



Chemistry



Chemistry

Chemistry is the study of substances: their make-up, structure and composition; how they behave; how they may be measured, harnessed and transformed for useful applications in the worlds of materials, medicine, technology and the environment.

The role of chemistry

Chemistry is the central science that underpins all other sciences. A good chemical knowledge is essential for the study and practice of most sciences.

In the modern world, developments in medicine, biology, biochemistry, microbiology, physiology, pharmacology, earth sciences, environmental sciences, new materials etc, are more and more based on molecular properties and interactions and hence chemistry is assured of its central role.

Solutions to current world problems in the environment, energy resources, waste management and pollution control as well as progress in medical treatments, new materials, biotechnology, nanotechnology and industrial processes will rely heavily on chemical knowledge and its application.

The next generation of chemists, like the present generation, will be heavily involved in these endeavours.

Why study chemistry?

A degree in chemistry develops skills in logical thinking, critical analysis, computer literacy, numeracy, data and information handling, and communication. These generic skills are sought by many employers.

Chemistry graduates can apply and develop their scientific and analytical skills to a huge range of fields both within science and in others such as law, banking, administration, marketing and politics.

The recent biotechnology boom has led to a number of new and exciting roles for chemistry graduates.

A graduate majoring in chemistry can step into many careers either with chemistry alone or combined with another discipline.

For many jobs in industry where almost 50 per cent of professional RACI registered chemists are employed, chemistry is essential. The role of the professional chemist in industry includes research and development, sales, marketing, production and all levels of management.

Approximately 35 per cent of professional chemists are employed in government laboratories, such as CSIRO, forensic and analytical laboratories, universities and other research organizations. The remaining 15 per cent of professional chemists use and develop their professional skills in such diverse fields as teaching, computing, science journalism and self-employment.

Career opportunities

Studying chemistry at Monash University provides the flexibility to undertake a limitless range of careers. A few of the many direct options include:

- research chemist in university, government and industrial laboratories
- teaching at primary, secondary or tertiary level
- analytical scientist
- forensic scientist
- environmental scientist
- biotechnology
- quality control
- patent attorney
- materials scientist
- food scientist
- industrial chemist
- science journalist
- geochemist
- pharmaceuticals
- sales and marketing
- information technology
- mining
- waste and resources management
- occupational health and safety
- petrochemicals
- risk management
- wine and brewing industry
- hospital or medical laboratories
- water quality and management
- toxicology



Chemistry at Monash

The School of Chemistry provides units for students with a broad variety of interests. The teaching staff in the school have expertise in wide-ranging areas of chemistry. They are supported by professional staff in the teaching and research laboratories.

Students have the opportunity to experience this wide range of chemistry and its broader applications in science and industry during their undergraduate studies.

The interests of staff and the focus of their research groups are detailed on the school website at www.chem.monash.edu.au

These include:

- molecular design and synthesis
- anti-cancer agents
- medicinal chemistry
- new materials
- glasses and polymers
- bio-spectroscopy
- chemometrics
- drug design
- food chemistry
- bio-diagnostics
- forensic analysis
- analytical chemistry and instrumentation
- water chemistry and quality
- energy
- environmental chemistry
- bio-organic and bio-inorganic chemistry
- biotechnology
- green chemistry
- chemical education

The school collaborates in a number of projects with other Monash departments and schools (including biochemistry, biological sciences, microbiology and earth sciences) and with external parties such as CSIRO (radio-physics, minerals, chemicals and polymers, wood technology etc.), hospitals (Monash Medical Centre, Royal Melbourne, Royal Women's), industries (coal, energy, dairy, chemical, biotechnology) and many other chemistry and science departments worldwide.

How do I study chemistry?

There are a number of ways to study chemistry at Monash. You can choose the Bachelor of Science (BSc) and major in chemistry, Bachelor of Science Advanced with Honours or Bachelor of Science (Science Scholars Program). Chemistry units can also be taken as part of various double degrees available at Monash.

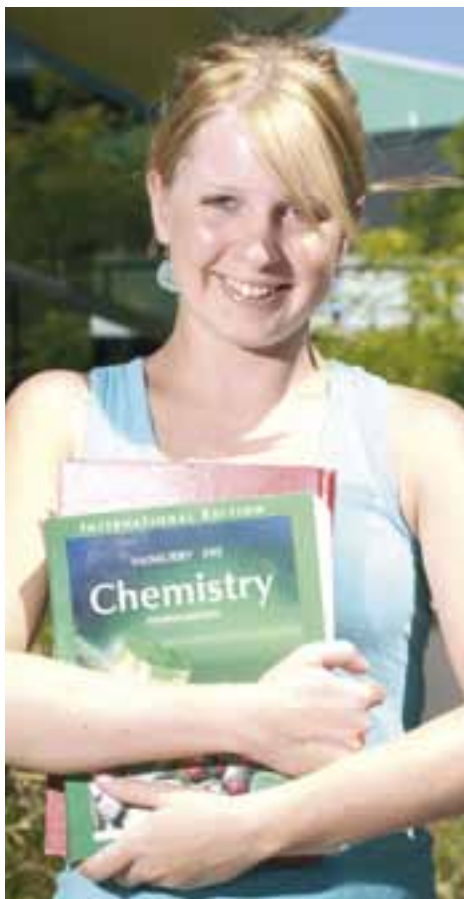


Bachelor of Science

The Bachelor of Science is a course of three years full-time duration (or equivalent part-time). It aims to provide a broad, general science education, equipping graduates for employment in both the public and corporate sectors where the emphasis is on generic skills, which include numeracy, data analysis and presentation skills, and the capacity to work in teams.

Graduates will also have specialist training in one or more science disciplines, with the potential for honours and postgraduate study, leading to employment opportunities in any of the traditional careers for scientists.

BSc Students who perform exceptionally well at Level 1 have the option of transferring into the BScAdv(Hons) prior to the commencement of their second year.



Bachelor of Science Advanced (with Honours), (BScAdv(Hons))

The BScAdv(Hons) is highly recommended for students with excellent academic backgrounds who expect to pursue Honours studies in science. It is a prestigious, high-profile, and flexible single-degree course with a strong coordinated foundation of studies in the 'basic sciences' leading to advanced studies in at least two different areas of science. Students studying chemistry as part of the BScAdv(Hons) have the additional benefits of:

Level one

A problem-based learning Laboratory program which involves the design, assessment and execution of experiments to answer set problems.

Level two

Mentoring within an Academic Research Group in the School and the option of undertaking a Special Research Project.

Level three

Guaranteed Vacation Research placement either in the School or with an Industry/CSIRO partner.

Bachelor of Science (Science Scholars Program), (BSc(ScSchProg))

This course allows students with an excellent academic background the option of doing an accelerated degree program or enriching their studies by enrolling in units additional to those normally required.

Students are assigned a mentor who assists with the design of their degree program. Students can be given credit for previous studies (based on previous tertiary study, including secondary school year 12 enhancement studies) leading to the BSc (Honours) degree after three years rather than the normal four years.

Studying chemistry as part of the BSc(ScSchProg) gives students the option of taking a special research project as part of their Level 2 chemistry units



Double degrees

Within the Faculty of Science it is also possible to combine a science major, like chemistry, with many different disciplines through the following double degrees:

- Bachelor of Science/Bachelor of Law
- Bachelor of Science/Bachelor of Engineering
- Bachelor of Science/Bachelor of Commerce
- Bachelor of Science/Bachelor of Education
- Bachelor of Science/Bachelor of Arts

It is also possible to combine a chemistry major with many other subjects through a choice of units from those offered by the faculty. With the central role taken by chemistry within the sciences, chemistry combines well with most other science subjects. A combination of any of the biosciences, earth sciences, physics, mathematics or materials science with chemistry, broadens career choices.

A further alternative lies within environmental science where knowledge of chemistry is an essential part of the solution to environmental problems.

Route to becoming a professional chemist

Studying chemistry starts at level one with a general introduction to chemistry and, as students progress, becomes increasingly specialised, culminating in the possibility of undertaking an honours year. It is recommended that all students should set their sights on an honours degree as this significantly increases their employment potential.

Level one

Level-one chemistry is an introductory year. The emphasis is on chemistry as a central science and on the development of laboratory skills. The main-stream chemistry units are aimed at students who already have a good background from VCE chemistry. The 'Chemistry in Context' units are available for students who have not completed VCE chemistry and who wish to undertake further chemistry or require chemistry for other science units.

Level two

Various units are available to students pursuing professional training in chemistry and to those requiring a strong chemistry background for other science, engineering or biomedical science disciplines. 'Synthetic Chemistry 1', and 'Spectroscopy and Analytical Chemistry' are recommended units for students intending to major in chemistry.

Level three

The level-three units allow students to develop specialist or interest areas. Students intending to continue chemistry at the honours level are required to complete three of the following four units – 'Advanced Physical Chemistry, Advanced Organic Chemistry, Advanced Inorganic Chemistry or Advanced Analytical Chemistry'. Research projects are incorporated into the laboratory program to provide advanced laboratory skills, and for students undertaking a significant amount of chemistry, a full research project unit is available.

Level four – Honours

The honours year is offered to students who have achieved good chemistry grades at level three. The major component is an advanced research project. Two John Swan scholarships are offered, on a competitive basis, to provide support to the most promising honours students.

Chemistry units

Each unit = 6 points, minor = 24 points, major = 48 points

Level one

CHM1011	Chemistry (for students with VCE chemistry)
CHM1022	Chemistry (for students with VCE chemistry)

or

CHM1031	Chemistry in Context I
CHM1042	Chemistry in Context II

Level two

CHM2911*	Synthetic Chemistry 1
CHM2922*	Spectroscopy and Analytical Chemistry
CHM2942	Synthetic Chemistry 2
CHM2951	Environmental Chemistry – Water
CHM2962	Food Chemistry

Level three

CHM3911*	Advanced Physical Chemistry
CHM3922*	Advanced Organic Chemistry
CHM3941*	Advanced Inorganic Chemistry
CHM3952*	Advanced Analytical Chemistry
CHM3180	Materials Chemistry
CHM3931	Medicinal Chemistry
CHM3960	Environmental Chemistry
CHM3990	Applied chemistry project

Students with a total of 24 points of third-year chemistry, an average distinction grade, plus the required units (*see above), can choose to do an honours year.

Level four – Honours

Advanced research project

Further information

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General career information can be found by visiting the future students section on the Faculty of Science website www.sci.monash.edu.au

Details of courses are provided in the *Monash University Undergraduate Handbook* and online at www.monash.edu.au/pubs/handbooks