City University of Hong Kong
Course Syllabus

offered by Department of Biomedical Sciences
with effect from Semester A 2023/24

Part I Course Overview

Course Title:	Pharmacology Principles in Drug Discovery and Development
Course Code:	BMS5007
Course Duration:	One semester
Credit Units:	3
Level:	5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	NIL
Precursors: *(Course Code and Title)*	NIL
Equivalent Courses: *(Course Code and Title)*	NIL
Exclusive Courses: *(Course Code and Title)*	NIL

Part II Course Details

1. Abstract

This course aims to provide students with the fundamental principles of pharmacology in drug discovery and development. Topics include (1) protein structure, receptor theory, enzyme kinetics, and cell signalling pathways; (2) drug absorption, distribution, metabolism, elimination, and toxicity (3) key aspects of drug discovery, such as target selection and validation, identification of early lead compounds, optimization of leads into compounds suitable for pre-clinical development; (4) key stages and challenges in progressing from discovery to clinical development, and medical and economical consideration that may impact the progress of a drug discovery program; (5) enabling technologies in drug discovery: high throughput screening, structure-based drug design, molecular modelling, pharmaceutical profiling, and translational medicine. To enhance the understanding of basic principles of pharmacology in drug discovery and development, the students will participate in journal article discussions and critical evaluation of examples of successful or failed drug development, in addition to guided readings and lectures.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Understand basic concepts and principles in pharmacology in drug discovery and development: receptor theory, cell signalling pathways, DMPK/toxicity, formulation and drug delivery.	40	✓	✓	
2.	Understand the basic process of drug discovery and development, key considerations and challenges in this process: drug target identification and validation, lead identification and optimization, pre-clinical and clinical development.	40	✓	✓	✓
3.	Understand the theory and principles of the enabling technologies that are instrumental for drug discovery and development.	20		✓	✓
		100%			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Lectures	Lecture on course content	✓	✓	✓	
Tutorial	Oral presentation and participation in journal discussions	✓	✓	✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.			Weighting	Remarks
	1	2	3		
Continuous Assessment: 65 %					
Oral presentation	✓	✓	✓	30%	
Mid-term Exam/Quiz	✓	✓	✓	35%	Midterm exam 35% @ 7th week, covering contents from 1-6 weeks
Examination: **35%** (Duration: 2 hours; covering studies from 8-13 weeks study).				35%	
				100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Oral Presentation	Ability to analyse and critical evaluation of a drug discovery and development program	Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.	Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.	Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.	Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
2.Mid-term Exam/Quiz/Examination	Ability to master, analyse, apply the fundamental principles of pharmacology in the context of drug discovery and development				

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Oral Presentation	Ability to apply the principles to drug discover and development	Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.	Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.	Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.	Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.	Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
2.Mid-term Exam/Quiz/Examination	Ability to analyse, state and apply the principles and subject matter learnt in the course					

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Principles of pharmacology,
Drug discovery,
Drug development,
Receptors
Cell signalling
Drug target selection/validation
DMPK
Lead discovery
Preclinical development
Clinical trials

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	
2.	
3.	
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2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	"Basic Principles of Drug Discovery and Development", 2nd Edition, edited by Benjamin E Blass, 2021.
2.	"Basic and Clinical Pharmacology", 15th Edition, Bertram Katzung and Anthony Trevor, 2021.
3.	"Goodman & Gilman's: The Pharmacological Basis of Therapeutics", 14th Edition, Laurence Brunton and Bjorn Knollmann, 2023