BMS5007: PHARMACOLOGY PRINCIPLES IN DRUG DISCOVERY AND DEVELOPMENT

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Pharmacology Principles in Drug Discovery and Development

Subject Code
BMS - Biomedical Sciences
Course Number
5007

Academic Unit
Biomedical Sciences (BMS)

College/School
College of Biomedicine (BD)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

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.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-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	x	x	
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	x	x	x
3	Understand the theory and principles of the enabling technologies that are instrumental for drug discovery and development.	20		x	x

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 real-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.

Learning and Teaching Activities (LTAs)

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

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Oral presentation	1, 2, 3	30	
2	Mid-term Exam /Quiz	1, 2, 3	35	Midterm exam 35% @ 7th week, covering contents from 1-6 weeks

Continuous Assessment (%)

65

Examination (%)

35

Examination Duration (Hours)

2

Additional Information for ATs

Examination: covering studies from 8-13 weeks study.

Assessment Rubrics (AR)

Assessment Task

Oral Presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to apply the principles to drug discover and development

Excellent

(A+, A, A-) 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.

Good

(B+, B, B-) 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.

Fair

(C+, C, C-) 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.

Marginal

(D) Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) 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.

Assessment Task

Mid-term Exam/Quiz/Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyse, state and apply the principles and subject matter learnt in the course

Excellent

(A+, A, A-) 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.

Good

(B+, B, B-) 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.

Fair

(C+, C, C-) 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.

Marginal

(D) Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) 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.

Assessment Task

Oral Presentation (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to analyse and critical evaluation of a drug discovery and development program

Excellent

(A+, A, A-) 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.

Good

(B+, B) 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.

Marginal

(B-, C+, C) 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.

Failure

(F) 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.

Assessment Task

Mid-term Exam/Quiz/Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to master, analyse, apply the fundamental principles of pharmacology in the context of drug discovery and development

Excellent

(A+, A, A-) 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.

Good

(B+, B) 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.

Marginal

(B-, C+, C) 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.

Failure

(F) 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.

Part III Other Information

Keyword Syllabus

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

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
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