

UNIVERSITY OF MADRAS
B.Sc. DEGREE PROGRAMME IN CHEMISTRY
 SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Course	PHARMACEUTICAL CHEMISTRY						
Paper No.	EC VI (EC-6)						
Category	Elective	Year	III	Credits	2	Course Code	324E5C
		Semester	V				
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	4		-		4		
Prerequisites	Knowledge on active chemical compounds and biochemistry						
Objectives of the course	<p>The course aims at providing an overall view of</p> <ul style="list-style-type: none"> • drugs design and drug metabolism • important Indian medicinal plants, common diseases and antibiotics • drugs for major diseases like cancer, diabetes and AIDS • analgesics and antipyretic agents <p>significance of clinical tests</p>						
Course Outline	<p>UNIT I Introduction Important terminologies – drug, pharmacognosy, pharmacy, pharmacology, pharmacodynamics, pharmacokinetics, clinical pharmacology, pharmacotherapeutics, chemotherapy, toxicology, pharmacophore, antimetabolites, mutation, bacteria, virus, fungi, actinomycetes, vaccines, pharmacopeia, posology and therapeutic index.</p> <p>Sources of drugs – dosage forms – bio availability – routes of administration – absorption, distribution and elimination of drugs – drug metabolism – prescription terms.</p> <p>Structure and pharmacological activity Effect of – unsaturation, chain length, isomerism; groups - halogens amino, nitro, nitrite, cyano, acidic, aldehydic, keto, hydroxyl and alkyl groups.</p> <p>Development of Drugs Development of a drug – classic steps- lead compounds- comparison of traditional and modern methods of development of drugs – drug design by method of variation – disjunction and conjunction methods.</p> <p>Unit II Indian medicinal plants Some important Indian medicinal plants – tulsi, neem, kizhanelli, mango, semparuthi, adadodai, turmeric and thoothuvalai –uses.</p>						

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Common diseases and their treatment

Causes, prevention and treatment of the following diseases:

Insect borne diseases– malaria, filariasis, plague; Air borne diseases– diphtheria, whooping cough, influenza, measles, mumps, common cold, tuberculosis; Water borne diseases – cholera, typhoid , dysentery.

Digestive system – jaundice; Respiratory system – asthma; Nervous system – epilepsy.

Antibiotics

Definition – classification – structure and therapeutic uses of chloramphenicol, penicillin's , structure activity relationship of chloramphenicol ; therapeutic uses of ampicillin, streptomycin, erythromycin, tetracycline, rifamycin.

UNIT III

Drugs for major diseases

Cancer – common causes – chemotherapy – anti neoplastic agents - classification –adverse effects of cytotoxic agents ; alkylating agents – chlorambucil ; anti metabolites – methotrexate, fluouracil;

Vinca alkaloids–vincristine, vinblastine. Diabetes–types –

management of diabetes – insulin ; oral hypoglycemic agents - sulphonyl ureas – chlorpropamide ; biguanides - metformin – thiazolidinediones .Cardiovascular drugs– cardio glycosides ; anti arrhythmic agents – quinidine, propranolol hydrochloride ; anti-hypertensive drugs - Aldomet, pentoliniumtartarate; vasodilator-tolazoline hydrochloride, sodium nitroprusside. AIDS –causes, symptoms and prevention – anti HIV drugs - AZT, DDC.

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	<p>UNIT IV</p> <p>Analgesics and antipyretic agents Classification – action of analgesics – narcotic analgesics –morphine; synthetic analgesics – pethidine, methadone; antipyretic analgesics – salicylic acid derivatives, indolyl derivatives, p-aminophenol derivatives.</p> <p>Anaesthetics Definition, characteristics, classification - general anaesthetics – volatile anaesthetics – nitrous oxide, ethers, cyclopropane, chloroform, halothane, trichloro ethylene– storage, advantages and disadvantages ; non volatile anaesthetics – thiopental sodium ; local anaesthetics – requisites – advantages- esters – cocaine, benzocaine ; amides – lignocaine, cinchocaine.</p> <p>Blood and haematological agents Blood– composition, grouping – physiological functions of plasma proteins – mechanism of clotting; Coagulants – vitamin K, protamine sulphate, dry thrombin; Anti coagulants – coumarins, citric acid and heparin; antifibrinolytic agents – aminocaproic acid and tranexamic acid. Anaemia– causes, types and control – anti anaemic drugs.</p>
	<p>UNIT V</p> <p>Clinical Chemistry Blood tests – blood count – complete haemogram – Hb, RBC, GTT, TC, DC, platelets, PCV, ESR; bleeding and clotting time -- glucose tolerance test.</p> <p>Significance of Clinical Tests Serum electrolytes - blood Glucose – ortho toluidine method; Renal functions tests - blood urea, creatinine; liver function tests - serum proteins, albumin globulin ratio, serum bilirubin, enzymes SGOT, SGPT; lipid profile – cholesterol, triglycerides, HDL, LDL, coronary risk index. Urine examination – pH, tests for glucose, albumin and bile pigment.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>

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Recommended Text	<ol style="list-style-type: none"> Jayashree Ghosh, (1999), A text book of pharmaceutical chemistry, 2nded., S.Chand & company, NewDelhi. Lakshmi S, (2004), Pharmaceutical chemistry, 3rded., Sultan chand & sons, Delhi. Tripathi K D, (2018), Essentials of medical pharmacology, 8thed., Jaypee brothers medical publishers (P) Limited, NewDelhi. Ashutosh Kar, (2018), Medicinal chemistry, 7thed., New age international (P) Limited, Publishers, New Delhi.
Reference Books	<p>Reference Books:</p> <ol style="list-style-type: none"> Chatwal G R, (2013), Pharmaceutical chemistry, inorganic (vol-I) 6thed .,Himalaya publishing house, Bombay. Chatwal G R, (1991), Pharmaceutical chemistry, organic (vol-II), Himalaya publishing house,Bombay. Patrick G, (2002), Instant Notes Medicinal Chemistry, Viva Books Private Limited, NewDelhi. Intellectual Property Rights, NeerajPandey, KhushdeepDharni. Publisher: PHI Learning Pvt. Ltd., 2014 ISBN: 812034989X, 9788120349896.
Website and e-learning source	<ol style="list-style-type: none"> http://www.pharmacy.umaryland.edu/faculty/amackere/courses/phar531_delete/lectures/qsar_1.pdf http://www.indianmedicinalplants.info/ https://www.wipo.int/about-ip/en/
<p>Course Learning Outcomes (for Mapping with POs and PSOs) On completion of the course the students should be able to</p> <p>CO1: Define the pharmaceutical terminologies; describe the principles in pharmacological activity, drug development, clinical chemistry, hematology, therapeutic drugs and treatment of diseases; list the types of IPR and trademarks.</p> <p>CO2: Discuss the development of drugs, structural activity, disease types, physio-chemical properties of therapeutic agents, significance of medicinal plants, clinical tests and factors for patentability.</p> <p>CO3: Apply the principles involved in structural activity and drug designing, functions of haematological agents; estimation of clinical parameters and therapeutic application of drugs for major diseases.</p> <p>CO4: explain classification of analgesics and anesthetics, and physiological functions of plasma proteins</p> <p>CO5: explain the significance of clinical tests like blood urea, serum proteins and coronary risk index</p>	

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's