The Chemistry Major - for Students Entering 2\textsuperscript{nd} Year

• *What will you gain?*

Students majoring in Chemistry develop the capacity to view the world from a molecular perspective and to solve complex problems that span the breadth of chemistry and other sciences. You will gain transferable skills and specialised laboratory skills and knowledge in the areas of molecular design and synthesis, analysis, quantum chemistry, molecular dynamics, chemical kinetics, and thermodynamics. Make an impact in the spheres of health, environment, industry, agriculture, science, and technology with a major in Chemistry.

• *What does this major lead to?*

**Careers:** As a Chemistry graduate, you can work in establishing manufacturing industries such as food and beverages, pharmaceuticals, mineral and petroleum products. You can also take a leading role in the emerging industries involved biotechnology, advanced materials and synthesis and testing of bioactive molecules. Other options include careers in management, marketing and sales, information technology, law, teaching, and environmental consultancies. Careers in research, government and professional positions are also available to you. Employment growth in Chemistry is projected to be strong with a high employment rate and excellent job prospects.\(^1\)

**Research:** If you are interested in a career as a research scientist, you can follow Masters and Honours pathways to a research higher-degree (PhD).

**Graduate Study:** This major can lead to Graduate degrees preparing you for a wide range of professions including Engineering, Law, Medicine and Health, Science and Teaching.

Professionally-focussed graduate degrees in the sciences and technology, including Biotechnology, Environmental Systems, Informatics, Management Sciences, and Nanotechnology.

• *What second year subjects are available?*

Together *Reactions and Synthesis* (CHEM20018), *Structure and Properties* (CHEM20020) and *Practical Chemistry* (CHEM20019) are the path to a Chemistry major. These subjects will give you entry into all 1\textsuperscript{st} semester third-year Chemistry subjects as well as the 2\textsuperscript{nd} semester subject, *Analytical and Environmental Chemistry* (CHEM30012). In addition, *Environmental Chemistry* (CHEM20011) will give you entry into the 3\textsuperscript{rd}-year subject, *Analytical and Environmental Chemistry* (CHEM30012).

\(^1\) Based on data from the Australian Bureau of Statistics and the Department of Employment and Workplace Relations. See www.jobsearch.gov.au
What will you do in these subjects?

Reactions and Synthesis (CHEM20018) covers key concepts associated with the synthesis and design of organic and inorganic molecules, molecular architecture and the energy transformations associated with chemical and physical processes. Topics covered include synthesis of simple polyfunctional organic compounds, reactions and properties of s-, p- and d- block elements and thermodynamics. These topics have applications in drug discovery, nanotechnology and energy harnessing through conventional and alternative energy sources. **New for 2012** In the last 9 lectures of the subject students will be able to choose between modules which focus on "Theory of Advanced Materials" or "Biological Chemistry".

Structure and Properties (CHEM20020) explores key concepts related to the stereochemical and electronic properties of molecules and methods central to their study. The subject includes characterisation and quantification of materials by spectroscopic techniques, molecular orbital theory and the application of approaches based on molecular symmetry and group theory to the understanding of stereo-selective reactions, bonding and spectroscopy. These topics have applications to advanced materials, light emitting polymers, chemical analysis and catalysis in biological and industrial systems.

Practical Chemistry (CHEM20019) allows the development of skills in synthesis; analysis of single and multiple component samples; determination of kinetic and thermodynamic properties; measurement and interpretation of the spectroscopy and magnetism of inorganic and organic compounds; the operation of modern analytical and spectroscopic techniques (including chromatography, atomic and molecular spectroscopy, mass spectrometry) and the documentation and reporting of chemical investigations.

Environmental Chemistry (CHEM20011) this option includes lecture and practical components and deals with important aspects of the structure and chemistry of the hydrosphere, atmosphere and lithosphere (soil); sources, chemistry and impact of environmental pollution; and energy resources (fossil fuels, nuclear and solar) and the impact of energy utilisation. Topics include the principles and application of quantitative chemical analysis and environmental monitoring. The practical component will involve the application of titrimetric, optical and chromatographic analytical techniques to the determination of compounds of environmental interest.
How will these subjects fit into your course?

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• **What Breadth subjects would go well with this major?**

Students wanting to pursue careers in the Chemistry industry may wish to pursue language studies (Japanese, Chinese) and/or business studies.

• **What opportunities are there for research or off-campus studies in this major?**

We have a 12.5 point third year chemistry research project that is available to all Chemistry majors and involves undertaking experimental and/or theoretical research in an area currently relevant to one of the research groups in the School of Chemistry.

Students can undertake Study Abroad, provided the subjects they study are compatible with our major.

• **What other majors can you keep open?**

Pathways are available to undertake chemistry subjects and keep open majors in Mathematics, Geology, Biotechnology, Pharmacology, Chemical Systems, Biochemistry and Molecular Biology and Physics.

Need further information or still not sure... Speak to us!!!

For 2nd Year subject inquiries contact the Director of 2nd Year Chemistry, second-year-director@chemistry.unimelb.edu.au.

All other enquiries should be directed to The School of Chemistry, telephone: 8344-6567.