**Medicinal Chemistry**

The Bachelor of Medicinal Chemistry at UNSW is an interdisciplinary degree teaching the fundamental principles of new drug design from concept to clinical application.

The Bachelor of Medicinal Chemistry is a professionally oriented, truly interdisciplinary degree taught as a joint initiative between the School of Chemistry (Faculty of Science), and the Pharmacology section of the School of Medical Sciences (UNSW Medicine). This four year degree leads to the award of Honours based on successful completion of the degree including a medicinal chemistry oriented research project in the fourth year.

The Medicinal Chemistry degree is structured to provide graduates with a strong background in biology, biochemistry and pharmacology based on a foundation of essential chemistry. The first year focuses on the fundamental areas of science: chemistry, mathematics and biology. In the following 2 years students enhance their knowledge of chemistry while undertaking courses in pharmacology, biochemistry, and selecting from a number of elective courses from the biological and medical sciences. In the Honours year, 4th year students complete a research project and thesis related to medicinal chemistry.

The course is designed for students with a passion for chemistry and its ability to solve significant human health problems at the interface between chemistry and biology.

**What is Medicinal Chemistry?**

**Medicinal chemistry deals with the design, chemical synthesis and development of drugs.**

Normally the discovery of a drug occurs by screening of a natural product or by assay of synthetic compounds. The initial discovery is further refined to generate a new compound with optimised drug properties. A clinical trial program is used to determine the drug’s safety and behaviour. A drug that successfully passes the clinical trial program may then be approved and marketed to patients.

A Medicinal Chemist is a scientist who can be involved at all stages from the initial design of a drug, through to its clinical testing, refinement and development as a therapeutic agent. Many different aspects are involved:

- the rational design and synthesis of novel drug candidates,
- the study of their biochemical and physiological effects,
- testing regimes, and
- regulatory and ethical considerations.
Career Opportunities

As a graduate from the Medicinal Chemistry degree at UNSW you will be equipped with a unique and wide armoury of skills, ranging from fundamental chemistry enabling the synthesis and analysis of drug candidates, through to relevant pharmacology and molecular biology skills. This combination will see you in high demand both locally and globally in pharmaceutical companies involved in modern drug design. In addition, the multidisciplinary nature of the degree will mean that your skills will also be highly marketable within other science-based biotech industries and related fields.

Graduates will also be qualified for careers in research-intensive institutes, government and the private sector.

Why study Medicinal Chemistry at UNSW?

UNSW offers a unique opportunity to study this exciting, rapidly developing discipline in an environment that prides itself on the interrelationship between quality education and research. UNSW has invested in modern facilities across the University from the new Chemistry laboratories, to the Children’s Cancer Institute Australia for Medical Research, and the Lowy Cancer Research Centre.

Our world-leading researchers at UNSW have established strong collaborative projects across the university investigating such diverse areas as novel anticancer drugs, antimicrobial agents, new HIV-AIDS therapies, arthritis and brain science. As a part of the Medicinal Chemistry degree students will have the opportunity to participate in research during their Honours year with the option to progress into a higher research degree.

Does Medicinal Chemistry have anything to do with pharmacy?

Medicinal chemistry involves the design and development of compounds which are useful as drugs. This is challenging and requires an understanding of biochemistry, molecular biology, human physiology and pharmacology. Medicinal chemists make drugs.

Pharmacy is a health profession that links the health sciences with the chemical sciences and it is charged with ensuring the safe and effective use of pharmaceutical drugs.
The Degree - Core Courses

Year 1
These courses provide the required foundation knowledge in the key disciplines of Chemistry, Mathematics and Biology while introducing students to the attributes essential to completing university studies.

- CHEM1051  Higher Chemistry Medicinal A
- BABS1201  Molecules, Cells and Genes
- MATH1031  Mathematics for Life Sciences
- CHEM1151  Introductory Medicinal Chemistry
- CHEM1061  Higher Chemistry Medicinal B
- MATH1041  Statistics for Life and Social Sciences
- BIOT1011  Introductory Biotechnology
- CHEM6041  Analytical Chemistry: Frontier Techniques
- PHAR3102  Molecular Pharmacology
- PHAR3101  Rational Drug Design

Plus 6 units of credit in electives

Year 2
This year builds on Chemistry knowledge and skills, as well as introducing the essential principles of pharmacology and biochemistry. Elective courses can be selected from the biological and medical sciences (microbiology, biochemistry, pharmacology).

- CHEM2011  Physical Chemistry: Molecules, Energy, and Change
- CHEM2021  Organic Chemistry: Mechanisms and Biomolecules
- CHEM2041  Analytical Chemistry: Essential Methods
- BIOC2101  Principles of Biochemistry (Advanced)
- BIOC2201  Principles of Molecular Biology (Advanced)
- PHAR2011  Introductory Pharmacology and Toxicology

Plus 12 units of credit in electives

Year 3
Students undertake advanced courses, with an emphasis on organic and medicinal chemistry, and a selection of biological courses from the medical sciences (microbiology, biochemistry, pharmacology).

- CHEM3021  Organic Chemistry: Strategies for Synthesis
- CHEM6041  Analytical Chemistry: Frontier Techniques
- CHEM3051  Medicinal Chemistry
- PHAR3102  Molecular Pharmacology
- PHAR3101  Rational Drug Design

Plus 18 units of credit in electives

Year 4
In the Honours year students work on a supervised research project designed to emphasise the truly interdisciplinary nature of Medicinal Chemistry with contributions from both the Faculty of Science and Medicine. The research project is the focus for the year and will culminate in the submission of a research thesis or dissertation.

More detail about the program, including electives and program rules, can be found in the undergraduate section of the UNSW Online Handbook www.handbook.unsw.edu.au/
A Student’s Perspective

Rebecca Jayanthakumar
Bachelor of Medicinal Chemistry

Ever since high school I had always been interested in Science and health as a career, I felt that this would satisfy my ambition to help people. When researching for suitable options, I came across some information on this course at UNSW. I also loved Chemistry at school which was an added bonus! After further research I had seen that UNSW was a fantastic university for Science degrees as it had many resources and had won many awards for their teaching quality. This was the basis of my decision to choose UNSW, as well as the fact that not many other local universities offered Medicinal Chemistry as a stand-alone course.

Since I had done Chemistry at school, I naively assumed that university Chemistry would be somewhat similar.

I was very wrong! My eyes have been opened to many types of Chemistry that I had not even thought existed. In general, this course has given me a newfound appreciation for Chemistry and the impact it has (and could potentially have) on society, as well as a respect for those who devote their lives to studying and working in this field.

UNSW has been a great experience for me so far. Entering university from school, I was worried as to how I would cope with the workload as well as the independence of being a university student. This didn’t end up being a problem for me, as I felt that UNSW provided me with the right balance of support and independence that I needed to develop as a good student. My objective is to achieve a career in the field of Medicinal Chemistry; working in hospitals, pharmaceutical or research laboratories leading a team of people. I would love for the research and results achieved by my team to be used to benefit a local or even global community.