



Faculty of Medicine
School of Medical Sciences

DEPARTMENT OF PHARMACOLOGY

PHAR3101

Drug Discovery, Design and Development

COURSE OUTLINE

Term 3, 2020

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Please read this outline in conjunction with the following pages on the

[School of Medical Sciences website:](#)

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

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

PHAR3101 Course Information

Drug Discovery, Design and Development (PHAR3101) is a 3rd year Science course worth six units of credit (6 UOC). The course is usually undertaken as part of a major in Pharmacology for the Bachelor of Advanced Science (Honours) or Bachelor of Medical Sciences or as part of the Bachelor of Medicinal Chemistry. The course builds on the knowledge you have gained in Introductory Pharmacology and Toxicology (PHAR2011).

COURSE PRE REQUISITE

PHAR2011 Introductory Pharmacology and Toxicology

OBJECTIVES OF THE COURSE

This course will explore the process of drug development, from target identification to final drug registration. It will present drug development as a process involving target selection, hit discovery using computer-based methods, combinatorial chemistry/high-throughput screening. Lead identification and optimisation via the use of structure activity series and computational methods will be covered. Safety evaluation, bioavailability, clinical trials, and the essentials of intellectual property, regulatory affairs and commercialisation will also be discussed. Along the way, you will learn about screening assays, computer-aided drug design, and toxicology as applied to the development of new medicines.

COURSE CO-ORDINATOR and LECTURERS

Course Convener:

Dr. Angela Finch

a.finch@unsw.edu.au

Wallace Wurth Building, level 3E, ph: (02) 9065 1017

Co-Convener:

Dr Nicole Jones

n.jones@unsw.edu.au

Wallace Wurth Building, level 3E

Students wishing to talk to the course staff should make an appointment via email.

Lecturers in this course:

Dr Orin Chisholm o.chisholm@unsw.edu.au

Prof Peter Gunning p.gunning@unsw.edu.au

Dr Nicola Smith nicola.smith@unsw.edu.au

COURSE STRUCTURE and TEACHING STRATEGIES

In 2020 PHAR3101 will be delivered full online.

Learning activities occur on the following days and times*:

- Lectures: pre-recorded and available at the start of the week they are timetabled.
- Lecture Q&A sessions: 9:40-9:55 am Tuesdays and 1:40-1:55 pm Wednesday
- Tutorials: Friday 1-2 pm or 2-3 pm
- Practicals: Monday 11-2 pm

* see the timetable on page 8 for details of when specific activities run, flexibility week and classes lost to public holidays.

Students are expected to actively engage with all scheduled activities for their full duration (2 hours of lectures per week and 4 hours of practical and tutorial sessions per week, plus complete any online activities provided). Students are reminded that UNSW recommends that a 6 units-of-credit course should involve about 125-150 hours of study and learning activities. The formal learning activities are approximately 56 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study.

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 and challenges 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 material covered in lectures, tutorials, and practical classes, 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 and required to prepare for practical classes before attendance via the pre-lab modules. 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

Recommended Primary Texts:

- Drug Discovery and Development - Technology in Transition. Hill & Rang. Elsevier Ltd 2nd edition 2013.
- Pharmacology in Drug Discovery: understanding drug response T. P. Kenakin. Elsevier, 1st Edition 2012.

These textbooks will be available at the UNSW bookshop. They are also available in print and online formats from the library.

Other Resources:

The following electronic journals are accessible via the UNSW library.

- [Nature Reviews: Drug Discovery.](#)
- [Drug discovery today.](#)
- [Pharmacology & Pharmaceutical Medicine Study guide](#)

Links to additional sources to supplement the material covered in the lectures will be placed on the lecture pages on Moodle.

STUDENT LEARNING OUTCOMES

PHAR3101 will develop those attributes that the Faculty of Science has identified as important for a Science Graduate to attain and the Learning Objectives of the Pharmacology Major.

Pharmacology Major Learning Outcomes

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

PHAR3101 Learning Outcomes

On completion of this course students should be able to:

1. demonstrate an understanding of the steps involved in drug development from bench to bedside.
2. apply knowledge of the drug development process and identify challenges and benefits of different approaches to address novel scenarios.
3. critically analyse scientific literature and experimental data and communicate their findings.
4. show an understanding of teamwork and the contributions of different discipline areas to drug development

ASSESSMENT PROCEDURES

Progress exam (45 min duration):	10 %
Research Report	20 %
Therapeutic Product Development History	15 %
End of session examination (2 hours duration)	55 %

The practicals are provided to support lecture material and practise analytical skills. You will submit a written report covering three of the practical sessions. The report should be in the form of a technical report. (see below for instructions).

In the tutorials, students will work in teams to evaluate projects at different stages of the drug discovery process, deciding if the project should progress or not and planning the approach that you will take to progress the project. The tutorials will give you experience in applying your drug discovery knowledge as well as developing your communication, time management and teamwork skills (Learning outcomes 1-4).

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

You will work in teams to research the drug discovery process of a given drug and the teamwork involved in that process. These assessment tasks 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, collaborate successfully and enable you to demonstrate your mastery of learning outcomes 1, 2, 3 & 4.

The progress examination will be held in the lecture slot on Wednesday the 14th of October, 1 pm. This exam will give you feedback on how you are succeeding in the course. The progress examination and end of session examination will test not only your knowledge of the process of drug design and development but also your ability to apply the knowledge you have acquired from multiple lectures, practicals and tutorials to drug development scenarios. The examination will be in the format of short and long 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 examined again in the final exam. The examinations will enable you to demonstrate your mastery of learning outcomes 1, 2 & 3. The end of session examination will be held during the official examination period.

COURSE EVALUATION AND DEVELOPMENT

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 UNSW myExperience survey 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. Based on feedback given in these meetings changes will be implemented during the course and for future years.

We appreciate student feedback because we are always looking for ways to improve your learning experience in this course. Below is a summary of the feedback from the previous student cohort in this course and our response to how we improved this year's course delivery.

Previous students told us that: They liked the structure and content of the course, especially the real-life examples and that all the components were integrated. Especially that the course covers the Drug Discovery, Design and Development process from start to end providing an understanding of how the industry functions. They commented on the enthusiasm and passion of the teaching staff and that they liked they got to hear from researchers and workers in the field presenting relevant and current content. They also liked that the tutorials gave them an opportunity to consolidate the course content. They particularly enjoyed the careers in pharmacology workshop that included guest speakers who shared their experiences in the pharmaceutical industry.

When asked what could be improved in the course the most frequent responses were regarding allowing more time and directions for the technical report assignment. Students suggested that more help be provided, possibly in the form of more videos, to help them understand how to use Prism and the other software used in the practical classes.

In the last couple of years, we have responded to this feedback by reducing the word count of the practical report along with an online tutorial being developed to help student to complete this task. More explanation of each step of using the software has been provided in the practical manual along with online "how-to" videos. In preparation for the transition to the 10-week and then 9-week format student focus groups were consulted and their suggestions and feedback have been incorporated.

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 talk with her may be made via email (m.morris@unsw.edu.au)

There is an honours program conducted by the School. The Honours program is convened by A/Prof Cristan Herbert. Any students considering an Honours year should discuss the requirements with the convenor. (SOMShonours@unsw.edu.au)

Postgraduate degrees

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

Research Masters or Doctorate (Ph.D) in pharmacology: Contact the postgraduate co-ordinators Dr Nicole Jones and A/Prof Pascal Carrive (somshdr@unsw.edu.au)

Enrolment and administrative help

The Student Administration Officers are available to help with problems with enrolment and scheduling and should be the first point of contact for administrative problems. They can be contacted via the UNSW Student Portal Web Form. <http://unsw.to/webforms>

Attendance Requirements

For details on the Policy on Class Attendance and Absence see [Advice to students/attendance](#) and the [Policy on Class Attendance and Absence](#).

Special Consideration

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

Final exam period for Term 3, 2020 is 27 November to 10 December 2020.

Supplementary exam period for Term 3, 2020 is 11 January to 15 January 2021.

If you unavoidably miss the progress exam in PHAR3101, you must lodge an application with UNSW Student Central for special consideration. If your request for consideration is approved an alternative assessment will be granted in the form of an increased weighting of the final exam.

Student Support Services

Details of the available student support services can be found at [Student Advice-Student support services](#).

The following resources can provide help with online learning

- Transitioning to Online Learning <https://www.covid19studyonline.unsw.edu.au/>
- Guide to Online Study <https://student.unsw.edu.au/online-study>
- UNSW Student Life Online <https://student.unsw.edu.au/help#main-content>
- 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 Student Conduct and Integrity Unit (SCIU) 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](#).

PHAR3101 Drug Discovery, Design and Development – Timetable 2020

Wk	Practical Monday 11am-2pm	Lecture 1 Tuesday 9am	Lecture 2 Wednesday 1pm	Tutorial Friday 1pm or 2pm	Online Activities	Assessments Due
1	Teamwork in pharm industry	The drug discovery process: Choosing the project	Novel target identification and validation	The drug discovery process: Choosing the project	Gene modification techniques in drug discovery (Lecture)	
2	Target validation	Target Selection	Hit identification	Target Selection and validation	Hit optimisation: radioligand binding (Prac)	
3	Hit optimisation: cAMP	High-throughput screening	Sources of active compounds	Hit identification & HTS screening		
4	Public Holiday	Ligand-based drug design	Structure-based drug design	Sources of active compounds / Structure Activity Relationships		Teamwork infographic (Monday 5 th 11 pm)
5	Computational Drug discovery	Bioavailability	Progress Exam	Ligand and Structural based drug discovery	How to write a technical report	Progress Exam (Wednesday 14 th , 1pm)
6	Flexibility Week					
7	Careers in Drug Discovery	Intellectual property	Pre-clinical toxicology – <i>in vitro</i>	Intellectual property / Bioavailability		Technical Report (Sunday 25 th , 11 pm)
8	Preclinical toxicology	Pre-clinical toxicology – <i>in vivo</i>	Clinical trials	Pre-clinical toxicology		
9	Clinical Trials	Clinical trial design	Ethics of human and animal experimentation	Clinical trial design		
10	Clinical Trials	Biopharmaceuticals	Regulatory Affairs	Regulatory Affairs & Biopharmaceuticals	Commercialisation (Lecture)	Timeline (Sunday 15 th , 11 pm)