

Subject Description Form

Subject Code	ABCT4762
Subject Title	Medicinal Chemistry
Credit Value	3
Level	4
Pre-requisite	ABB programme: Organic Chemistry I with Grade A- or above ASTC programme: Biochemistry or equivalent with Grade B+ or above, and Organic Chemistry I with Grade A- or above CT programme: Organic Chemistry II, and Biochemistry or equivalent with Grade B+ or above
Objectives	After taking this subject, students will have a systematic understanding of the basic chemical and biochemical basis of drug research and development in the pharmaceutical industry; the analytical skill in evaluate the benefits and limitations of therapeutic agents currently in use or understanding; and a stronger interest in the discipline of chemical technology and applied biology.
Intended Learning Outcomes	Upon completion of this subject, the students will be able to <ol style="list-style-type: none">discuss and contrast the chemical and biochemical basis of drug development in the pharmaceutical industry.recognize the concepts of enzyme inhibition, receptors and ligands, agonists and antagonists.optimize the various chemical and physical parameters which affect the development and use of therapeutic agents.analyze the benefits and criticize the limitations of therapeutic agents currently in use or in development.develop a greater interest in the field of synthetic chemistry and chemical biology, and a better understanding of the potential of the field in the pharmaceutical industry.
Subject Synopsis/ Indicative Syllabus	<u>Basic chemical and biochemical concepts:</u> Stereochemistry; chemistry of lipids, steroids, carbohydrates, amino acids, and nucleic acids; biochemistry of proteins, DNA and RNA, glycolipids and glycoproteins. <u>Pharmacodynamics and pharmacokinetics:</u> Drugs and medicinal chemist; the why and the wherefore - drug targets; proteins as drug targets; enzymes; receptors; receptor structure and signal transduction; nucleic acids as drug targets; pharmacokinetics and related topics; <u>The process of drug development:</u>

	<p>Screening and bioassays; the lead compounds; synthetic analogues; molecular modeling; pharmacodynamics; structure-activity relationships; physiochemical properties; drug design-optimizing PK properties; clinical testing</p> <p><u>Tools in drug discovery and development:</u></p> <p>Quantitative structure-activity relationships; combinatorial chemistry; Parallel synthesis.</p> <p><u>Selected topics in medicinal chemistry:</u></p> <p><u>Anti-cancer drugs:</u> Cause of cancer; cell cycle, cancer chemotherapy; alkylating agents; anti-metabolites; intercalating agents; mitotic inhibitors; multidrug resistance; the mechanism of anti-cancer drugs and recent developments.</p> <p><u>Anti-viral drugs:</u> How viruses reproduce; amantadine and analogs; the nucleoside analogs; the protease inhibitors; treatment of HIV by combination therapy; the development of zanamivir as anti-influenza drug;</p> <p><u>Drugs affecting cholinergic and adrenergic neurotransmitters:</u> The neurotransmitters; cholinesterase inhibitors; cholinomimetics and Alzheimer's disease; anticholinergics; adrenoreceptors; selective α- and β-blockers;</p> <p><u>Antibacterial agents</u> The bacterial cell; mechanisms of antibacterial action; antibacterial agents which inhibit cell metabolism; antibacterial agents which inhibit cell wall synthesis; antibacterial agents which act on the plasma membrane structure; antibacterial agents which impair protein synthesis; antibacterial agents which act on nucleic acid transcription and replication; drug resistance</p> <p>The content of this subject is subject to change with reference to Graham L. Patrick's book - An Introduction to Medicinal Chemistry.</p>
<p>Teaching/Learning Methodology</p>	<p>The fundamental principles of medicinal chemistry will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Lecture notes will be given to students one week ahead and the students can participate in the discussion of lecture materials. The students are encouraged to develop an independent approach of learning the subject matters. To enhance their learning and knowledge, problem-based learning approach will be adopted.</p>

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	e
	1. Examination	40	√	√	√	√	√
	2. Continuous assessment	60	√	√	√	√	√
Total	100 %						
	<p>Test, essay, computer work and examination are used to gauge how much students have learned in this subject. Writing skills will be assessed in test, essay and examination. The students need to demonstrate their competence in understanding the basic concept and also appreciate the drug discovery and development process.</p>						
Student Study Effort Expected	Class contact:						
	▪ Lecture		26 Hrs.				
	▪ Tutorial / Presentation		13 Hrs.				
	Other student study effort:						
	▪ Self Study		52 Hrs.				
	▪ Assignments / Essay / computer work		26 Hrs.				
Total student study effort		117 Hrs.					
Reading List and References	<p><u>Essential</u> An Introduction to Medicinal Chemistry, 5th edition, Graham L. Patrick, Oxford University Press, Oxford, 2013</p> <p><u>Supplementary</u> Drug-Like Properties, 2nd edition, Li Di and Edward H. Kerns, Elsevier Inc., 2016</p> <p>Lead Optimization for Medicinal Chemists, 1st edition, Florencio Zaragoza Dörwald, Wiley-VCH Verlag & Co., 2012</p> <p>The Organic Chemistry of Drug Design and Drug Action, 3rd edition, Richard B. Silverman and Mark W. Holladay, Elsevier Inc., 2014</p>						