

Bachelor of Medicinal Chemistry

Coordinators of Degree Program:

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The Field of Medicinal Chemistry

Medicinal Chemistry is a specialist four-year degree, which provides students with excellent training in the modern techniques of chemical science applied to medicine. This includes specialized courses in drug discovery and design, using both rational, computer-aided and bioprospecting approaches. As well as a fundamental training in the chemical sciences, students study concepts needed to understand the effects of the disease state on the human body and the role of drugs. Topics of study include physiology, pharmacology, and cell biology.

This degree represents an excellent foundation for students considering post graduate studies in medicine or other health areas. Many of our past graduates have been successful in obtaining entry into these post graduate degrees. Recent graduates of the degree have also readily found excellent employment opportunities in the pharmaceutical and biomedical sectors in Australia and overseas

The BMedChem program is four years full-time with a workload of 48 credit points per year, but it is possible to undertake the course part-time. Honours is awarded on performance at the end of the fourth year. Advanced entry to the degree program may also be considered.

Employment

Medicinal chemists may be employed to:

- design new pharmaceutical agents which could be used to treat major human diseases
- identify new medically useful compounds from natural sources (e.g. marine organisms, microorganisms and medicinal plants)
- develop new therapeutic and diagnostic agents for nuclear medicine
- develop new forms of drug delivery
- monitor guidelines for testing drugs and undertake analyses
- assess patent applications for new pharmaceuticals
- teach

Organisations employing medicinal chemists include:

- Biomedical Research Institutes
- ANSTO
- Pharmaceutical and related firms
- Universities
- CSIRO
- Hospitals
- Government

The Degree

The Bachelor of Medicinal Chemistry is a four-year honours or pass degree, honours being awarded based on academic performance at the completion of the fourth year.

See Section 3.3.2 (School of Chemistry) for information regarding teaching staff and their research interests.

Course Aims and Objectives

The degree aims to provide:

- (a) new training opportunities for those interested in interdisciplinary chemistry degrees, and
- (b) a sound base for students in chemistry, medicinal chemistry, and areas of the biological sciences, anatomy, physiology, and pharmacology, in order to help them to address fundamental questions at the molecular level.

The course is designed to:

- (a) have a balanced content of lectures tutorials, laboratory classes and project work in order to develop the required knowledge, concepts, skills, independent thinking and research training;
- (b) instil an interdisciplinary outlook while maintaining a very strong chemical training;
- (c) produce graduates who would qualify for membership of the Royal Australian Chemical Institute.

A four-year course is required in order to provide both the advanced chemical and medicinal chemical training, together with the necessary ancillary supporting subjects. The interdisciplinary outlook will be nurtured particularly in the medicinal

chemistry components of the course. In both laboratory and lecture/tutorial classes, deliberate stress will be laid on the fact that in order to understand the concepts and address the key issues, multiple inputs from basic chemistry, biochemistry, physiology, pharmacology, etc. are crucial.

Students who decide not to proceed with the fourth year qualify to graduate with a Bachelor of Science (Medicinal Chemistry).

Course Structure

The course is a four-year honours degree program (full-time) with a workload of 48 credit points per year. It is also possible to undertake the course part time.

Medicinal Chemistry Course Structure		cps	Session
1st Year			
CHEM101	Chemistry 1A	6	1
CHEM102	Chemistry 1B	6	2
BIOL103	Molecules, Cells and Organisms	6	2
BMS101	Systemic Anatomy	6	1
BMS112	Human Physiology I: Principles and Systems	6	2
STAT252	Statistics for the Natural Sciences	6	2
<i>Plus two of the following:</i>			
BIOL104	Evolution, Biodiversity and Environment	6	1
BMS103	Human Growth, Nutrition and Exercise	6	1
MATH151*	General Mathematics 1A (if required)	6	1,3
MATH187/141	General Mathematics 1A Part 1 / 1C Part 1	6	1
*The Mathematics subject to study is dependent on the level of Maths already achieved by the individual student (HSC or equivalent).			
PHYS141	Fundamentals of Physics A	6	1
OR			
PHYS155	Introduction to Biomedical Physics	6	1
Total for major at 100-level		48	
2nd Year			
CHEM211	Inorganic Chemistry II	6	1
CHEM212	Organic Chemistry II	6	1
CHEM213	Molecular Structure, Reactivity and Change	6	2
CHEM214	Analytical and Environmental Chemistry	6	2
BIOL213	Principles of Biochemistry	6	1
BIOL214	The Biochemistry of Energy and Metabolism	6	2
BIOL215	Introductory Genetics	6	2
BMS202	Human Physiology II: Control Mechanisms	6	1
Total for major at 200-level		48	
3rd Year			

CHEM320	Bioinformatics: From Genome to Structure	8	2
CHEM321	Organic Synthesis and Reactivity	8	2
CHEM330	Medicinal Chemistry	8	2
CHEM350	Principles of Pharmacology	8	1
CHEM364	Molecular Structure and Spectroscopy	8	1

Plus one of the following:

BIOL303	Biotechnology: Applied Cell and Molecular Biology	8	1
BIOL320	Molecular Cell Biology	8	1

Total for major at 300-level 48

4th Year

CHEM440*	Selected Topics in Medicinal Chemistry	16	A
CHEM460	Medicinal Chemistry Project	32	A

Total for major at 400-level 48

Total 192

* This subject covers specialist topics in a variety of medicinal chemistry areas. Topics to be selected from could include structure-based ligand design (including computer-aided drug design); structure-pharmacological property relationships; synthesis and applications of radiopharmaceuticals; drug stability and formulation; toxicology and metabolism; advanced synthetic chemistry (including asymmetric synthesis and chiral drugs); bioactive natural products and drug development (including medicinal plant studies), toxicology and advanced proteomics.

Those who do not qualify for direct admission to the BMedChem may gain admission via the BSc program subject to satisfactory performance in first year, pre-requisite considerations, and approval by the Dean or Associate Dean.

AWARD OF HONOURS FOR THE BMedChem DEGREE

Honours is awarded on completion of the fourth year on academic performance assessed by calculating a weighted average mark (WAM) for all 300 level and 400 level subjects.

The weighting reflecting the level of the subject will be 1 for 300 level and 4 for 400 level subjects.

The approved ranges of marks for the award of Honours grades is:

Honours Class I	80 to 100%
Honours Class II, Division 1	72.5 to less than 80%
Honours Class II, Division 2	65 to less than 72.5%
Pass degree	50 to less than 65%

The regulations governing the award of Honours and the formula used for the calculation of the final grade is set out in the Course Rules in the University's Online Course Handbook: www.uow.edu.au/handbook

Postgraduate Studies

Students completing the BMedChem degree would be eligible to undertake higher degree (MSc/PhD) studies in medicinal chemistry or chemistry, particularly in the Centre for Medicinal Chemistry and Pharmacology or the Centre for Medical Biosciences in which a number of academic staff from the Schools of Chemistry and Biological Sciences are engaged.

Bachelor of Medicinal Chemistry (Advanced)

Students entering with at least 90 UAI or equivalent, can enrol in the Bachelor of Medicinal Chemistry (Advanced) degree. See Section 7.4 for details. Students can transfer to the Bachelor of Medicinal Chemistry (Advanced) degree from the BSc (Medicinal Chemistry) or the Bachelor of Medicinal Chemistry after completing 72 credit points of study if they have obtained a distinction average.