

PHAR3202

Neuropharmacology

Course Outline
Term 2, 2023

School of Biomedical Sciences
Faculty of Medicine & Health

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1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Dr Natasha Kumar	neuropharm@unsw.edu.au	By appointment	Email
Course Convenor	Marty Le Nedelec	neuropharm@unsw.edu.au	By appointment	Email
Lecturer	Dr Trudie Binder	w.binder@unsw.edu.au	By appointment	Email
Lecturer	Dr Jane Carland	jane.carland@svha.org.au	By appointment	Email
Lecturer	A/Prof Lu Liu	lu.liu@unsw.edu.au	By appointment	Email
Lecturer	Dr Frederic von Wegner	f.vonwegner@unsw.edu.au	By appointment	Email
Lecturer	Dr Angela Finch	a.finch@unsw.edu.au	By appointment	Email
Lecturer	Dr Tertia Purves-Tyson	t.purves-tyson@unsw.edu.au	By appointment	Email

2. Course information

Units of credit: 6

Pre-requisite(s): PHAR2011 or NEUR2201

Teaching times and locations: <https://timetable.unsw.edu.au/2023/PHAR3202.html>

2.1 Course summary

The course will build on the information you have gained in Pharmacology (PHAR2011) and Physiology (2101 & 2201) as well as Biochemistry (BIOC2101/2181), Molecular Biology (2201/2291), Chemistry (2021/2041) or Neuroscience Fundamentals (NEUR2201). This course will cover the basic principles of neuropharmacology with an emphasis on drug action on the central and peripheral nervous systems. The course will focus on how the major groups of neurotransmitters, including monoamines, amino acids and neuropeptides, influence the operation of the nervous system. Drugs targeting these transmitter systems will be examined. Issues surrounding drug entry into the central nervous system will be addressed. Clinical applications of neuropharmacology, the link between neuropharmacology and behaviour, and current research investigating the development of drugs for neuronal targets will be addressed. Practical classes will complement the lecture material.

2.2 Course aims

Building on basic pharmacology skills learned in PHAR2011 and NEUR2201, the objectives of this course are to:

1. provide both knowledge and conceptual understanding of the use and action of various classes of drugs in the treatment of different human diseases affecting the brain.
2. develop an appreciation of the need for further research to identify new drug targets for more effective therapies.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Describe the synthetic and metabolic pathways and functions of the major CNS neurotransmitters.
2. Describe the mechanism of action of specified drug classes used to treat the major types of brain and mind disorders.
3. Generate, analyse and interpret neuropharmacology data.
4. Apply knowledge of neuropharmacology techniques and theory to design experiments and test hypotheses.
5. Demonstrate the ability to work in teams and communicate scientific information effectively to a variety of audiences and in a variety of formats.

2.4 Relationship between course learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Related Tasks & Assessment
CLO 1	Describe the synthetic and metabolic pathways and functions of the major CNS neurotransmitters	Progress Exam Practical Quizzes 'Controversial Research Topic in Neuropharmacology' End of Session Examination
CLO 2	Describe the mechanism of action of specified drug classes used to treat the major types of brain and mind disorders	Progress Exam Practical Quizzes 'Controversial Research Topic in Neuropharmacology' End of Session Examination

CLO 3	Generate, analyse and interpret neuropharmacology data.	Progress Exam Practical Quizzes 'Controversial Research Topic in Neuropharmacology' End of Session Examination
CLO 4	Apply knowledge of neuropharmacology techniques and theory to design experiments and test hypotheses.	Progress Exam Practical Quizzes End of Session Examination
CLO 5	Demonstrate the ability to work in teams and communicate scientific information effectively to a variety of audiences and in a variety of formats.	'Controversial Research Topic in Neuropharmacology'

3. Strategies and approaches to learning

3.1 Learning and teaching activities

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.

Although the primary source of information for this course is the lecture material, effective learning can be enhanced through self-directed use of other resources such as textbooks and Web based sources. Your practical classes will be directly related to the lectures, and it is essential 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.

Learning activities occur on the following days and times:

Lectures: Topics being covered each week can be found on the course timetable. The topics will be covered via pre-recorded lectures or online modules and will be available online prior to the week scheduled.

Tutorials: You should attend one session per week, delivered face-to-face on Tuesday at either 11 am-12 pm, 12 pm-1 pm or 1 pm- 2pm, Mathews 231.

Laboratory practicals: You should attend the laboratory practicals to be held face to face on Thursdays 10 am-1 pm or 2-5 pm. The practicals are a core part of your learning experience in the sciences.

Q & A sessions: Online via MS Teams on Friday 9am-10am.

Progress exam: Week 5 (covers content from weeks 1-4) and will be held during the Q & A time slot of week 5.

Information regarding weekly activities will be available via the interactive timetable on Moodle and in weekly announcements via Moodle.

3.2 Expectations of students

Students are reminded that UNSW recommends that a 6 units-of-credit course should involve about 150 hours of study and learning activities. The formal learning activities total approximately 61 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study.

The *Q&A sessions* are provided to allow you the opportunity to clarify points covered in each week's topics. You should review the weeks topics and make notes well in advance of the Q&A session. You should then review your notes and write down any questions you have about these topics and bring those questions along to the Q&A session.

To assist in the development of research and analytical skills *practical classes and tutorials* will be held. These classes and tutorials allow students to engage in a more interactive form of learning than is possible in the lectures. The skills you will learn in practical classes and tutorials are relevant to your development as professional scientists.

The practical classes and tutorials help you to achieve course learning outcomes 1-4. You need to complete any preparation work set prior to attending these classes. This might include pre-lab modules, answering questions. Attendance at practical classes and tutorials will be recorded at the start of each class.

If you wish to contact the course convenors or staff, you can do so by e-mail, using the details provided in section 1 of this document and on the course Moodle page. We are committed to providing the best experience and outcome for all students and will therefore endeavour to respond to e-mails as soon as possible, but please consider the following:

- Standard work hours are Monday to Friday from 8 am to 6 pm. E-mail correspondence received outside of this time may be dealt with from the next working day.
- All staff and students have busy schedules and multiple commitments, so while staff will endeavour to answer e-mail correspondence as quickly as possible, please apply appropriate expectations in this regard (i.e. within 48 hours and on a workday).
- Please only use Teams messaging to communicate with the course staff *during class*. Outside of class please use e-mail.
- All digital correspondence, including e-mail, Teams messages, and messages on discussion forums should be respectful, courteous, and polite.

To help us improve the course, please consider providing us with feedback by acting as a student liaison, and/or by completing the MyExperience survey later in the term.

4. Course schedule and structure

This course consists of 41 hours of class contact hours. You are expected to take an additional 109 hours of non-class contact hours to watch lectures, take notes, and complete assessments and exam preparation.

Week	Topic	Activity [Learning opportunity]	Related CLO
Week 1	<ul style="list-style-type: none"> • Neurochemical transmission & neuromodulation • Serotonin / Noradrenaline • Acetylcholine / Dopamine 	<ul style="list-style-type: none"> • Tutorial: Summarising Research Articles • Practical: Behavioural Pharmacology • Q&A 	1, 3, 4, 5
Week 2	<ul style="list-style-type: none"> • ATP and NO as neurotransmitters • Neuropeptides as transmitters 	<ul style="list-style-type: none"> • Tutorial: Cutting Edge Research in Neuropharmacology – How can we study neurotransmission? • Practical: Behavioural pharmacology in crickets I • Q&A 	1, 3, 4, 5
Week 3	<ul style="list-style-type: none"> • Amino Acids – Glutamate • Amino Acids –GABA and Glycine • Neurotrophic factors 	<ul style="list-style-type: none"> • Tutorial: CNS Neurotransmitters • Behavioural pharmacology in crickets II • Q&A 	1, 3, 4, 5
Week 4	<ul style="list-style-type: none"> • Mood / Psychiatric Disorders I • Mood / Psychiatric Disorders II 	<ul style="list-style-type: none"> • Tutorial: Treatments for Mood / Psychiatric Disorders • Practical: Actions of barbiturates • Q&A 	1, 2, 3, 4, 5
Week 5	<ul style="list-style-type: none"> • Therapeutic use of stimulants • Pain and Analgesia in CNS 	<ul style="list-style-type: none"> • Tutorial: Pain • Debate Groupwork Time 	2, 3, 5
Week 7	<ul style="list-style-type: none"> • Drug Addiction / Dependence • Stroke and Neuroprotection 	<ul style="list-style-type: none"> • Tutorial: Drugs of Addiction • Practical: Research Debate Presentations • Q&A 	2, 3, 5
Week 8	<ul style="list-style-type: none"> • Epilepsy and anticonvulsants • Neurodegeneration I: Parkinson's Disease 	<ul style="list-style-type: none"> • Tutorial: Neuronal Toxicity • Practical: Seizures • Q&A 	2, 3, 4, 5
Week 9	<ul style="list-style-type: none"> • Neurodegeneration II: Alzheimer's Disease • Neurodegeneration III: ALS and Huntington's Disease 	<ul style="list-style-type: none"> • Tutorial: Neuronal Toxicity • Practical: Tissue Culture – neuronal toxicity I • Q&A 	2, 3, 4, 5
Week 10	<ul style="list-style-type: none"> • General and Local Anaesthetics • CNS drugs and blood brain barrier 	<ul style="list-style-type: none"> • Tutorial: Neuronal Toxicity • Practical: Tissue Culture – neuronal toxicity II • Q&A 	2, 3, 4, 5

Exam Period: 11 August – 24 August 2023

Supplementary Exam Period: 4 Sep – 8 Sep 2023

5. Assessment

5.1 Assessment tasks

Assessment task	Length	Weight	Mark	Due date and time
Assessment 1: Progress Exam	50 min	15	100	28 th June 1pm
Assessment 2: Practical Quizzes	3 quizzes	10	100	Weeks 2, 4 & 10
Assessment 3: 'Controversial Research Topic in Neuropharmacology'	<ul style="list-style-type: none">• Group work log• Debate: 15 min• Debate Synopsis: 500 words	20	100	<ul style="list-style-type: none">• Assessed weeks 2-8• Debate plan - week 3• Debate - week 7• Debate Synopsis & Teamwork assessment – week 8
Assessment 4: End of Term Examination	2 h	55	100	Exam Period: 11 August – 24 August

Assessment 1: Progress Exam. This exam will give you feedback on how you are succeeding in the course. It will test not only your knowledge of drugs used to treat major classes of brain and mind disorders but also your ability to apply the knowledge you have acquired from multiple lectures, tutorials and practicals to neuropharmacology experimental and clinical scenarios. This assessment will be in the format of MCQ and short answer questions. Questions will be based on the material covered in the lectures, practical classes and tutorials. Material covered prior to the progress exam may again be examined in the final exam.

Assessment 2: Practical Quizzes. This assessment will be in the format of MCQ and short answer questions. There will be three online practical quizzes over the course of the term, each worth 3.33%.

Assessment 3: Controversial Research Topic in Neuropharmacology. Students will work in teams of 3-4 to research a "Controversial Research Topic in Neuropharmacology". Each group member will participate in the development of an argument for or against a given topic, and present it to the class during the designated practical time slot (12.5%). Each group will be required to keep a log of the contributions made by each group member. Following the debate, individual group members will also submit a synopsis of their own group's debate and research into the topic. The group oral presentation (research debate) is worth 12.5%, the group work log is worth 2.5%, and the individual written synopsis is worth 5%. Separate marking rubrics will be used to evaluate the group oral presentation, groupwork log and individual synopsis.

Assessment 4: End of Session Examination. The end of session examination will test not only your knowledge of drugs used to treat major classes of brain and mind disorders but also your ability to apply the knowledge you have acquired from multiple lectures, tutorials and practicals to neuropharmacology experimental and clinical scenarios. This assessment will be in the format of MCQ, and short answer questions. Questions will be based on the material covered in the lectures, practical classes and tutorials.

Further information

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>

5.2 Assessment criteria and standards

Practice exam questions will be made available to you via Moodle, as well as during the tutorials.

Details regarding the assessment tasks will be provided to you during the classes in week 1, as well as being available on the course Moodle page. A detailed marking rubric for the Controversial Research Topic in Neuropharmacology assessment task will be provided to you via the course Moodle page.

5.3 Submission of assessment tasks

Late Submission

UNSW has standard late submission penalties as outlined in the UNSW Assessment Implementation Procedure, with no permitted variation. All late assignments (unless extension or exemption previously agreed) will be penalised by 5% of the maximum mark per day (including Saturday, Sunday and public holidays). For example, if an assessment task is worth 30 marks, then 1.5 marks will be lost per day (5% of 30) for each day it is late. So, if the grade earned is 24/30 and the task is two days late the student receives a grade of 24 – 3 marks = 21 marks.

Late submission is capped at 5 days (120 hours). This means that a student cannot submit an assessment more than 5 days (120 hours) after the due date for that assessment.

Special Consideration

If you experience a short-term event beyond your control (exceptional circumstances) that impacts your performance in a particular assessment task, you can apply for Special Considerations.

You must apply for Special Consideration **before** the start of your exam or due date for your assessment, except where your circumstances of illness or misadventure stop you from doing so.

If your circumstances stop you from applying before your exam or assessment due date, you must **apply within 3 working days** of the assessment, or the period covered by your supporting documentation.

More information can be found on the [Special Consideration website](#).

5.4. Feedback on assessment

Assessment 1: Progress Exam. Individual marks are provided via Moodle once the exams have been graded. Cohort feedback is provided in the form of a post or podcast via the course Moodle page in week 7.

Assessment 2: Practical Quizzes. Students will receive individual written feedback on quizzes and marks will be posted on Moodle.

Assessment 3: Controversial Research Topic in Neuropharmacology. Written feedback sheets will be returned to the group for the debate presentation, online written feedback will be provided on the

groupwork logs and online written feedback will be provided for the synopsis. All marks will be posted on Moodle.

Assessment 4: End of session examination. Cohort feedback is provided once the exams are completed in the form of a post in Moodle.

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Please use Vancouver or APA referencing style for this course.

Further information about referencing styles can be located at

<https://student.unsw.edu.au/referencing>

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.¹ At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The Current Students site <https://student.unsw.edu.au/plagiarism>, and
- The ELISE training site <https://subjectguides.library.unsw.edu.au/elise>

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>.

7. Readings and resources

Recommended Primary Text:

- Nestler, Hyman, Holtzman and Malenka; Molecular Neuropharmacology: A Foundation for Clinical Neuroscience. 3rd Edition McGraw Hill, 2015. This book is available for purchase through the UNSW bookshop and there will be a copy available in the UNSW library.

Additional reading suitable as Secondary Resources:

- Brunton, Lazo and Parker; Goodman and Gilman's The Pharmacological basis of therapeutics. 11th Edition. McGraw Hill. There are copies of this textbook and there is also an electronic resource – both are available through the UNSW library.

8. Administrative matters

Student enquiries should be submitted via student portal <https://portal.insight.unsw.edu.au/web-forms/>

¹ International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

9. Additional support for students

- The Current Students Gateway: <https://student.unsw.edu.au/>
- Academic Skills and Support: <https://student.unsw.edu.au/academic-skills>
- *Student Wellbeing and Health* <https://www.student.unsw.edu.au/wellbeing>
- UNSW IT Service Centre: <https://www.myit.unsw.edu.au/services/students>
- *UNSW Student Life Hub*: <https://student.unsw.edu.au/hub#main-content>
- *Student Support and Development*: <https://student.unsw.edu.au/support>
- *IT, eLearning and Apps*: <https://student.unsw.edu.au/elearning>
- *Student Support and Success Advisors*: <https://student.unsw.edu.au/advisors>
- *Equitable Learning Services (Formerly Disability Support Unit)*: <https://student.unsw.edu.au/els>
- *Transitioning to Online Learning* <https://www.covid19studyonline.unsw.edu.au/>
- *Guide to Online Study* <https://student.unsw.edu.au/online-study>