



Australia's
Global
University

Faculty of Medicine & Health
School of Medical Sciences

PHAR3202

Neuropharmacology

COURSE OUTLINE

TERM 2, 2021

CRICOS Provider Code 00098G

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Please read this manual/outline in conjunction with the following pages on the [School of Medical Sciences website](#):

- [Advice for Students](#)
- [Learning Resources](#)

(or see "STUDENTS" tab at medicallsciences.med.unsw.edu.au)

PHAR3202 Course Information

Neuropharmacology (PHAR3202) is a 3rd year Science Course worth Six Units of Credit (6 UOC). The prerequisites for this course are PHAR2011 or NEUR2201. 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).

OBJECTIVES OF THE COURSE

Building on basic pharmacology skills learned in PHAR2011 and NEUR2201, the objectives of this course are to a) 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 and b) develop an appreciation of the need for further research to identify new drug targets for more effective therapies.

COURSE COORDINATOR and LECTURERS

Course Coordinator:

Dr Nicole Jones

Room 327, Wallace Wurth Building East

n.jones@unsw.edu.au

Co-Coordinators:

Dr Natasha Kumar

Room 325, Wallace Wurth Building East

natasha.kumar@unsw.edu.au

Dr Jane Carland

Room 323, Wallace Wurth Building East

j.carland@unsw.edu.au

Students wishing to see the course coordinators should make an appointment *via* email as our offices are not readily accessible. We will organize to meet you in a convenient location elsewhere in the building.

Lecturers in the course:

Dr Trudie Binder

w.binder@unsw.edu.au

Mr Martin Le Nedelec

m.lenedelec@unsw.edu.au

COURSE STRUCTURE and TEACHING STRATEGIES

Learning activities occur on the following days and times:

- Lectures: Online
- Q&A sessions – live via MS Teams - Wednesday 1-2pm (in the lecture slot)
- Tutorials: Thursday 10-11, or 11-12, or 12-1pm *
- Practicals: Friday 10am-1pm or 2-5 pm*

* Once enrolled in any of these sessions, students cannot change.

Students are expected to attend/complete all scheduled activities (2 hours of lectures per week (online), live Q&A session and up to 4 hours of practical and tutorials per week). 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 are approximately 72 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study.

Lectures will provide you with the concepts and theory essential for understanding the mechanism of action and clinical effects of drug classes which are used to treat CNS disorders. For each disease the pathological process will be outlined in the lecture and the relevant drug targets in the disease process identified and current pharmacological treatments will be described. While lectures will focus on the mechanism of action and adverse effects of drugs currently in use, potential new therapies, drug targets and areas requiring further research for more effective therapies, will be identified and discussed.

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.

APPROACH TO LEARNING AND TEACHING

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.

TEXTBOOKS AND OTHER RESOURCES

These resources will take the form of text books, journal articles or web-based resources. If available, links to the electronic form of these resources will be put on the course Moodle page.

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.

See also medicalsciences.med.unsw.edu.au/students/undergraduate/learning-resources

STUDENT LEARNING OUTCOMES

PHAR3202 will develop those attributes that the Faculty of Science has identified as important for a Science Graduate to attain. These include; skills, qualities, understanding and attitudes that promote lifelong learning that students should acquire during their university experience.

Graduate Attributes

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

Pharmacology Major Learning Outcomes

1. Demonstrate an understanding of how drugs/therapeutics are developed, work and are used safely.
2. Critically analyse, interpret and effectively communicate pharmacology data and literature.
3. Design and/or execute experiments or other activities to address pharmacological scenarios.

PHAR3202 Learning Outcomes

On completion of this course students should be able to:

- describe the synthetic and metabolic pathways and functions of the major CNS neurotransmitters
 - describe the mechanism of action of specified drug classes used to treat the major types of brain and mind disorders
 - generate, analyse and interpret neuropharmacology data
 - apply knowledge of neuropharmacology techniques and theory to design experiments and test hypotheses
 - demonstrate the ability to work in teams and communicate scientific information effectively to a variety of audiences and in a variety of formats
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COURSE EVALUATION AND DEVELOPMENT

For course evaluation, feedback has been gathered at the completion of the course, using among other means, UNSW's Course and Teaching Evaluation and Improvement Process and myExperience. Student feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback. 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.

Based on student feedback received 2015-2020, the following changes have been made: the student assignment and has been allocated a larger proportion of the total assessment marks from 17.5% to 20%, and includes a reflective process (blog) related to group work. Time to work on group assignments has been allocated within prac class sessions. There are 2 new online tutorials which will be devoted to revision questions. The weighting of the final exam mark has been reduced from 60% to 55%.

ASSESSMENT PROCEDURES

- | | |
|--|------------|
| • Progress exam (40 min duration) | 15% |
| • Practical Quizzes (3 in total throughout the term) | 10% |
| • Assignment "Controversial Research Topic in Neuropharmacology" | 20% |
| ○ Debate presentation (12.5%) | |
| ○ Synopsis (5%) | |
| ○ Teamwork blog (2.5%) | |
| • End of session examination (2 hours duration) | 55% |

A penalty will apply for late submissions of assessment tasks (10% per day).

The *progress examination* will be held during the live Q&A session (Wednesday 1-2pm) in week 5. This exam will give you feedback on how you are progressing in the course. The *progress examination* and *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. The progress examination will be in the form of multiple choice and short answer questions. The questions 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. These exams will address graduate attributes A and B. The end of session examination will be held during the official examination period.

GENERAL INFORMATION

The Department of Pharmacology is part of the School of Medical Sciences and is within the Faculty of Medicine. It is located in the Wallace Wurth building.

Professor Margaret Morris is Head of Department and appointments to meet with her may be made via email (m.morris@unsw.edu.au).

There are two honours programs run through the School. The SoMS Honours program is coordinated by Dr Trevor Lewis (t.lewis@unsw.edu.au), and Neuroscience Honours program is coordinated by Dr Natasha Kumar (natasha.kumar@unsw.edu.au). Any students considering an Honours year should discuss the requirements with the coordinators.

Postgraduate degrees

The Department of Pharmacology offers students the opportunity to enter the following graduate programs:

Research Masters: In Pharmacology. Contact the post-graduate co-ordinators A/Prof Pascal Carrive (p.carrive@unsw.edu.au) and Dr Nicole Jones (n.jones@unsw.edu.au)

Doctorate (Ph.D): In Pharmacology. Contact the post-graduate co-ordinators A/Prof Pascal Carrive (p.carrive@unsw.edu.au) and Dr Nicole Jones (n.jones@unsw.edu.au)

Enrolment and administrative help

The Education Support Team is available to help with problems with enrolment and scheduling, and should be the first point of contact for administrative problems. Please contact them via student portal: <http://unsw.to/webforms>.

Attendance Requirements

For details on the Policy on Class Attendance and Absence see [Advice for Students](#) and the [Policy on Class Attendance and Absence](#). Guidelines on extra-curricular activities affecting attendance can be found on the School of Medical sciences Website. [Advice for Students – Special Consideration](#)

Satisfactory completion of the work set for each class is essential and all of the class content will be assessable. Tutorials and practical classes will be run on campus. Online access to the classes will be available to those students unable to attend in person (ie overseas or unable to attend), please contact the convenor in advance if this is required.

Practical Classes

The practical class is an opportunity for students to develop graduate attribute C by behaving in an ethical, socially responsible and professional manner within the practical class. All practical classes for this course in 2021 will be run on campus.

For more details see [Advice for Students-Practical Classes](#)

Special Consideration

Please see [UNSW-Special Consideration](#) and [Student Advice-Special Consideration](#).

Final exam period for Term 2, 2021 is Friday, 13 August to Thursday, 26 August.
Supplementary exam period for Term 2, 2021 is Monday, 6 September to Friday, 10 September.

If you unavoidably miss the progress exam in PHAR3202, you must lodge an application with UNSW The Nucleus: Student Hub for special consideration. If your request for consideration is granted an alternative assessment will be organised which may take the form of a supplementary exam or increased weighting of the final exam.

Student Support Services

See: [Student Advice-Student support services](#).

Some links to Student Support Services:

- Key Dates <https://student.unsw.edu.au/dates>
- Transitioning to Online Learning <https://www.covid19studyonline.unsw.edu.au/>
- Guide to Online Study <https://student.unsw.edu.au/online-study>
- 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: <https://student.unsw.edu.au/els>

Appeal Procedures

Details can be found at [Student-Advice-Reviews and Appeals](#)

Academic Integrity and Plagiarism

The School of Medical Sciences will not tolerate plagiarism in submitted written work. The University regards this as academic misconduct and imposes severe penalties. Evidence of plagiarism in submitted assignments, etc. will be thoroughly investigated and may be penalized by the award of a score of zero for the assessable work. Flagrant plagiarism will be directly referred to the Division of the Registrar for disciplinary action under UNSW rules.

The [UNSW Student Code](#) outlines the standard of conduct expected of students with respect to their academic integrity and plagiarism.

More details of what constitutes plagiarism can be found [here](#)

LECTURE THEMES

The course timetable is appended at the end of these notes and can also be found on Moodle.

The course is divided into 5 main themes covering different aspects of Neuropharmacology

1. Introduction to neuropharmacology
 2. Neurotransmitter and receptor systems in the brain
 3. Brain disorders – and drugs used to treat them
 4. Analgesics and anaesthetics
 5. Neurodevelopment and blood brain barrier
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TIMETABLE

Wk	Online Activities	Topics Pre-recorded lectures / short modules*	Q&A Session Wed 1-2pm Online via MS Teams	Tutorials Thurs 10-11,11-12,12-1 Mathews 230	Practical Class Fri 10-1, 2-5pm WW120	Assessment Tasks Due (M=Monday 5pm) (F=Friday midnight)
1		<ul style="list-style-type: none"> Course Introduction: Neurochemical transmission & neuromodulation* Serotonin / Noradrenaline Acetylcholine / Dopamine 	Q&A	Summarising Research Articles	Behavioural Pharmacology Videos Research Debate Topics Distributed	
2		<ul style="list-style-type: none"> ATP and NO as neurotransmitters Neuropeptides as transmitters 	Q&A	Cutting Edge Research in Neuropharmacology – How can we study neurotransmission?	Behavioural pharmacology I	Online Prac Quiz#1 (M) Blog Post #1 (F) Individual Teamwork Assessment (F)
3	ONLINE REVISION QUESTIONS	<ul style="list-style-type: none"> Amino Acids – Glutamate Amino Acids –GABA and Glycine Neurotrophic factors * 	Q&A	CNS Neurotransmitters	Behavioural pharmacology II	Submit Plan for debates (F)
4	Case studies: Mood / Psychiatric Disorders	<ul style="list-style-type: none"> Mood / Psychiatric Disorders I Mood / Psychiatric Disorders II 	Q&A	Treatments for Mood / Psychiatric Disorders	Detecting neurotransmitters in the brain	
5		<ul style="list-style-type: none"> Therapeutic use of stimulants 	Mid-Session TEST	NO TUTORIAL	Barbiturates	Blog Post #2 (F)
6	Flexibility Week					
7		<ul style="list-style-type: none"> Drug Addiction / Dependence Pain and Analgesia in CNS 	Q&A	Drugs of Addiction	Research Debate Presentations	Online Prac Quiz #2 (M)
8	ONLINE REVISION QUESTIONS	<ul style="list-style-type: none"> Stroke and Neuroprotection Epilepsy and anticonvulsants Treatments for PD * 	Q&A	Neuronal Toxicity	Seizures Prac	Debate Synopsis (F) (500 words) Teamwork assessment (F) Blog Post #3 (F)
9	Case studies: Neurological disorders	<ul style="list-style-type: none"> Neurodegeneration: Alzheimer's Disease Neurodegeneration: ALS and Huntington's Disease 	Q&A	Treatments for Neurological Disorders	Tissue Culture – neuronal toxicity I	Online Prac Quiz #3 (M)
10		<ul style="list-style-type: none"> General and Local Anaesthetics CNS drugs and blood brain barrier 	Q&A	Revision tutorial	Tissue Culture – neuronal toxicity II / Exam Revision Quiz	

ASSESSMENT TASKS

Task	Due Date
Practical Quizzes	Submit prior to 5pm on the Monday immediately following the prac class
Mid-Session Test	Wednesday 1st July – 1-2 pm
Research Debate Presentations	Friday 17 th July – 10-1pm or 2-5 pm
Research Debate Synopsis	Friday 24 th July – 10am
Final Examination	Official Exam period

Group Assignment Information

Students will work in teams of 3-4 to research a “Controversial Research Topic in Neuropharmacology”. Each group member must participate in the development of an argument for or against the topic and in the prac class in week 7, groups will debate the topic. Topics will be assigned to groups in the first prac class session. Individual group members will be required to submit a 500-word synopsis of their own debate and research into the topic. This assessment task will allow you to develop your research, information literacy, communication and time management skills, as well as allowing you to demonstrate your ability to work in a team and collaborate successfully. The report must be submitted electronically *via* Moodle, through Turnitin. A penalty will apply for late submissions (10% per day).

Groups: Will be assigned in the first prac class session. Each group will be assigned a topic in this class.

General Instructions: Groups will need to examine and critically evaluate the available evidence on their topic. They will be required to use available experimental and clinical data in order to reach a conclusion. The validity of the evidence needs to be considered and discussed.

Group Oral presentation (Research Debates) (12.5%)

- Groups will construct a debate on the assigned topic and prepare a presentation from their research. A powerpoint presentation is required.
- One or more members of the group will give the presentation, while other group members will be required to help with the rebuttal and answer questions following the presentation.
- The oral presentation (per group) will be a maximum of 8 minutes in length and will be followed by a 2 minute rebuttal (per group) and 5 minutes of question time per topic.

Individual Written Synopsis (5%)

The individual written synopsis should include the following information:

- A brief introduction to the topic and why it is controversial.
- Discuss the pharmacological issues (receptors, drug, side effects, interactions), disease condition, methods used to assess drug efficacy in experimental and clinical studies and how these studies have led to advances in our understanding of a CNS disorder.
- Evaluate the available evidence and reach a conclusion about your research topic.

Group Work Log (2.5%)

- You will also be required to keep a log of your group work contributions using EPortfolio (this requirement will be further outlined in the First Prac Class).

Overall Assignment Assessment

- The synopsis, debate and group work log will be worth 20% of your total course grade.
- The oral presentation will be assessed by at least two members of Pharmacology staff and one peer group.

Research Debates: will be presented in random order in the prac sessions of week 7.

Due Date of Individual Written Synopsis: Friday 24th July – (10am - submitted via Turnitin)

DEBATE PRESENTATION: MARKING CRITERIA

Group: _____ Topic: _____

Category	Assessment form (Mark out of 10 for each marking criteria)					
	Exemplary (>8.5)	Very Good (8.4-7.5)	Good (7.4-6.5)	Satisfactory (6.4-5.0)	Unacceptable (<5.0)	Total
Introduction and topic info	Highly detailed and focused introduction. All info clear, accurate and thorough	Thorough introduction. Most information presented in this debate was clear, accurate, thorough	Team introduced the subject, but neglected to include some points. Info presented was clear and accurate, but not thorough	Team introduced the subject, but neglected to include many points. Minor inaccuracies or at times unclear	The team does not introduce the subject matter. Major inaccuracies or mostly unclear.	/10
Critical evaluation of the literature	Every major point was clearly supported with relevant facts, statistics and/or examples	Every major point was adequately supported with relevant facts, statistics and/or examples	Every major point was adequately supported with relevant facts, statistics and/or examples but the relevance of some points was questionable	Some points were supported, others were not	Very limited critical analysis of strengths and limitations of the literature, mostly descriptive	/10
Organization, concluding statement to summarise group argument	Clear and concise argument integrated with the literature. Well developed, organised in a tight logical fashion.	Mostly clear description of argument. Well developed, organised in a tight logical fashion.	All arguments were tied to an idea, but the organisation was sometimes not clear, developed or logical	Arguments were not well tied to an idea, and the organisation was sometimes not clear, developed or logical	Arguments lacked in major aspect. Poor links with the literature.	/10
Questions	Team clearly understood all questions and answered appropriately, in depth, convincingly and with ease.	Team clearly understood questions and answered appropriately and convincingly	Team understood most of the questions and answered appropriately and convincingly	Team seemed to understand most of the questions, but presented uneasily or inappropriately	Team did not understand the questions and the answers were inappropriate	/10
Audience Engagement	Team successfully engaged the audience. Consistent use of convincing body language (gestures, eye contact, level of enthusiasm)	Team usually engaged the audience. Consistent use of convincing body language that kept the attention of the audience	Team sometimes used convincing body language that kept the attention of the audience	One or more team members did not keep the attention of the audience	Team presentation style did not engage or keep the attention of the audience.	/10
Total (Mark/50)						/50

Comments:

Strengths:

Improvement:

Points for clarification (if necessary):

INDIVIDUAL WRITTEN SYNOPSIS : MARKING CRITERIA

Category	Exemplary (>8.5)	Very Good (8.4-7.5)	Good (7.4-6.5)	Satisfactory (6.4-5.0)	Unacceptable (<5.0)
Title & Formatting ____ /10 x 0.5	Title clearly indicates the subject matter of the paper. Name and student number and departmental address given. Word count 500 ± 50	Title indicates the subject matter of the paper. Name and student number and departmental address given. Minor errors in formatting. Word count 500 ± 50	Title indicates the subject matter of the paper. Name and student number and departmental address given. Errors in formatting. Word count 500 ± 50	Title does not indicate the subject matter of the paper. Name and student number and departmental address given. Errors in formatting. Word count >550	Title, author's name and/or address not given. Formatting requirements not followed. Word count >550 or <450.
Introduction ____ /10 x 2.5	Focused introduction to the topic and explanation of the controversy. Concise and clear account of the pharmacological issues, disease condition and methodologies used to assess efficacy.	Introduction to the topic and explanation of the controversy. Clear account of the pharmacological issues, disease condition and methodologies used to assess efficacy. Minor omissions or errors.	Introduction to the topic and some explanation of the controversy. Clear account of the pharmacological issues, disease condition and methodologies used to assess efficacy. A few factual errors or omissions.	Some introduction to the topic and explanation of the controversy. Some of the pharmacological issues, disease condition and methodologies used to assess efficacy are described. More detail needed.	No real introduction to the topic or explanation of the controversy. Some of the issues, disease condition and methodologies used to assess efficacy are mentioned. Lacking detail.
Discussion & Conclusion ____ /10 x 4	Critical evaluation of the issues identified and supported by chosen sources. A well balanced and logical presentation that explores available evidence supporting / against your topic. Re-stated key findings and main conclusions conveyed in a final paragraph.	Critical evaluation of the issues identified and supported by chosen sources. A balanced and logical presentation that explores available evidence supporting / against your topic. Some re-stating of key findings and main conclusions conveyed in a final paragraph.	Some critical evaluation of the issues identified. A mostly balanced and logical presentation that explores available evidence supporting / against your topic. Some re-stating of key findings and conclusions conveyed in a final paragraph.	Some critical evaluation of the issues identified. A mostly balanced and logical presentation that explores available evidence supporting / against your topic. Some errors in interpretation. Some re-stating of key findings and some conclusions conveyed in a final paragraph.	No critical evaluation of the issues identified and supported by chosen sources. No balance or logic to presentation. Main conclusions not conveyed in a final paragraph.
Referencing ____ /10 x 0.5	In-text citations and reference list follow BJP conventions. Relevant information selected. A wide range of references used.	In-text citations and reference list follow BJP conventions. Relevant information selected. A wider range of references needed.	In-text citations and reference list follow BJP conventions, with minor errors. Relevant information selected. A wider range of references needed.	In-text citations and/or reference do not follow BJP conventions. Relevant information selected. A wider range of references needed.	BJP conventions not followed. Non-peer reviewed sources used. Information is not referenced. Wider range of references needed.
Writing Conventions ____ /10 x 2.5	Excellent sentence structure, correct grammar and word usage. Sentences and paragraphs well connected. Appropriate written expression- using discipline specific vocabulary and formal not oral language. Has been proof read.	Very good sentence structure, correct grammar and word usage. Sentences and paragraphs well connected. Appropriate written expression- using discipline specific vocabulary and formal not oral language. Proof reading needed to eliminate minor errors.	Good sentence structure, correct grammar and word usage. Sentences and paragraphs not always well connected. Appropriate written expression- better use of discipline specific vocabulary and formal not oral language needed. Proof reading needed.	Poor sentence structure, grammar and word usage. Sentences and paragraphs not well connected. Appropriate written expression- better use of discipline specific vocabulary and formal not oral language needed. Proof reading needed.	Use of paragraphs and improved sentence structure needed. The report is difficult to read due to poor grammar and word usage. No evidence of proof reading.
TOTAL /100					