

GLOBAL INNOVATION



MONASH University

CHEMICAL ENGINEERING

OUR CHANGING
WORLD NEEDS MORE
CHEMICAL ENGINEERS



WHAT IS CHEMICAL ENGINEERING?

Many everyday items we take for granted involve chemical engineering during some stage of their production. Computer chips, mobile phones, petrol, paper, aspirin, coffee and clean power, to name just a few.

Chemical engineering is concerned with the ways raw materials are changed into useful and commercial end products. This involves the research of raw materials and their properties, design and development of equipment and the evaluation of operating processes.

Chemical engineering has its foundation in chemistry, physics and mathematics – as well as other branches of engineering including applied sciences, biological sciences and economics.

WHAT DO CHEMICAL ENGINEERS DO?

Chemical engineers invent, develop and design processes that convert raw materials into useful products - with minimal environmental impact. They are also involved with pollution control, protection of the environment and energy conservation and conversion.

As a chemical engineer you might:

Design, develop or improve industrial processes and equipment for large scale chemical and biochemical manufacturing

Plan and test methods of manufacturing

Improve energy efficiency or reduce water use at manufacturing sites

Develop methods for the treatment of by-products

Devise production processes that are safe, efficient, profitable and environmentally-sound

Research naturally occurring chemical reactions so that these processes can be copied for human benefit

Conduct environmental impact studies

Develop and implement cleaner production technologies

Research new processes and products

Design, develop and use new materials

Develop alternative fuels and energy sources

Chemical engineers increasingly play a leading role in the development of renewable energy technologies and creating more sustainable processes and products.

The next generation of industries includes nanotechnology and biotechnology and will require highly trained chemical engineers to implement these technologies.



CAREERS IN CHEMICAL ENGINEERING

As populations grow and resources and energy reserves decline, the demand for chemical engineers increases.

As a chemical engineer, you can work in a range of industries including biotechnology, chemical, energy, environmental, food, mineral, nanotechnology, oil, paper, petrochemical and pharmaceutical.

In these industries you are likely to work in one of the following roles:

PROCESS ENGINEER

As a process engineer you will solve production problems, develop new products, reduce energy use, increase plant safety and efficiency, and oversee plant upgrades and expansions. You are likely to work with a team in operations, maintenance and business strategy.

DESIGN ENGINEER

As a design engineer you may work in a consultancy designing new plants or extending existing plants for clients.

You might design distillation columns, size heat exchangers, work on safety and environmental protections or work out how to control units of a plant for smooth and reliable operation.

RESEARCH AND DEVELOPMENT ENGINEER

As a research and development engineer you are likely to work in a laboratory or company developing new products or working on new catalysts to increase reaction efficiency.

WHY MONASH?

REPUTATION

Monash University has a strong global reputation supported by impressive credentials. We are rated as one of the best universities in Australia and within the top 50 universities in the world for engineering (Academic Ranking of World Universities 2013).

The Faculty of Engineering is recognised as producing research that is well above world standard (Excellence in Research for Australia 2012). Monash is also ranked 22nd in the world for Chemical Engineering (2013 QS Discipline Rankings).

MORE CHOICE, GREATER FLEXIBILITY

Monash offers the widest choice of engineering courses in Australia. We offer you the flexibility of the common first year – and the opportunity to broaden your career options with a double degree.

WORLD-CLASS FACILITIES

Engineering is a hands-on discipline that requires the very best facilities to support your learning. Monash is proud to host a range of world-class engineering facilities.

THE TOTAL EXPERIENCE

Monash Engineering is well-known for its integration of practical and theoretical learning. The Faculty offers a range of enrichment activities to open your eyes to a world outside the classroom. Some of these activities include the Leadership in a Technological Environment, the Monash Industry Team Initiative and the Summer Research Program.

PROFESSIONAL RECOGNITION

The Monash Engineering degree is accredited by Engineers Australia. Engineers Australia is signatory to the Washington Accord - an international agreement among bodies responsible for accrediting engineering degree programs. This means that your Monash engineering qualification will be automatically recognised in any of the 17 signatory countries/programs.

CHEMICAL ENGINEERING AT MONASH

THE DEPARTMENT OF CHEMICAL ENGINEERING

The Department of Chemical Engineering at Monash is a leading chemical engineering department in Australia.

Our mission is to blend academic excellence with industry relevance in our research and in our teaching.

A source of strength for our department is the high quality of our undergraduate and postgraduate student body. Our students come from all corners of Australia and the globe.

The Department of Chemical Engineering maintains close ties with Engineers Australia and the Institution of Chemical Engineers (UK) and has full accreditation from both bodies.

THE SOCIETY OF MONASH UNIVERSITY CHEMICAL ENGINEERS (SMUCE)

SMUCE is a student-run society that aims to bridge the gap between the classroom and the outside world. It serves as a link between students, academics and industry.

We strive to expose students to the world of chemical engineering through our popular Industry Seminar Series. Industry partners present to students on what it's like to be an engineer in industry and about graduate and vacation opportunities.

SMUCE works closely with other Monash departments to inform students about career opportunities and to help them in their professional undertakings. Socially, SMUCE organises events to facilitate networking between students of different year levels and academic staff.



COURSE OVERVIEW

COURSE STRUCTURE

The first level of the course contains units common to all five engineering disciplines. At the beginning of your second year, you can apply to specialise in chemical engineering.

During Level 2 you will be introduced to the basics of chemical engineering, mass and energy balances, fluid flow and other core fundamentals in chemical engineering

In Level 3 you will be exposed to the design of chemical engineering plants and equipment and how we incorporate the environmental impact and safety aspects into the design process. At this level you can choose to specialise in one of three engineering streams. Each stream involves three specialised units and the opportunity to undertake a final year research project in the chosen stream.

The three streams are:

1. Biotechnology

Biotechnology involves the use of biological processes for commercial and industrial applications. Applications

include the use of recombinant DNA, the development of micro-organisms and new bio-processing techniques.

2. Sustainable processing

Sustainable processing involves the application of principles of sustainability and life cycle assessment for environmental benefit. Chemical engineers develop processes for manufacturing existing and new products from renewable raw materials.

3. Nanotechnology

Nanotechnology is engineering at the molecular level. It lets us fabricate an entire new generation of products that are cleaner, smaller, stronger, lighter and more precise.

In level 4 you will experience the university's outstanding research facilities while undertaking your final year research project. You will also have the opportunity to apply all your specialist knowledge to design a chemical engineering process plant as part of a team.

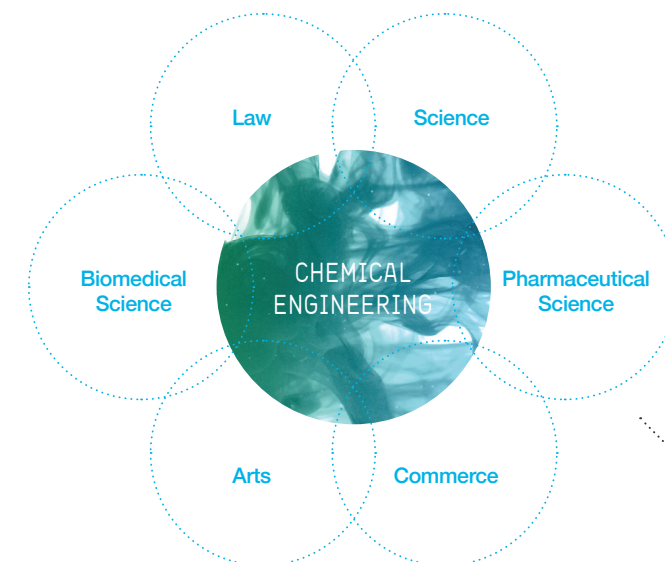
COURSE HIGHLIGHTS

INTEGRATED INDUSTRY TRAINING

Selected students with high academic performance and leadership potential are given the opportunity to spend 4-5 months at a company site gaining practical experience and credit towards their degree.

BLEND OF ACADEMIC EXCELLENCE & INDUSTRIAL RELEVANCE

Our students have an expert industry lecturer in every semester during third and fourth year. These lecturers teach modules or whole units. We also offer frequent industry guest lectures.



DOUBLE DEGREES

More and more organisations seek engineering graduates with expertise in other disciplines. They increasingly value the breadth of knowledge evident in Monash double degree graduates.

A double degree allows you to pursue a career in either area - or to take up one of the many opportunities emerging at the interface of disciplines.

Combine chemical engineering with:

MEET OUR GRADUATES



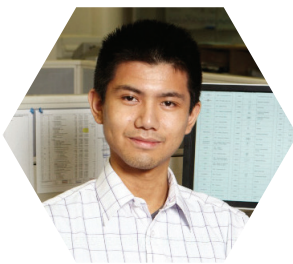
ALISON SLATER

Process Engineer, Rio Tinto

Alison studied a double degree in engineering and biomedical science at Monash because of its excellent reputation. The wide range of clubs and societies also caught her eye - most notably, Engineers Without Borders.

In her role at Rio Tinto, Alison works towards making the plant easier, safer to operate and more energy-efficient.

‘I monitor key parameters and bottlenecks in a section of the plant and recommend action to overcome these and make improvements. I am exposed to completely different aspects of the plant operation and I learn new things every day,’ says Allison.



HARRY WAN

Project Engineer, GlaxoSmithKline

Harry studied a double degree in chemical engineering and pharmaceutical science - the perfect combination for his keen interest in medicinal chemistry and mathematics.

‘As a Project Engineer for GlaxoSmithKline, I am involved in the design, construction and validation of a pilot manufacturing facility which makes sterile pharmaceuticals using Blow-Fill-Seal Technology. I love being able to use my skills for implementing and developing processes that will bring benefit to patients in the future,’ explains Harry.

‘Looking back, the units I studied were carefully selected to give me the knowledge of the entire spectrum of drug development – from target identification and synthesis of the chemical molecule to regulatory considerations and finally releasing the product.’

‘THE VACATION EMPLOYMENT AND INDUSTRY-BASED LEARNING EXPERIENCE IN MY FINAL YEAR HELPED ME DEFINE MY CAREER GOALS. THEY GAVE ME A CLEAR EDGE WITH PROSPECTIVE EMPLOYERS.’



MATTHEW BELL

Offshore Facilities Surveillance Engineer, ExxonMobil

Matthew finished his Bachelor of Engineering in the field of Chemical Engineering in 2011 and is now working for ExxonMobil in their Bass Strait oil and gas production operations.

‘I monitor the processes of several offshore platforms and identify engineering opportunities to improve these processes. I also work with the platform operations personnel to maintain process integrity,’ explains Matthew.

‘The vacation employment and industry-based learning experience in my final year helped me define my career goals. They gave me a clear edge with prospective employers.’

NEXT STEPS

PREREQUISITES

ENTERING THE BACHELOR OF ENGINEERING

2014
CLEARLY IN SCORE

91.50

Monash Clayton
(Malaysia - Please contact us)

MINIMUM VCE PREREQUISITES (UNITS 3 AND 4)

30	25	25	25
English (EAL)	English other than EAL	Maths: Mathematical Methods (CAS)	Chemistry OR Physics

INTERNATIONAL BACCALAUREATE SUBJECT PREREQUISITES

4	3	5	4
English SL	English HL	English B SL	English B HL
4	3	5	4
Mathematics SL	Mathematics HL	Physics SL	Physics HL
4	3		
Chemistry SL	Chemistry HL		

ENTERING THE CHEMICAL ENGINEERING BRANCH (LEVEL 2)

After you have successfully completed your first year, you may apply for entry into the chemical engineering stream.

HOW TO APPLY

Domestic (Australian) and Onshore International students

Apply through VTAC
If you are an Australian or New Zealand citizen, an Australian permanent resident, or you are an international student studying an Australian Year 12 or IB in Australia or New Zealand, apply through the Victorian Tertiary Admission Centre (VTAC).

Visit www.vtac.edu.au for more information.

CONNECT

Please contact the Department of Chemical Engineering to find out more.

Website
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MONASH University

The information in this brochure was correct at the time of publication (June 2014).
Monash University reserves the right to alter this information should the need arise.
You should always check with the relevant Faculty office when considering
a course. CRICOS provider: Monash University 00008C



Group of 8 is an alliance of
Australia's best universities,
recognised for their excellence
in teaching and research.