INSTITUTE	**FACULTY OF PHARMACY**
PROGRAM	**BACHELOR OF PHARMACY**
SEMESTER	**5**
COURSE TITLE	**MEDICINAL CHEMISTRY-II**
COURSE CODE	**13PH0501**
COURSE CREDITS	**4**

Objective:

1 This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs,
importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on
chemical synthesis of important drugs under each class.

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Course Outcomes: After completion of this course, student will be able to:

1 Able to know the chemistry of drugs with respect to their pharmacological activity

2 Know the drug metabolic pathways, adverse effect and therapeutic value of drugs

3 Know the Structural Activity Relationship of different class of drugs

4 Understanding of the basic biological and pharmacological interactions by using both natural products and synthetic molecules

5 To show why medicinal chemistry must be a key component of the education of pharmacy students

6 Able to write the chemical synthesis of selected drugs

Pre-requisite of course: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	75	15	10	0	0

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Contents : Unit	Topics	Contact Hours
1	**Unit-1: Antihistaminic agents** Antihistaminic agents: Histamine, receptors and their distribution in the human body. H1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines cuccinate, Clemastine fumarate, Diphenylphyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium. H2-antagonists: Cimetidine*, Famotidine, Ranitidin. Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole. Anti-neoplastic agents: Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan Chlorambucil, Busulfan, Thiotepa. Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine. Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin. Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate. Miscellaneous: Cisplatin, Mitotane.	10
2	**Unit-2: Anti-anginal** Anti-anginal: Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole. Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine. Diuretics: Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide. Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide, Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid. Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride. Osmotic Diuretics: Mannitol. Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide,Minoxidil, Reserpine, Hydralazine hydrochloride.	10
3	**Unit-3: Anti-arrhythmic Drugs** Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol. Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol. Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel. Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.	10

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Contents : Unit	Topics	Contact Hours
4	**Unit-4: Drugs acting on Endocrine system** Drugs acting on Endocrine system: Nomenclature, Stereochemistry and metabolism of steroids. Sex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol. Drugs for erectile dysfunction: Sildenafil, Tadalafil. Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol. Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone. Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.	8
5	**Unit-5: Antidiabetic agents** Antidiabetic agents: Insulin and its preparations Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride. Biguanides: Metformin. Thiazolidinediones: Pioglitazone, Rosiglitazone. Meglitinides: Repaglinide, Nateglinide. Glucosidase inhibitors: Acrabose, Voglibose. Local Anesthetics: SAR of Local anesthetics. Benzoic Acid derivatives: Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine. Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate. Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine. Miscellaneous: Phenacaine, Diperodon, Dibucaine.*	7
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial** Workshop 1, Workshop 2, Workshop 3, Workshop 4, Workshop 5, Workshop 6, Workshop 7, Workshop 8, Workshop 9, Workshop 10, Workshop 11, Workshop 12, Workshop 13, Workshop 14	15
Total Hours		**15**

Textbook :

1 Organic medicinal and Pharmaceutical Chemistry., Oganic Chemistry Wilson and Giswold's, Organic medicinal and Pharmaceutical Chemistry, 2010

References:

1 Medicinal chemistry, Medicinal chemistry, Lemke, Thomas L., Williams, David A., Lippincott Williams & Wilkins , 2012

2 Medicinal chemistry, Medicinal chemistry, Burger's , Wiley, 2010

3 Drug design, Drug design, Smith and Williams., CRC Press, 2005

4 Pharmaceutical Science, Pharmaceutical Science, Remington, John Wiley & Sons, 1990

5 The Extra Pharmacopoeia -hardcover, The Extra Pharmacopoeia -hardcover, Martindale, Pharmaceutical Press, 2008

References:

6 Stereochemistry and the Chemistry of Naturalproducts, Stereochemistry and the Chemistry of Naturalproducts, I.L. Finar,, Longman, 1988

7 Organic Chemistry Series of Drug Synthesis, Organic Chemistry Series of Drug Synthesis, Lednicer, Wiley-Interscience, 1995

8 Indian Pharmacopoeia., Indian Pharmacopoeia., Indian Pharmacopoeia Commission, Indian Pharmacopoeia Commission, 2017

9 Text book of practical organic chemistry, Text book of practical organic chemistry, A.I. Vogel., Pearson India, 2003

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by the blackboard may also use any tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom.

3 Students will use supplementary resources such as online videos, NPTEL videos, MOOCs/ e-courses, virtual laboratories.

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