



FACULTY OF MEDICINE

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF PHARMACOLOGY

PHAR2211

# Pharmacology for Health and Exercise Science

COURSE OUTLINE (online)

SESSION 2, 2013

## CONTENTS

<b>PHAR2211 COURSE INFORMATION</b> .....	3
UNITS OF CREDIT (UOC).....	3
PREREQUISITES .....	3
OBJECTIVES OF THE COURSE.....	3
COURSE CO-ORDINATORS.....	3
LECTURERS AND TUTORS IN THIS COURSE .....	3
COURSE STRUCTURE AND TEACHING STRATEGIES .....	4
APPROACH TO LEARNING AND TEACHING .....	4
STUDENT LEARNING OUTCOMES .....	4
ASSESSMENT PROCEDURES.....	5
TEXTBOOK AND READING LIST.....	5
COURSE EVALUATION AND DEVELOPMENT .....	6
GENERAL INFORMATION .....	6
OFFICIAL COMMUNICATION BY EMAIL .....	6
ATTENDANCE REQUIREMENTS .....	7
BEHAVIOUR IN PRACTICAL CLASSES .....	7
CONSENT FORMS .....	7
COMPUTING FACILITIES .....	7
TEACHING RESOURCES.....	8
HANDWRITING .....	8
SPECIAL CONSIDERATION .....	8
MISSED ASSESSMENT ITEMS .....	8
MISSED PRACTICAL CLASSES .....	9
REPEATING STUDENTS .....	9
STUDENT RIGHTS AND RESPONSIBILITIES.....	9
STUDENT SUPPORT .....	9
APPEAL PROCEDURES .....	9
GRIEVANCE RESOLUTION OFFICER .....	9
PLAGIARISM.....	10
<b>LECTURE OUTLINES</b> .....	11
<b>TIMETABLE</b> .....	14

# PHAR2211 COURSE INFORMATION

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## UNITS OF CREDIT (UOC)

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PHAR 2211 Pharmacology for Health and Exercise Science is a 3rd year Science Course with 6 Unit of Credit (UOC).

## PREREQUISITES

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Prerequisites: 6UOC PHSL2501 Human Physiology A  
6UOC HESC3541 Clinical Exercise Physiology

Equivalent: PHAR2011

## OBJECTIVES OF THE COURSE

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To gain:

- an understanding of the principles of pharmacology
- an appreciation of the mechanisms by which drugs act
- an understanding of the interaction of drugs and exercise

## COURSE CO-ORDINATORS

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Dr Lu Liu Room 325, Wallace Wurth East  
Phone: 9385 8762  
Email: [Lu.Liu@unsw.edu.au](mailto:Lu.Liu@unsw.edu.au)  
Consultation times: by email or phone arrangement

Co-coordinator:

Dr Trudie Binder Lowy Room 408  
Phone: 9385 8737  
E-mail: [W.Binder@unsw.edu.au](mailto:W.Binder@unsw.edu.au)  
Consultation time: by appointment via email or phone

## LECTURERS AND TUTORS IN THIS COURSE

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### Lecturers:

Dr. Trudie Binder [W.Binder@unsw.edu.au](mailto:W.Binder@unsw.edu.au)  
Dr. Angela Finch [A.Finch@unsw.edu.au](mailto:A.Finch@unsw.edu.au)  
Dr. Ross Grant [R.Grant@unsw.edu.au](mailto:R.Grant@unsw.edu.au)  
Dr. Nicole Jones [N.Jones@unsw.edu.au](mailto:N.Jones@unsw.edu.au)  
Dr. Lu Liu [Lu.Liu@unsw.edu.au](mailto:Lu.Liu@unsw.edu.au)  
Prof. Margaret Morris [m.morris@unsw.edu.au](mailto:m.morris@unsw.edu.au)

### Tutors:

Adrian Campbell [Adrian.Campbell@unsw.edu.au](mailto:Adrian.Campbell@unsw.edu.au)  
Andre Serobian [A.Serobian@unsw.edu.au](mailto:A.Serobian@unsw.edu.au)

## **COURSE STRUCTURE AND TEACHING STRATEGIES**

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This 6 UOC consists of:

- 2 lectures per week
- Practical / tutorial sessions of up to 4 hours per week

Lectures: Wed 5-6 pm, and Thur 1-2 pm (week 1-13)

Tutorials: Fri 10-11am, or Fri 11am-12pm (week 2-13)

Practicals: Monday 2 – 5 pm (week 1, then even weeks)

You are expected to attend all scheduled activities for the full duration. You are reminded that UNSW recommends that a 6 UOC course should involve about 125-150 hours of study and learning activities. Apart from the formal learning activities you are strongly recommended to do your own studies throughout the semester.

Lectures will provide you with the concepts and theory essential for understanding Introductory Pharmacology. To assist in the development of research and analytical skills practical classes and tutorials will be held. As these classes are relatively small they allow you to engage in a more interactive form of learning than is possible in the larger class lectures. The skills you will learn in practical classes are relevant in your development as professional scientists.

## **APPROACH TO LEARNING AND TEACHING**

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The learning and teaching philosophy underpinning this course is centred on student learning and aims to create an environment, which interests, challenges, and enthuses students. The teaching is designed to be relevant and engaging in order to prepare students for future careers.

The primary source of information for this course is the lecture material, and the tutorials and practical classes will be directly related to the lectures. Nevertheless, effective learning can also be enhanced through self directed use of other resources such as textbooks, literature references and web based sources. Your practical classes will be directly related to the lectures and you are advised to prepare for practical classes before attendance. It is up to you to ensure you perform well in each part of the course; preparing for classes; completing assignments; studying for exams and seeking assistance to clarify your understanding. Past exam questions are provided to assist you in preparing for examinations.

This course will be parallel taught with Introductory Pharmacology and Toxicology PHAR2011.

## **STUDENT LEARNING OUTCOMES**

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### *A) Discipline specific learning outcomes*

On completion of this subject students will be able to:

- Apply pharmacological approaches to problem solving
- Participate effectively in group work
- Apply quantitative analysis to pharmacological data
- Organise information into a clear report
- Have gained a basic knowledge of pharmacology and the impact of drug treatment on acute and chronic responses to exercise.

### *B) Skills based learning outcomes*

Underlying PHAR2211 will be an emphasis on Graduate Attributes which include the skills, qualities, understanding and attitudes that promote lifelong learning that students should

acquire during their university experience.

- Research, inquiry and analytical thinking abilities
- The capability and motivation for intellectual development
- Ethical, social and professional understanding
- Effective communication
- Teamwork, collaborative and management skills
- Information Literacy – the skills to locate, evaluate and use relevant information.

## ASSESSMENT PROCEDURES

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	<b>% total marks</b>
Mid-session test (50 min duration)	<b>20%</b>
Assignment	<b>10%</b>
Pre- and post-lab quizzes	<b>5%</b>
Online quiz	<b>5%</b>
Final exam (2 hours duration)	<b>60%</b>
Multiple choice and short answer questions	

The progress examination [mid-session test] will be held during the session on the **12<sup>th</sup> of September**. This exam will give you feedback on how you are succeeding in the course. The test will consist of 25 multiple choice questions (MCQs) and will be based on the material covered in the lectures, practical classes and tutorials. Material covered prior to the progress exam may be again examined in the final exam.

The written assignment task will allow you to develop your research, information literacy, communication and time management skills. Your assignment must be submitted electronically via Blackboard, through Turnitin and a hard copy submitted to G27, Biosciences Building. A penalty of 10% per day will apply for late submissions.

The practicals and tutorials are provided to support lecture material and practise analytical skills. The practical classes and tutorials help you to develop graduate attributes. During the practical course you will be required to participate in two lab quizzes to test your knowledge of the concepts and preparation for the labs. You will get feedback at the end of each quiz.

The Online Quiz is a formative assessment, which is created to help you revise the teaching contents and become familiar with the multiple-choice format. The Online Quiz will be due in week 6, and you will receive assessment results and feedback immediately once the task is finished.

The end of session examination will be held during the official examination period. **The examinable material consists of what is covered in lectures, tutorials and practicals classes.**

## TEXTBOOK AND READING LIST

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*Prescribed textbook:*

- Rang and Dale's pharmacology. 7<sup>th</sup> ed. Churchill Livingstone/Elsevier.

*Recommended textbooks:*

- Goodman and Gilman's the pharmacological basis of therapeutics. 12<sup>th</sup> ed. McGraw-Hill Companies, c2011. (The e-book is available through UNSW Library Resources database).
- Katzung et al., Basic and Clinical Pharmacology. 12<sup>th</sup> ed. McGraw-Hill. (The e-book

is available through UNSW Library Resources database).

All textbooks are available from the UNSW Bookshop

## **COURSE EVALUATION AND DEVELOPMENT**

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Each year feedback is sought from students about the courses offered in the Department of Pharmacology and continual improvements are made based on this feedback. The Course and Teaching Evaluation and Improvement [**CATEI**] Process of the UNSW is the way in which student feedback is evaluated and significant changes to the course will be communicated to subsequent cohorts of students. Also a staff-student liaison group will be set up and students will be invited to become class representatives to seek feedback from their colleagues and meet with academic staff to discuss any issues that arise.

Improvements to PHAR2211 have been made based on feedback given last year, including modification of the lecture contents, and addition of a practical lab.

## **GENERAL INFORMATION**

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The Department of Pharmacology is part of the School of Medical Sciences (SoMS) and is within the Faculty of Medicine. It is located in the Wallace Wurth East building. General inquiries can be made at the BABS.SOMS.BEES (B.S.B.) Student Office, located on the Ground Floor Room G27, of the Biosciences Building. Office hours are 9.00 am - 5:00pm.

**Professor Margaret Morris** is Head of Department of Pharmacology. Appointments with Prof Morris may be made through her Administrative Assistant Chris Riordan ([C.Riordan@unsw.edu.au](mailto:C.Riordan@unsw.edu.au)) on level 5, Wallace Wurth East.

**School Vacation Scholarships:** SoMS supports several summer vacation scholarships each year to enable good students to undertake short research projects within the school. For further details contact the Administrative Officer.

**Honours program** There are two honours programs within SoMS, the SoMS Honours Program and the Neuroscience Honours Program. The SoMS Honours Program is currently coordinated by Dr Andrew Moorhouse ([a.moorhouse@unsw.edu.au](mailto:a.moorhouse@unsw.edu.au), Ph: 9385 1101), and Dr. Richard Vickery, is the co-coordinator for Neuroscience Honours ([richard.vickery@unsw.edu.au](mailto:richard.vickery@unsw.edu.au), Ph: 9385 1676). Medical students may take a year out of the medical course to undertake an Honours program. This is normally done between the 3rd and 4th year of the course.

Any students considering an Honours year should discuss the requirements with the Honours co-ordinator. Outstanding students may be considered for scholarships offered by the University and School and these are offered annually.

**Postgraduate research degrees:** The Department of Pharmacology offers students the opportunity to enter into **Doctorate (Ph.D)** and **Masters**. For further information contact the co-ordinator, A/Professor Pascal Carrive ([p.carrive@unsw.edu.au](mailto:p.carrive@unsw.edu.au), Ph 9385 2467)

### **The School Teaching Administrator**

Ms Carmen Robinson is able to provide additional information on any courses offered by the School. Student enquires counter, located on the Ground Floor of the Biosciences building (G27). Ph: 9385 2464. Email: [Carmen.Robinson@unsw.edu.au](mailto:Carmen.Robinson@unsw.edu.au)

## **OFFICIAL COMMUNICATION BY EMAIL**

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All students in the course PHAR2011 are advised that e-mail is now the official means by

which SoMS at UNSW will communicate with you. All e-mail messages will be sent to your official UNSW e-mail address (e.g. z1234567@student.unsw.edu.au) and, if you do not wish to use the University e-mail system, you **MUST** arrange for your official mail to be forwarded to your chosen address. The University recommends that you check your mail at least every other day. Facilities for checking e-mail are available in SoMS and in the University library. Further information and assistance is available from IT Service Centre, ph. 9385 1333. <http://www.it.unsw.edu.au/index.html>

*Email etiquette: All email communication should be in formal English; students should provide their name, student number and course code.*

## **ATTENDANCE REQUIREMENTS**

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**Attendance at practical classes is compulsory, and must be recorded in the class roll ON THE DAY OF THE CLASS.** It is your responsibility to ensure that the demonstrator records your attendance and no discussions will be entered into after the completion of the class. Satisfactory completion of the work set for each class is essential. It should be noted that non attendance for other than documented medical or other serious reasons, or unsatisfactory performance, **for more than 1 practical class during the session** may result in an additional practical assessment exam or ineligibility to pass the course.

## **BEHAVIOUR IN PRACTICAL CLASSES**

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The practical class is an opportunity for students to develop graduate attributes by behaving in an ethical, socially responsible and professional manner within the practical class.

- Punctual arrival is expected
- Turn off mobile phones before entering the class
- You must read the "Student Risk Assessment" form and sign your name on the form before the lab starts.
- Enclosed shoes are compulsory for all practical classes. Lab coat must be worn for wet labs.

Information on relevant Health and Safety policies and expectations will be provided in the practical notes, as outlined at:

[http://www.ohs.unsw.edu.au/ohs\\_policies/index.html](http://www.ohs.unsw.edu.au/ohs_policies/index.html)

Students must take due care with biological and hazardous material and make sure all equipment is left clean and functional. Those who don't adhere to these basic laboratory rules will be marked absent. Special attention should be paid to any precautionary measures recommended in the notes. If any accidents or incidents occur they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.

## **CONSENT FORMS**

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Practical classes involving your participation as a subject require you to sign a witnessed, informed consent form.

## **COMPUTING FACILITIES**

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Computer facilities may be available to students in teaching labs on the ground floor and first floor of Wallace Wurth East Building. A multiple choice bank of questions is available for student revision. Your student card will allow you to operate the security lock on the door between 8:30am - 6:00pm, weekdays. However, priority is given to scheduled classes

and meetings. NB: The School would like to advise you that a record is kept of students entering the computer facility. Students will be held responsible for any damage.

## TEACHING RESOURCES

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The Department of Pharmacology has chosen to use the University's central Blackboard service to provide teaching materials for all of its courses.

- To access these materials, either point your browser to the TeLT gateway (<http://telt.unsw.edu.au/>) or go to the UNSW home page at: <http://www.unsw.edu.au/> then select on "Blackboard" under STUDENT.
- On the login page, log in using your zPass (zStudent No. and password).
- After logging on to Blackboard, look for the course PHAR2011. You should have access to it if you are properly enrolled.

You can make use of Lectopia (formerly iletures) recordings taken of the lectures that are available on Blackboard. Lecture notes will also be made available on Blackboard before each lecture. It is recommended that students print these out and bring them to the lecture, so they can annotate them and make their additional own notes during the lecture.

## HANDWRITING

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Students whose writing is difficult to understand will disadvantage themselves in their written assessment. Make every effort to write clearly and legibly. Do not use your own abbreviations.

## SPECIAL CONSIDERATION

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### **Please note the following statement regarding Special Considerations**

*If you believe that your performance in a course, either during session or in an examination, has been adversely affected by sickness or for any other reason, you should notify the Registrar and ask for special consideration in the determination of your results. Such requests should be made as soon as practicable after the problem occurs. **Special considerations sought outside the 3 day time period WILL NOT be accepted except in TRULY exceptional circumstances.***

*When submitting a request for special consideration you should provide all possible supporting evidence (eg medical certificates) together with your registration number and enrolment details. Consideration request forms are available from Student Central. In exceptional circumstances further assessment may be given. **If you believe you might be eligible for further assessment on these grounds, you should contact the Course Coordinator as soon as possible.***

## MISSED ASSESSMENT ITEMS

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If in any circumstances you unavoidably miss the final exam, mid session test or cannot hand in an assessment task on time, **you must inform the course coordinator and you must lodge a special consideration request**, supported by a medical certificate or other documentation to Student Central (see web address above) within **3 DAYS**.

Your request for consideration will be assessed and a deferred exam may be granted. You cannot assume you will be granted supplementary assessment.

If necessary, a supplementary final examination will be held **in the week starting 9<sup>th</sup> December 2013**.



Normally, if you miss an exam (without valid reasons) you will be given an absent fail. If you arrive late for an exam no time extension will be granted. It is your responsibility to check timetables and ensure that you arrive with sufficient time.

## **MISSED PRACTICAL CLASSES**

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Students who miss practical classes due to illness or for other reasons must submit a copy of medical certificates or other acceptable documentation to the course coordinator. **Certificates should be lodged no more than 3 days after an absence. Certificates lodged after 3 days will not be accepted.** The following details must be attached: Name, Subject number, Date of the class, Name of class/es missed.

## **REPEATING STUDENTS**

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Practical class exemptions may be granted to repeat students but students **must** check with the course co-ordinator whether they have exemption **prior** to their first practical class. All students must be familiar with the material covered in the practical classes.

## **STUDENT RIGHTS AND RESPONSIBILITIES**

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Refer to Student Central @:

<https://my.unsw.edu.au/student/resources/Policies.html#StudentResponsibilities&Conduct>

Student equity and diversity issues can be addressed via Student Equity Officers (Disability) in the Student Equity and Diversity Unit (9385 4734).

## **STUDENT SUPPORT**

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Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course coordinator prior to, or at the commencement of, their course. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

Contact: Student Equity and Disabilities Unit, Ground Floor of the John Goodsell Building

Tel: +61 2 9385 4734/5434

Email: [seadu@unsw.edu.au](mailto:seadu@unsw.edu.au)

Further information for students with disabilities is available at:

[www.studentequity.unsw.edu.au](http://www.studentequity.unsw.edu.au)

## **APPEAL PROCEDURES**

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Students can make complaints or appeal against academic decisions. Details can be found at MyUNSW.

<https://my.unsw.edu.au/student/atoz/Appeals.html>

<https://my.unsw.edu.au/student/atoz/Complaints.html>

## **GRIEVANCE RESOLUTION OFFICER**

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In case you have any problems or grievances about the course, you should try to resolve it with the Course Organizer (Dr. Lu Liu ph:9385 8762) or the Head of Department (Prof Margaret Morris ph: 9385 1560). If the grievance cannot be resolved in this way, you should contact the SoMS Grievance Officer, Dr P. Pandey (9385 2483, [P.Pandey@unsw.edu.au](mailto:P.Pandey@unsw.edu.au)).

## PLAGIARISM

SoMS will not tolerate plagiarism in submitted written work. The University regards this as academic misconduct. Evidence of plagiarism in submitted assignments, etc. will be thoroughly investigated and may be penalised by the award of a score of zero for the assessable work. Evidence of plagiarism may result in a record being made in the Central Plagiarism Register and the Faculty Students Ethics Officer being notified.

### What is Plagiarism?

Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. The University has adopted an educative approach to plagiarism and has developed a range of resources to support students.

UNSW has produced a booklet to assist you with [essential information for avoiding plagiarism \(pdf\)](#).

Details of what plagiarism is can be found on the Learning Centre's [Plagiarism & Academic Integrity website](#) and in Appendix A of the [Student Misconduct Procedure \(pdf\)](#).

Examples of plagiarism include:

- Direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying materials, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, website, internet, other electronic resource, or another person's assignment, or the student's own assignment from a previous course, without appropriate acknowledgement;
- Quotation without the use of quotation marks;
- Paraphrasing another person's work with very minor change keeping the meaning, form and/or progression of ideas of the original;
- Citing sources which have not been read, without acknowledging the 'secondary' source from which knowledge of them has been obtained;
- Piecing together sections of the work of others into a new whole;
- Presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or tutor;
- Claiming credit for a proportion of work contributed to a group assessment item that is greater than that actually contributed;
- Submitting your own assessment item that has already been submitted for academic credit at UNSW or elsewhere may also be considered plagiarism;
- Using another person's ideas or words in an oral presentation without crediting the source.

The basic principles are that you should not attempt to pass off the work of another person as your own, and it should be possible for a reader to locate information and ideas you have used by going to the original source material. Acknowledgement should be sufficiently accurate to enable the source to be located quickly and easily. If you are unsure whether, or how, to make acknowledgement, consult your lecturer or visit [The Learning Centre](#).

Academic Misconduct carries penalties. If a student is found guilty of academic misconduct, the penalties include warnings, remedial educative action, being failed in an assignment or excluded from the University for two years.

For more information, please refer to UNSW's [Plagiarism & Academic Integrity website](#).

# LECTURE OUTLINES

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The course is divided into 5 main themes and will cover:

1. How drugs work
2. Autonomic and autacoid pharmacology
3. The use of drugs
4. Alternative sources of drugs
5. Drug handling by the body

## 1. HOW DRUGS WORK

### **History of Pharmacology**

This lecture will provide a brief overview of the development of pharmacology throughout the ages. It includes, medications used by ancient civilizations, Materia Medica, early drug preparation, drug sources and storage, the birth of modern science and pharmacology, examples of drugs developed from plants, adverse reactions, and drug regulations.

### **Sites of Drug action: Dose Response**

This lecture provides an introduction to pharmacodynamics – what the drug does to the body; it includes: receptors, affinity and efficacy, side effects, desensitisation, up and down regulation, quantitation of drug-receptor interactions, dose-response curves, ED50, and spare receptors.

### **Agonists and Antagonists**

This lecture explores competitive antagonism, irreversible antagonism, functional (physiological) antagonism, chemical antagonism, the concept of tone, potentiation, partial agonist, quantitative response, quantal response, therapeutic ratio and indirectly acting drugs.

### **Introduction to Receptors**

A cell responds to its environment by receiving signals. These signals are received by proteins, known as receptors, which in turn transmit the signal within the cell (this process is termed receptor or cell signalling). Receptors allow the body to detect not only what is happen in the outside world (eg taste, sight, sound, touch) but also what is happening within the body (eg blood pressure, heart rate, glucose metabolism). Receptors can be found either on the cell surface or in intracellular compartments. The main cell surface and intracellular receptor families will be covered

### **Receptor Signalling**

Receptor signalling is the process whereby a receptor relays the stimulus imparted by the binding of the ligand. This often involves a sequence of events mediated by second messengers inside the cell. Calcium's role as a second messenger will be explored. To maintain homeostasis within the cell the termination of signalling must also occur. The role of phosphorylation in signal termination will be covered.

### **Regulation of Neurotransmitters**

This lecture will cover the basic aspects of synthesis, storage and release of monoamines (serotonin, dopamine and noradrenaline) and also cover pathways involved in metabolism and reuptake. In addition, the manipulation of neurotransmitter activity as effective strategies for alleviating various diseases and/or their symptoms will be discussed.

## 2. AUTONOMIC AND AUTACOID PHARMACOLOGY

### Introduction to Autonomic Pharmacology

Introduction to the autonomic nervous system (ANS), i.e. the parasympathetic and sympathetic nervous systems. The integrative action of the ANS. The cholinergic and adrenergic neurotransmissions. Cholinergic and adrenergic receptor classifications.

### Cholinergic Mechanisms

Introduction to 3 classes of cholinergic agents: Muscarinics, Nicotincs and Anticholinesterases. Representative agents of each class, mechanisms of action, clinical uses, side effects and contraindications. The action of Botulinum toxin in inhibiting cholinergic exocytosis and its clinical uses will also be discussed.

### Adrenergic Mechanisms

Catecholamines. Synthesis and Metabolism of Catecholamines. Adrenergic receptors. Alpha-1 adrenergic agonists and antagonists. Alpha-2 adrenergic agonists and antagonists. Beta adrenergic agonist and antagonists. Indirectly acting sympathomimetic amines.

### Autacoids

Autacoids refer to substances produced locally by one group of cells but exert effects on other types of cells in the same region. Autacoids include histamine, serotonin, angiotensin, prostaglandins etc. This lecture will focus on histamine: how it is synthesised in the body, its physiological function and involvement in immune responses; antihistamines in the management of acute allergic reactions. Another important autacoid, serotonin, will also be briefly explored.

## 3. THE USE OF DRUGS

### Drugs of Addiction

This lecture encompasses drug dependence and abuse. Patterns of drug use in Australia. Why take drugs? Reward, pleasure and addiction. How drugs act at a cellular level; tolerance, dependence and withdrawal. Different classes of Drugs: Opioids, Alcohol, Stimulants, Cannabis, Hallucinogens, Nicotine.

### Peptic Ulcer

Introduction to current views on pathogenesis of peptic ulcer focussing on *Helicobacter pylori*. Factors contributing to *H. pylori*-related gastric pathology; clinical symptoms of gastroduodenal ulcers and diagnostic tests; pharmacological treatment options: e.g. proton pump inhibitors (PPI); histamine H<sub>2</sub> blockers, antacids, combination of antibiotics and PPI.

### Anti-inflammatory Drugs

Inflammation is the response of the body to invasion by a pathogen (infection) or injury, This lecture will provide an overview of the therapeutic strategies to treat inflammation. The lecture encompasses eicosanoid biosynthesis, NSAIDs, paracetamol and DMARDs, including their mechanism of action.

### Drugs and Disease: Asthma

This lecture introduces drug treatment and disease, using asthma as an example. Treatments for asthma and associated pharmacology. Bronchial asthma, inflammatory cells and mediators, commonly used anti-asthmatic drugs [ $\beta$ -adrenergic agonists, xanthines, glucocorticoids, oral steroids]. Asthma management, treatment of severe acute asthma, viral infections, novel treatments for asthma.

### Diabetes

After a brief overview of endocrine function, major issues regarding treatment of endocrine disorders will be addressed. This lecture will focus on epidemiology and rationale for treatment of diabetes, including the adverse effects of therapy. The need for ongoing monitoring of therapy will be highlighted.

### **Cardiovascular Pharmacology**

Definition of hypertension, primary (essential) and secondary hypertension, consequences of untreated hypertension, guidelines for treating hypertension, non-pharmacological treatment including lifestyle issues, pharmacological treatment including ACE inhibitors, angiotensin 2 receptor blocking agents, diuretics, calcium channel blocking agents and beta blockers.

### **Anti-depressants**

Monoamine theory of depression; pharmacology of anti-depressant drugs (tricyclic anti-depressants; monoamine oxidase inhibitors; “atypical” anti-depressants) important adverse reactions to these drugs including the underlying mechanisms.

## **4. ALTERNATIVE SOURCES OF DRUGS**

### **Alternative Medicine**

Alternative medicines describes the use of, generally plant or animal based, preparations not currently established as conventional therapeutic treatments. This lecture will briefly discuss the role of alternative medicines in healthcare and identify key elements for a reasonable evaluation of their use.

### **Neutraceuticals**

The therapeutic effects or side effects of a medication can affect nutritional status. Conversely, diet nutrient supplementation or nutritional status can decrease a drug's efficacy or increase its toxicity. Failure to identify and properly manage drug-nutrient interactions can lead to serious consequences. This lecture outlines drug / nutrient interactions including alterations in pharmacodynamics and pharmacokinetics, the effect of food on drug therapy and the effect of drugs on food and nutrition.

## **5. DRUG HANDLING BY THE BODY**

### **Drug Chemistry & Absorption**

Acidic, basic and neutral drugs; relationship between lipid solubility and ionization; characteristics of transfer of drugs across cell membranes, passive diffusion, active transport.

### **Drug Metabolism**

Drug absorption and pathways of metabolism of drugs leading to either inactive or active metabolites. Contribution of Phase 1 (oxidative) and Phase II (conjugative) pathways to drug metabolism. Factors affecting drug metabolism - other drugs (induction, inhibition), age, disease states, genetic factors. Polymorphic drug metabolism and its consequences. Renal secretion of drugs affecting secretion. Effects of other drugs, protein binding, pH and age on renal elimination. Renal dysfunction and drug elimination.

### **Toxic Effects of Drugs**

This lecture will cover the basic definition of drug toxicity and will introduce the concept of the Therapeutic Index (TI). The causes for different individual responses to drugs (risk factors for drug toxicity) will be outlined. Major toxic reactions to common drugs including the mechanism of disease and primary treatment options will be discussed.

### **Future of Pharmacology: New Drug Targets**

What does the future hold for pharmacology? Will the majority of drugs still target membrane receptors? Has reading the human genome lead to the identification of new drug targets? What will be role of “omics” in drug discovery? Is the 21<sup>st</sup> century the era of personalised medicine? What role will antibodies and gene therapy play in medicine of the future? All these questions and more will be covered as we look into pharmacology's crystal ball.

## TIMETABLE – PHARMACOLOGY FOR HEALTH AND EXERCISE SCIENCE (PHAR2211) S2 2013

<b>Wk</b>	<b>Date</b>	<b>Practical: 115</b> Monday 2-5 pm	<b>Lecture 1: Clancy</b> Monday 5-6 pm	<b>Lecture 2: Mathew A</b> Thursday 1-2 pm	<b>Tutorials: CLB1</b> Friday 10-11am or 11-12am
1	29/7	<b>Orientations to Practicals</b> Liu / Binder	<b>Introduction &amp; History of Pharmacology</b> Liu / Binder	<b>Sites of Drug Action: Dose Response</b> T. Binder	
2	5/8	<b>Concentration Response: Agonists</b> Liu / Binder	<b>Agonists and Antagonists</b> T. Binder	<b>Introduction to Receptors</b> A. Finch	<b>Pharmacology &amp; Exercise Essay Writing Skills</b> Liu / Tzarimas / Campbell
3	12/8		<b>Receptor Signalling</b> A. Finch	<b>Introduction to Autonomic Pharmacology</b> L. Liu	<b>Pharmacodynamics</b> (Self directed learning)
4	19/8	<b>Concentration Response: Antagonists</b> Binder / Serobian	<b>Cholinergic Mechanisms 1</b> L. Liu	<b>Cholinergic Mechanisms 2</b> L. Liu	<b>Receptor Signalling</b> Finch / Campbell
5	26/8		<b>Regulation of Neurotransmitters</b> Finch / Jones	<b>Adrenergic Mechanisms 1</b> A. Finch	<b>Cholinergics</b> Liu / Campbell
6	2/9	<b>β-Blockers</b> Finch / Serobian	<b>Adrenergic Mechanisms 2</b> A. Finch	<b>Autacoids</b> L. Liu	<b>Adrenergics</b> Finch / Campbell
7	9/9		<b>Drugs of Addiction</b> T. Binder	<b>TEST (Mat B)</b> Liu / Binder	<b>β-Blockers- results discussion</b> Finch / Campbell
8	16/9	<b>Drugs Alter the Brain's Reward Pathway</b> Self directed learning	<b>Drug Chemistry and Absorption</b> R. Grant	<b>Drug Metabolism</b> R. Grant	<b>Test Review and prac Questions</b> Liu / Campbell
9	23/9		<b>Anti-inflammatory Drugs</b> T. Binder	<b>Drugs and Disease: Asthma</b> T. Binder	<b>Anti-depressants (L)</b> N Jones
Midsession break (28 Sep to 7 Oct)					
10	7/10	<b>Monday - Public Holiday</b>	<b>Monday - Public Holiday</b>	<b>Peptic Ulcer</b> L. Liu	<b>Anti-inflammatory Drugs</b> Binder/ Campbell
11	14/10		<b>Alternative Medicines</b> R. Grant	<b>Neutraceuticals</b> R. Grant	<b>Cardiovascular Drugs ( L)</b> M. Morris
12	21/10	<b>Drug Excretion: Aspirin</b> Binder / Grant / Serobian	<b>Toxic Effects of Drugs</b> N. Jones	<b>Anti-diabetic Drugs (Mat B)</b> M. Morris	<b>Drug Metabolism</b> Grant / Binder / Campbell
13	28/10		<b>Future of Pharmacology: New drug targets</b> T. Binder		<b>Exam Revision Quiz</b> L. Liu / T.Binder