

Pharmacology

The subjects in pharmacology introduce students to the unified study of the interaction of chemical agents and living matter. The emphasis is placed on the principles of drug action and on the reactions of living processes to drugs. Toxicology, a division of pharmacology, is concerned with the adverse effects on life of therapeutic drugs and other chemicals. Pharmacology 534-201 provides an introduction to the important concepts of pharmacology and toxicology and may be taken to provide the basis for more advanced studies in pharmacology and toxicology at the 300-level or to supplement a major study in another discipline.

Generic skills that students will develop through the study of pharmacology include experimental design and technique, computer skills, organisational skills, bioinformatics, data presentation and analysis, working in teams, and communication skills.

Suggested subjects

Pharmacology major

Students who commenced study towards a BSc, BASc, or BSc combined course during or after 1999 are required to complete a major area of study which comprises subjects at 100, 200 and 300-levels. The requirements for a major study in pharmacology are outlined elsewhere in this Handbook, on page 13. A pharmacology major may be combined with a major in anatomy and cell biology, biochemistry and molecular biology, chemistry, neuroscience, pathology or physiology.

Pharmacology combined with other subjects

Students who commenced study prior to 1999 may combine pharmacology with other subjects, for example:

200-level subjects

- Pharmacology 534-201 with subjects selected from:
- Biochemistry 521-211, 521-212 and 521-220
- Physiology 536-201, 536-211 and 536-202
- Chemistry 610-210 /211, 610-220 /221, 610-240/241, 610-260
- Anatomy 516-201
- Microbiology 526-201, 526-202, 526-204, 526-205 or 526-221

300-level subjects

Pharmacology - all 300-level pharmacology subjects

Pharmacology and other biomedical subjects - at least 50 points in 300-level pharmacology (normally 534-301 and any other two 300-level pharmacology subjects), with selected subjects from the following: anatomy and cell biology, biochemistry and molecular biology, chemistry, pathology, physiology or psychology.

Refer to the relevant subject information for details of prerequisites.

Neuroscience

Subject 534-302 Neuropharmacology can be undertaken as part of a neuroscience sequence. Students wishing to pursue the neuroscience sequence may be allowed to undertake 534-302 without 534-301 as a prerequisite.

Biotechnology

Both second year 534-201 (before 1998: 534-201 and 202) and third year subjects 534-301, 534-304, (before 1998: 534-301, 534-302, 534-305, 534-306) in pharmacology are approved subjects for inclusion in the Graduate Diploma in Biotechnology course (contact the Faculty of Medicine, Dentistry and Health Sciences for details).

Bachelor of Science (Honours)

For information about faculty and departmental entry requirements for honours, please refer to *Bachelor of Science (Honours) and Bachelor of Information Systems (Honours) (p.1)*. These requirements should be considered when planning your course.

Further Information

Department of Pharmacology
The University of Melbourne
Victoria 3010

Tel: +61 3 8344 7843
Fax: +61 3 8344 0241

Web: <http://www.pharmacology.unimelb.edu.au>

Subject descriptions

200-level subject

534-201 Pharmacology

Note: Special requirements: Laboratory coat. Experiments involving the use of animals are an essential part of this subject; exemption is not possible.

Credit points: 12.5

HECS-band: 2

Coordinator: Dr M.Lew

Prerequisites: 25 points of 100-level chemistry; biology 600-141 and 600-142. Exemption may be considered in special cases.

Contact: 36 lectures (three a week); 18 hours practical work (*Semester 2*).

Description: The lecture course covers the basic principles of drug action and focuses on receptor sites that mediate drug action and the physiological and biochemical mechanisms associated with the response to a drug. The interaction of drugs with hormones and common therapeutic agents will be used to illustrate these principles. It investigates the ways in which drugs are handled by the body in terms of their absorption, distribution and metabolism. The course examines the development of new drugs from natural sources or new chemical syntheses and how these drugs are evaluated and regulated. Aspects of drugs of abuse and addiction and the potential strategies for dealing with this problem will be examined. The principles of selective toxicity and the toxicology of environmental contaminants will be introduced. Aspects of venoms and toxins will be examined. The practical course will reinforce the lecture material and illustrate the basic concepts of the pharmacological concentration response relationship, competitive antagonism and pharmacodynamic and pharmacokinetic modelling.

Assessment: A 3-hour end-of-semester written examination; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

300-level subjects

534-301 Principles of Pharmacology

Note: Special requirements: Laboratory coat. Experiments involving the use of animals are an essential part of this subject; exemption is not possible.

Credit points: 25

HECS-band: 2

Coordinator: Dr G Anderson

Prerequisites: Pharmacology 534-201 or in some circumstances 534-202; exemption may be given at the discretion of the Head of Department. Students completing 534-202 normally require a practical based unit in second year. Physiology 536-201 and 536-211 and biochemistry 521-211 and 521-212 are highly recommended.

Contact: 24 lectures (two a week), 72 hours practicals, one 6-hour session a week (*Semester 1*).

Description: The teaching program covers the mechanisms of drug-receptor interaction, classification of drug receptors, drug-receptor kinetics, drug-enzyme interactions and second messenger systems involved in cell signalling. The disposition of drugs in the body, drug administration, absorption and elimination, and genetically-determined variability in drug action will be discussed. The course will cover the pharmacology of the adrenergic and cholinergic nervous systems and autacoids. Students will also acquire skills to set up and carry out laboratory experiments using computer-based recording equipment and learn to record accurately and analyse results of a variety of pharmacological experiments. In addition they will learn to appreciate the fundamental importance of good laboratory practice which includes the proper treatment and handling of laboratory animals, the keeping and writing up of laboratory records and the importance of good experimental design and methods of data analysis in investigating mechanisms of drug action.

Assessment: A 3-hour end-of-semester written examination; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

534-302 Neuropharmacology

Note: Experiments involving the use of animals are an essential part of this subject; exemption is not possible. Credit cannot be obtained for 534-302 and either 534-303 or 534-304 prior to 1998.

Credit points: 12.5

HECS-band: 2

Coordinator: Dr M Morris

Corequisites: 534-301 Principles of Pharmacology (*p.1*); exemption may be given at the discretion of the Head of Department for students wishing to take 534-302 as part of the neuroscience stream.

Contact: 12 lectures (two a week for 6 weeks) and 36 hours practical, one 6-hour session a week for 6 weeks. First half of Semester 1 (*Semester 1*).

Description: The teaching program will address the mechanisms of neurochemical transmission and co-transmission and the techniques used to iden-

tify transmitter substances and monitor transmitter release. Central nervous system adrenergic and cholinergic pharmacology will be discussed, in addition to peptide and amino acid neurotransmitter systems. The interaction of neuropharmacological agents such as the antidepressants and psychotomimetics at sites of chemical neurotransmission will be discussed. In the practical component of the course, students will develop skills to set up and carry out experiments using computer-based recording equipment, and learn to record and analyse the results of pharmacological experiments demonstrating the use of drugs affecting neurotransmission. Through this process, it is envisaged that students will come to appreciate the importance of good laboratory practice, including the proper handling of laboratory animals, keeping of laboratory records, and the need for good experimental design.

Assessment: A 2-hour end-of-semester written examination covering material presented in lectures and practicals; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

534-303 Molecular Pharmacology

Note: Experiments involving animals are an essential part of this subject; exemption is not possible. Credit cannot be obtained for 534-303 and 534-310 prior to 1998.

Credit points: 12.5

HECS-band: 2

Coordinator: Dr M Lew

Corequisites: 534-301 Principles of Pharmacology (*p.1*), exemption may be considered in special cases at the discretion of the Head of Department.

Contact: 12 lectures (two a week for 6 weeks) and 36 hours practical, one 6-hour session a week for 6 weeks. Second half of Semester 1 (*Semester 1*).

Description: This subject will introduce the students to some of the information and techniques at the cutting edge of pharmacology. A major emphasis is placed on the molecular nature and behaviour of receptors, and the exploitation of 'new biology' or biotechnology in the service of drug and receptor characterisation. The lectures and practicals are closely integrated and include concepts and methods from current research programmes in the department. Students will be assisted to gain skills in understanding the current primary literature of molecular pharmacology and a poster-building practical exercise will enhance both group-working and communication skills. It is expected that students will finish the course with an enhanced understanding of biological science and an appreciation of how the molecular mechanisms of drug action are characterised.

Assessment: A 2-hour end-of-semester written examination covering material presented in lectures and practicals; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

534-304 Pharmacology of Therapeutic Substances

Note: Experiments involving animals are an essential part of this subject; exemption is not possible. Credit cannot be given for 534-304 and 534-305 and 534-306 prior to 1998.

Credit points: 25

HECS-band: 2

Coordinator: Dr M Morris

Prerequisites: 534-301 Principles of Pharmacology (*p.1*)

Contact: 24 lectures (two a week), 72 hours practical, one 6-hour session a week (*Semester 2*).

Description: The teaching program covers the benefits and risks associated with the use of drugs in a variety of systemic diseases. In particular, drugs affecting the cardiovascular, respiratory, gastrointestinal and renal systems, in addition to anti-inflammatory and immunomodulatory drugs. Drug action in the central nervous system; anaesthetics, sedatives and hypnotics, analgesics, drugs used in neurodegeneration and disorders of motor function will be addressed. In the practical component of the course, students will develop skills to set up and carry out experiments using computer-based recording equipment, and learn to record and analyse the results of pharmacological experiments demonstrating the use of drugs in a variety of settings. Through this process, it is envisaged that students will come to appreciate the importance of good laboratory practice, including the proper handling of laboratory animals, keeping of laboratory records, and the need for good experimental design. Thus a basis of understanding of the therapeutic benefit of drugs will be developed.

Assessment: A 3-hour end-of-semester written examination; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

534-305 Toxicology

Note: Experiments involving animals are an essential part of this subject; exemption is not possible. Credit cannot be given for 534-305 and 534-307 prior to 1998.

Credit points: 12.5

HECS-band: 2

Coordinator: Dr G Anderson

Prerequisites: 534-301 Principles of Pharmacology (*p.1*); exemption may be given at the discretion of the head of the department.

Contact: 12 lectures (two a week for 6 weeks) and 36 hours practical, one 6-hour session a week for 6 weeks. First half of Semester 2 (*Semester 2*).

Description: The teaching program will introduce students to the mechanisms by which drugs, chemicals and toxins cause cellular toxicity and how cellular toxicity can lead to effects on specific target organs. The lectures will cover the following topics: general mechanisms of toxicity; principles of toxicity testing; clinical testing of drugs; epidemiological studies; apoptosis and necrosis; free-radicals and cell damage; organ-specific toxicity (including cardiovascular system, lung, liver, kidney, nervous system, and reproductive system); the in-vitro and in-vivo toxic effects of commonly used and encountered drugs, chemicals and toxins. In the practical sessions, students will develop skills in a range of techniques used to examine the toxicity of drugs, chemicals and toxins, including in-vitro assays, in-vivo investigations and computer-based modelling. Throughout the teaching program, the importance of rational and critical scientific analysis of toxicological issues will be stressed.

Assessment: A 2-hour end-of-semester written examination covering material presented in lectures and practicals; continuous assessment throughout the practical component of the subject. An oral examination may also be held for students who do not pass the written examination.

534-306 Drug Discovery

Note: Credit cannot be gained for both 534-306 and 534-311 prior to 1998

Credit points: 12.5

HECS-band: 2

Coordinator: Dr R A Hughes

Prerequisites: 534-301 Principles of Pharmacology (*p.1*); exemption may be given at the discretion of the head of the department. Some 200-level chemistry is desirable, preferably 610-210 or 610-221.

Contact: 12 lectures (two a week for 6 weeks) and 36 hours practical workshops, one 6-hour session a week for 6 weeks. Second half of Semester 2 (*Semester 2*).

Description: The teaching program will introduce students to the means by which new drugs can be discovered. The lectures will cover the following topics: historical background; choice of therapeutic target; screening; rational drug design; molecular modelling; quantitative structure-activity relationships; the emerging role of combinatorial chemistry; peptide-based drug design; recombinant proteins as drugs; novel delivery systems; in-vitro and in-vivo assays; high throughput assays; and the impact of molecular biology on drug discovery. In the practicals, students will develop skills in the use of computer-aided molecular modelling to understand drug and receptor structure and how this knowledge can be applied to the design of new drugs, and examine case studies of modern drug discovery. Students will be encouraged to integrate knowledge from different parts of the subject, reinforcing the need for a multidisciplinary approach to the discovery and development of new drugs.

Assessment: A 2-hour end-of-semester written examination; continuous assessment of practical reports. An oral examination may also be held for students who do not pass the written examination.

534-307 Ocular Pharmacology

Credit points: 6.25

HECS-band: 2

Coordinator: Dr J Ziogas

Prerequisites: Enrolment in the third year of the BOptom course with successful completion of second year physiology and biochemistry.

Contact: 30 lectures, 4 tutorials, two 3-hour practical sessions (*Semester 2*).

Description: The teaching program will emphasise the importance of drug action in the eye and provide the optometry student with enough background to appreciate the special needs of optometry patients undergoing drug therapy for other conditions and be able to communicate confidently with patients and other health professionals about pharmacology and therapeutics. Topics that will be covered include principles of drug action; pharmacodynamics and pharmacokinetics; administration of drugs to the eye; absorption and penetration through the cornea; mechanisms of drug elimination and metabolism; autonomic innervation of the eye; miotics, mydriatics and cycloplegics; drugs used in systemic and central conditions and their consequence to ocular function; and drugs used in ocular conditions; local anaesthetics, anti-inflammatory drugs, antihistamines, anti-infective agents and drugs used in the treatment of glaucoma.

Assessment: A 3-hour written examination covering material presented in lectures, tutorials and practicals. An oral examination may be held for students who do not pass the written examination.