structure
- Legal constraints within industrial practice
- Personal effectiveness

Please note: in order to qualify for an industrial placement, you need to have achieved an average mark of over 60% at the end of your first and second years.

Where could I work?

Our School has excellent contacts with industry and we maintain a database of potential companies for placements. Although it is your responsibility to find a placement, we will do our best to help you.

Companies involved include: Acordis, AkzoNobel, AstraZeneca, Axion Recycling, BP, British Sugar, Cabot Corporation, Cadbury, Cargill, Chevron Texaco, Conoco, Dupont, Eli Lilly, Emerys, E-on, Exxon Mobil, GlaxoSmithKline, ICI Paint, Kraft Foods, Kroda, Imerys, Johnson Matthey, Lubrizol, Lucite International, Marathon Oil, Pfizar, Procter and Gamble, Sabic, Sanofi, Schlumberger, Sellafield Ltd, Shell, Solvay, Syngenta, Unilever.

You take an introductory course unit in your second year and course units by distance learning during the year out in industry.

International students do not need to obtain a work permit.

> “I enjoyed the course, which is not all about technical ability; it also teaches you how to tackle problems and, in the design project especially, how to work effectively as a member of a team. On graduation, I was offered a position with Foster Wheeler. My work is very varied and I may be working on a small pharmaceutical project one month and looking at the ways in which IT can help the design process become more efficient the next. In years to come, I expect to be involved in refinery production in the Middle East, pharmaceuticals in Singapore, or an oil platform in the Arabian Gulf.”
>
> **Matthew Cook, graduate Chemical Engineer, Foster Wheeler**

Chemical Engineering

I have just graduated from the Chemical Engineering with Industrial Experience degree. I felt the structure of this course was beneficial to me as it enabled me to gain practical experience while still doing my degree. My year in industry with BP reinforced what I had learnt in my first two years, standing me in good stead for the final year. In addition, the placement year enabled me to accrue skills and knowledge in a very practical way. While on my placement with BP, I had the opportunity of working with other engineering disciplines and getting to go out on site visits.

"One big advantage is the money factor – Manchester has an IChemE-accredited, four-year Industrial Experience course (at most other universities it takes five years). This means you pay less tuition fees (only half in your placement year) and you are earning a wage. I was able to afford to go travelling in the summer after my placement, while most of my fellow students had to work through the holidays.

"In terms of finding a job after your degree, the Industrial Experience course is ideal because experience in the field helps you to differentiate yourself from other applicants. In particular, the company you work for in your year out views the placement as a kind of year-long interview and is much more likely to give you a place on its graduate scheme than an external applicant.

"Whatever you want to do after university, a year in industry looks great on your CV and gives you the opportunity to perform well in the field and get a good reference."

Thomas Davison, student
MEng (Hons) Chemical Engineering with Industrial Experience

MEng Chemical Engineering with Study in Europe (4YRS)

Would you like the exciting opportunity to live and work in another culture for a year? This course enables you to spend your third year in France, Germany, or Spain, becoming familiar with a different social and technical culture, greatly improving your language skills and enhancing your career prospects.

Chemical engineers with sufficient knowledge of another language have career opportunities all around the world. You will have intensive language tuition in the second year of your course. This includes spoken language, grammar and some technical vocabulary.

During the year abroad in the third year, you will:

- Extend your chemical engineering knowledge by studying further subjects and undertaking additional projects
- Attend lectures and tutorials conducted in the local language
- Participate in group work in laboratories and on projects
- Write reports and take examinations in the local language
- Make a presentation in the local language about your project.

A student from the country may be assigned to act as your mentor, and staff from our University will visit you at least once a year. The European university will arrange your accommodation in student residences. During the year, you will be a registered student and will be liable for fees (at a reduced rate).

Where might I study?

The European universities where you can choose to spend your year out are:

- **France:** Lorraine and Toulouse
- **Germany:** Stuttgart and Furtwangen
- **Spain:** Oviedo and Cadiz

Practical and project work

This course is structured so that about one third is practical and project work, with the remainder made up of lectures and problem-solving classes. This means you can more easily relate theory to practice, enhancing your understanding.

Year 1

- Projects focused on equipment and process design
- Laboratory experiments introducing safety and good laboratory practice
- Use of information technology to assist with writing reports, calculations, design, programming and library research

Year 2

- Industrial-sized experiments in the pilot-scale laboratory
- Small-scale experiments in the laboratories
- Project on computer flow sheet design

Year 3

(This is the fourth year for Chemical Engineering with Study in Europe, or with Industrial Experience)

- Design project where, as part of a group of students, you design a complete process plant; this involves equipment design, costing and profitability, control, start-up and shutdown of the plant and assessment of hazards. The project is set up jointly with an industrial company, which means that it will relate to real life
- Detailed large experiments in the pilot-scale laboratory

Year 4

- Research project, which you can choose, to examine a scientific or technical problem relating to your specialist area; you report the work and its outcomes in a dissertation in the form of a book, in a short academic research paper and as a poster presentation

MEng Chemical Engineering (Energy and Environment) (4YRS)

A major challenge to society and to future chemical engineers is how to produce and use energy in ways that are sustainable, economical and environmentally friendly. This pathway allows you to take specialist units related to energy, such as Energy Systems, Wastewater Engineering Technology and Utility Systems, Distributed and Renewable Energy Systems and the Nuclear Fuel Cycle.

You will graduate both with a solid background in core chemical engineering and with additional expertise in a topic of major significance in the 21st century.

Studying abroad

Would you like to spend some time in another country as part of your studies? Our School has several links with universities abroad and encourages you to gain wider experience in an international context.

We are able to offer great opportunities for students on the MEng courses to undertake their final-year research project in Singapore, France, Germany, Spain, or the USA.

Career prospects

Ten reasons why Manchester chemical engineering graduates are snapped up by employers:

1 Our sterling reputation throughout the world means that employers know our graduates make excellent employees. A prestigious qualification from The University of Manchester is a passport to a great future.

2 Courses have a practical focus and use design projects, laboratory experiments and problem-based learning to enhance theoretical work. You gain the analytical and problem-solving skills that are so valuable to employers.

3 Highly qualified staff are experts in their field, ensuring that you learn up-to-date, relevant and cutting-edge chemical engineering.

4 You learn valuable skills, like team-working, communication, presentation skills and use of information technology, including specialist design and modelling packages.

5 Close links with industry ensure your degree will be well known and highly respected when you are applying for jobs.

6 A chemical engineering degree is widely applicable to industrial and business sectors, giving you choice and flexibility. Careers in the chemical engineering sector are wide and varied, and our graduates also forge excellent careers in non-chemical engineering jobs, such as accountancy, marketing and management.

7 All courses have professional recognition and have been accredited by the Institute of Chemical Engineers. This means that, after gaining appropriate industrial experience, graduates may apply for corporate membership and become a Chartered Chemical Engineer.

8 A brand new, state-of-the-art teaching facility puts Manchester at the forefront of chemical engineering teaching.

9 The MEng Chemical Engineering with Business Management course is unique and provides additional specialist skills and knowledge for a high-level management career.

10 The MEng Chemical Engineering with Industrial Experience course is the only one of its kind to have been accredited at MEng level by the IChemE. The course extends and broadens knowledge and provides you with experience you can only gain in the workplace.

The Manchester Leadership Programme (MLP)

The MLP is an exciting and high profile initiative that encourages University of Manchester students to engage with the local community while boosting their personal and professional development. It combines a credit-rated Leadership in Action unit with 60 hours of voluntary work.

By taking the MLP as part of your course, you can develop invaluable skills and knowledge for your CV, from project management to commercial awareness, and you will interact with and give something back to the local community.

Find out more online

Accommodation
Discover your new home:
www.manchester.ac.uk/accommodation

Admissions and applications
Everything you need to apply:
www.manchester.ac.uk/ug/howtoapply

Alan Gilbert Learning Commons
Take a look around our 24/7, independent learning space:
www.manchester.ac.uk/library/learningcommons

Careers
Take control of your career:
www.manchester.ac.uk/careers

IT Services
Online learning, computer access, IT support and more:
www.manchester.ac.uk/itservices

Library
We have one of the UK's largest and best-resourced university libraries:
www.manchester.ac.uk/library

Maps
Find your way around our campus, city and accommodation:
www.manchester.ac.uk/aboutus/travel/maps

Prospectus
Download or order a copy of our prospectus:
www.manchester.ac.uk/study/undergraduate/prospectus

Childcare
Balancing your studies with your caring responsibilities:
www.manchester.ac.uk/childcare

Disability support
Talk to us about any support you need:
www.manchester.ac.uk/dso

Funding and finance
Get to grips with fees, loans, scholarships and more:
www.manchester.ac.uk/studentfinance

Careers
Take control of your career:
www.manchester.ac.uk/careers

International students
Let us help you prepare for your time here:
www.manchester.ac.uk/internationa

Sport
Get active with our clubs, leagues, classes and facilities:
www.manchester.ac.uk/sport

Support
Let us help with any academic, personal, financial and administrative issues:
my.manchester.ac.uk/guest

Students' Union
Immerse yourself in societies, events, campaigns and more:
manchesterstudentsunion.com

Videos
Learn more about us on our YouTube channel:
www.youtube.com/user/universitymanchester

Contact details

For further information about the courses, or about qualifications, please contact:

Admissions tutor
Dr Stuart Holmes

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For the most up-to-date course information, please visit our website:
www.manchester.ac.uk/ceas

Disclaimer

This brochure is prepared well in advance of the academic year to which it relates. Consequently, details of courses may vary with staff changes. The University therefore reserves the right to make such alterations to courses as are found to be necessary. If the University makes an offer of a place, it is essential that you are aware of the current terms on which the offer is based. If you are in any doubt, please feel free to ask for confirmation of the precise position for the year in question, before you accept the offer.

“Pioneering innovation since 1824”

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