

**SACRED HEART COLLEGE (AUTONOMOUS)**

**DEPARTMENT OF CHEMISTRY**

**MASTER OF SCIENCE IN APPLIED CHEMISTRY - PHARMACEUTICAL**

**Course plan**

**Academic Year 2018 - 19**

**Semester 4**

### COURSE PLAN

PROGRAMME	MASTER OF SCIENCE IN APPLIED CHEMISTRY - PHARMACEUTICAL	SEMESTER	4
COURSE CODE AND TITLE	16P4CPHT13EL: PHARMACEUTICAL CHEMISTRY II (BIOCHEMISTRY AND BACTERIOLOGY)	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	90
FACULTY NAME	DR. V S SEBASTIAN, DR. FRANKLIN J, DR. ABI T.G, DR. RAMAKRISHNAN S		

### COURSE OBJECTIVES

COURSE OBJECTIVES
To describe the structure and functions of biomolecules, amino acids, proteins, enzymes, nucleic acids and hormones.
To explain the chemical processes involved in the biological oxidation and metabolism.
To illustrate the application of buffer systems in pharmaceutical chemistry.
To describe the principles of microbiology and immunology

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>MODULE I : Biomolecules (6h) and MODULE VII: Microbiology and Immunology (12Hrs)</b>				
1	Biomolecules an over view- carbohydrates	PPT	Q & A Session	
2	Proteins, glycoprotein and Lipids	PPT/Lecture		
3	Relevance in Pharmaceutical chemistry	PPT/Lecture		
4	Structure of cell membrane.	PPT/Lecture	Quiz	
5	Introduction to Microbiology and classification of Microbes.	PPT/Lecture		
6	Characterization and Screening of Microbes:, Microbia1growth, kinetics	PPT/Lecture		
7	Isolation and Improvement of Individual micro- organism	Lecture		
8	Fermentation technology: Design, operation and characteristics of fermentation processes	Lecture		
9	Staining of bacteria, theories of staining. General principles of microbial control- sterilization and disinfection	Lecture		
10	Immunochemistry in pharmaceutical applications.	PPT/Lecture		

11	Overview of the immune system and its role	PPT/Lecture		
12	Adaptive and innate immunity.	PPT/Lecture		
13	Immunoglobulins- classification and structure, their biological role.	PPT/Lecture		
14	Immune response and the underlying mechanisms,	PPT/Lecture		
15	Regulation of immune response. Hypersensitivity	Lecture		
16	immunodeficiency, Autoimmunity	Lecture		
17	Immunization, Immunosuppressants	Lecture	Video	
18	Immunomodulators, Immunological techniques	PPT/Lecture		
<b>MODULE II : Amino acids and Proteins (12h) and MODULE VI : Buffer Systems (6h)</b>				
19	Structural and functional classification of proteins.	Lecture	Q & A Session	
20	Structure, Physicochemical properties of amino acids	PPT/Lecture		
21	Configuration and optional properties of amino acids	PPT/Lecture		
22	Purification of proteins amino acids	PPT/Lecture		
23	Sequence determination-Primary, Secondary, Tertiary	PPT/Lecture	Quiz	
24	Quaternary structure of Proteins, Protein folding	Lecture		
25	Three dimensional structure of proteins.	Lecture		
26	Solid phase peptide synthesis	PPT/Lecture		
27	Buffer in pharmaceutical and biological system	Lecture	Video	
28	Buffer in biological system	PPT/Lecture		
29	pH in biological system	PPT/Lecture		
30	The buffer equation (Henderson Hesselbach)	PPT/Lecture		
31	Buffer calculations	PPT/Lecture		
32	Three important buffer systems in human body	PPT/Lecture		
33	Buffer capacity	PPT/Lecture		
34	Osmotic pressure and tonicity	PPT/Lecture		
35	Pharmaceutical buffers	Lecture	Quiz	
36	Preparations of pharmaceutical buffer solutions	PPT/Lecture		
CIA I				
<b>MODULE III : Enzymes (18h)</b>				

37	Enzymes Classification, Mechanism of enzymatic reactions,	PPT/Lecture	Q & A Session	
38	Kinetics of enzymatic reactions, MichaelisMenton model	PPT/Lecture		
39	Measurement of significance of Kmax and Vmax perfect enzymes.	PPT/Lecture		
40	Inhibition of enzymetic reactions.Kinetics of competitive and non-competitive Inhibition.	PPT/Lecture	Quiz	
41	Allosteric enzymes Mechanism of enzymatic catalysis by Lysozyme and carboxypeptidase,	PPT/Lecture		
42	Zymogens	PPT/Lecture		
43	Coenzymes Classification	PPT/Lecture		
44	Structure and Function of Nicotinamide adeninedinucleotides (NAD and NADP	PPT/Lecture		
45	Riboflavin Nuleotides (FMN and FAD),.	PPT/Lecture		
46	Biological oxidation and reduction, Lipoic acid	PPT/Lecture		
47	Cytocromes,Pyridoxal phosphate, Nucleoside diphosphates.	PPT/Lecture		
48	Tetrahydrofolic acid conjugates,	PPT/Lecture		
49	Biotinyl coenzyme. Conenzyme - A, and Thiamine pyrophosphate	PPT/Lecture		
50	Biotechnological Application of Enzymes	PPT/Lecture		
51	Large scale production and purification of enzymes,	PPT/Lecture		
52	Techniques and method of immobilization of enzymes, effect of immobilization on enzyme activity	PPT/Lecture		
53	Application of immobilized enzymes, use of enzymes as targets for drug design.	PPT/Lecture		
54	Clinical uses of enzyme therapy, Enzymes and recombinant DNA technology. Genomic Library	PPT/Lecture		
<b>MODULE IV: Nucleic acids and Hormones (18h)</b>				
55	Nucleic acids: Nucleacid bases, Nucleosides	PPT/Lecture	Q & A Session	
56	nucleotides, structure of DNA	Lecture		
57	RNA and its classifications	PPT/Lecture		
58	Replication of DNA, transcription	PPT/Lecture		
59	Translation and Protein Biosynthesis	PPT/Lecture		
60	Restriction enzymes.	PPT/Lecture		

61	DNA finger printing Techniques	PPT/Lecture		
62	Introduction to Recombinant DNA technology	PPT/Lecture	Quiz	
63	Genetic code	PPT/Lecture		
64	Gene therapy (basic concept only)	PPT/Lecture		
65	PCR	PPT/Lecture		
66	Chemical Synthesis of Nucleotides	PPT/Lecture		
67	Restriction enzymes.	PPT/Lecture		
68	Chemistry of ATP, ADP and AMP.	PPT/Lecture		
69	Hormones: Functions and mode of action of hormones, Pituitary	PPT/Lecture		
70	Thyroid, parathyroid, adrenal hormones	PPT/Lecture		
CIA II				
71	Adrenocorticoid and pancreatic hormones.	PPT/Lecture		
72	Male and female sex hormones. Anti-hormones.	PPT/Lecture		
<b>MODULE V : Biological oxidation and metabolism: (18h)</b>				
73	Carbohydrate metabolism- Carbohydrate the source of energy	PPT/Lecture	Q & A Session	
74	Glycolysis	PPT/Lecture		
75	Glycogenesis, pentose pathway	PPT/Lecture		
76	Citric acid	PPT/Lecture		
77	Cori cycle	PPT/Lecture		
78	Regulation of carbohydrate metabolism	PPT/Lecture		
79	Hormonal regulation of carbohydrate metabolism	PPT/Lecture		
80	Fructose metabolism	PPT/Lecture		
81	Galactose metabolism.	PPT/Lecture		
82	Diabetis-Type I&II.	PPT/Lecture		
83	Lipid metabolism: Oxidation of fatty acid	PPT/Lecture	Quiz	
84	Biosynthesis of fatty acids,\	PPT/Lecture		
85	Prostaglandins- classification	PPT/Lecture		
86	Structure and biosynthesis and biological role of proteins	PPT/Lecture		
87	Protein and amino acid metabolism	PPT/Lecture		
88	Oxidative deamination	PPT/Lecture		
89	Trans amination reactions,	PPT/Lecture		
90	Urea formation- ornithine cycle.	PPT/Lecture		

### INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	15/01/2019	Techniques and method of immobilization of enzymes, effect of immobilization on enzyme activity. Application of immobilized enzymes, use of enzymes as targets for drug design.

### GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	24/01/2019	Glycolysis, glycogenesis, pentose pathway citric acid

### References

1. Introduction to Microbiology- IldnEdn Ingraham and Ingraham (Thomson Books)
2. Microbiology-Stanies,
3. Microbiology-Pleczar.
4. Immunology-RoittBostolf, Malc (2001) Mosby
5. Industrial Microbiology-Cassida

PROGRAMME	MASTER OF SCIENCE IN APPLIED CHEMISTRY - PHARMACEUTICAL	SEMESTER	IV
COURSE CODE AND TITLE	16P4CPHT14EL: PHARMACEUTICAL CHEMISTRY III ADVANCES IN PHARMACEUTICAL OPERATIONS	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	90
FACULTY NAME	DR. JINU GEORGE AND DR. GRACE THOMAS		

### COURSE OBJECTIVES

COURSE OBJECTIVES
To know the different dosage forms drug delivery systems
To describe the formulation and development of solid dosage forms
To illustrate Preformulation studies and Stability Testing of Drugs
To discuss about application of colloids
To illustrate IPR and copyright
To explain different types of chromatography
To describe the Radio pharmaceuticals, principle and methods of extraction

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>Module I : Pharmaceutical Dosage forms and Drug delivery Systems (10 h)</b>				
1	An over view of different dosage forms	PPT		
2	Drug delivery systems	PPT		
3	Liposomes drug delivery system	PPT		
4	Nanoparticle drug delivery system	PPT		
5	Biodegradable drug delivery system	PPT	Assignment	
6	Biodegradable drug delivery system Continue	PPT		
7	Controlled release system	PPT		
8	Controlled release system	Lecture		
9	Targeted drug delivery systems	Lecture		
10	Hydrogel bases drug delivery systems	PPT		
<b>Module II : Formulation and Development of solid dosage forms (18h)</b>				
11	New materials, excipients	PPT		
12	Science - diluents, disintegrants, super disintegrants	PPT		
13	Evaluation of functional properties of excipients	PPT	Q & A Session	
14	Co-processed materials methods of preparation and evaluation.	PPT		
15	Coating, coating machines, coating techniques	Lecture		
16	Advanced coating technologies in tablet	Lecture		

	technology for product development			
17	Specialized tablets: Formulation and evaluation of effervescent	Lecture	Quiz	
18	Dispersible and chewable tablets	Lecture		
19	Formulation and manufacture of powder dosage forms for internal use	Lecture		
20	Soft and hard gelatine capsules advances in capsule manufacture, machines, processing and control	PPT		
21	Filling equipment and filling operations, formulations, finishing, special techniques	Lecture		
22	Disintegration, Disintegration time	Lecture		
23	Factors affecting disintegration, disintegration testing of tablets	Lecture		
24	Theories of Dissolution, dissolution models	Lecture		
25	Factors affecting dissolution rates	PPT/Lecture		
26	Dissolution of different dosage forms- solids, suspensions, suppositories, controlled drug release systems.	Lecture	Quiz	
27	Introduction, Pharmaceutical importance, particle size distribution, surface area and particle volume derived properties of powder, flow properties of powder and application in pharmacy	Lecture		
28	Different methods in particle size determination	Lecture		
<b>Module III : Preformulation studies and Stability Testing (10h)</b>				
29	Preformulation studies: Factors affecting dissolution	Lecture		
30	Bioavailability and drug absorption – pH, pka values	Lecture		
31	Partition coefficient , particle size, solubility etc	Lecture		
32	Methods to increase solubility of poorly soluble drugs. Drug release mechanisms	PPT/Lecture	Q & A Session	
33	Stability testing- drugs and dosage forms: Solid state drug stability	PPT/Lecture		
34	Dosage form stability, accelerated stability testing	PPT/Lecture		
35	Shelf life calculations	Lecture		
36	Strategies for prolonging shelf life	PPT	Quiz	
37	Effect of packaging materials on dosage form stability, photostability testing and oxidative stability	Lecture		
38	Role of containers in stability testing.	PPT/Lecture		
<b>Module IV : Colloids (10h)</b>				
39	Pharmaceutical application of colloids	PPT/Lecture		
40	Brief introduction to properties of colloids	PPT/Lecture	Q & A Session	



41	Coarse dispersions	PPT/Lecture		
42	Physical stability of suspension and emulsions	Lecture		
43	Types of suspension	PPT/Lecture		
44	Controlled flocculation-flocculated suspension	PPT/Lecture	Quiz	
45	types of emulsion	PPT/Lecture		
46	Theories of emulsification	PPT/Lecture		
47	Emulsifying agents mechanism of action	PPT/Lecture	Video	
48	Factors to improve physical stability of emulsions	PPT/Lecture		
<b>Module V : Forensic Pharmacy (14h)</b>				
49	Getting the drug to the market- Preclinical studies of toxicology	PPT/Lecture		
50	Drug metabolism	PPT/Lecture		
51	Pharmacology, formulation and stability tests	PPT/Lecture		
52	Clinical trials	PPT/Lecture		
53	IPR: Patents: Conditions for patentable inventions	PPT/Lecture	Video	
54	Patentable inventions under the patent Act 1970			
55	Types of inventions not patentable in India, Term of patent in Indian System	Lecture	Q & A Session	
56	Essential patent documents to be submitted, Provisional specification	PPT/Lecture		
57	Complete specification, Criteria for naming inventors patent	PPT/Lecture		
58	Copyright Entitlement to copyright, works protected by copyright	PPT/Lecture		
59	Rights granted by copyright, Geographical indication	PPT/Lecture	Quiz	
60	BP, IP, USP	PPT/Lecture		
61	Limits Tests	PPT/Lecture		
62	Revision	Lecture		
<b>Module VI : Chromatography (14h)</b>				
63	Applications of chromatography as an analytical and diagnostic tool in pharmaceutical chemistry	Lecture	Q & A Session	
64	Over view of plate theories	Lecture		
65	Over view of rate theories	Lecture		
66	Different classification of chromatography, adsorption	Lecture		
67	Different classification of chromatography, partition	Lecture	Quiz	
68	Size exclusion (GPC)	Lecture		
79	Affinity, Ion exchange chromatography	Lecture		
70	Applications of PC, TLC	Lecture		

71	GC, Different detectors	PPT/Lecture		
72	GCMSS	PPT/Lecture		
73	Column chromatography	PPT/Lecture		
74	HPLC. Normal and reverse phase	PPT/Lecture		
75	Chiral Columns	PPT/Lecture		
76	LCMS and its applications in pharmaceutical chemistry	PPT/Lecture		
<b>Module VII : Modern Techniques of Extraction and Radio Pharmaceuticals (14h)</b>				
77	Radio Pharmaceuticals	PPT/Lecture	Q & A Session	
78	Radio Pharmaceuticals and their applications in diagnosis	PPT/Lecture		
79	Radio Pharmaceuticals and their applications treatment	PPT/Lecture		
80	Continue	PPT/Lecture		
81	Diagnostics techniques Introduction	PPT/Lecture	Quiz	
82	Diagnostics techniques ELISA	PPT/Lecture		
83	Diagnostics techniques RIA	PPT/Lecture		
84	Diagnostics techniques PET	PPT/Lecture		
85	Diagnostics techniques SPET	PPT/Lecture		
86	Principles and methods of Industrial extraction	PPT/Lecture		
87	Principles and methods of evaporation	PPT/Lecture		
88	Principles and methods of distillation	PPT/Lecture		
89	Principles and methods of ultracentrifugation	PPT/Lecture		
90	Principles and methods of electrophoresis	PPT/Lecture		
<b>Reference</b>	<p>01. G. Patrick, Medicinal Chemistry, BIOS. 2001.</p> <p>02. T. Nogrady, D.F. Weaver, Medicinal Chemistry, Oxford University Press, 2005.</p> <p>03. W.O. Foye, T.L. Lemke, D.A. Williams, Principles of Medicinal Chemistry, 4<sup>th</sup>Edn., Williams &amp; Wilkins, 1995.</p> <p>04. J.P. Remington, Remington's Pharmaceutical Sciences, Vol.13, , 19th Edn., Mack,1990.</p> <p>05. D. Sriram , P. Yogeswari, Medicinal Chemistry, Pearson Education India, 2010.</p> <p>06. K. D. Tripathi, Essentials of Medical Pharmacology, 6th Edn.,Jaypee, 2008</p> <p>07. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics, 10<sup>th</sup>Edn., McGraw Hill, 2001.</p> <p>08. S.S. Kadam, Principles of Medicinal Chemistry, Vol.I&amp; II, Pragati Books, 2008.</p> <p>09. A. Kar, Medicinal Chemistry, New Age International, 2007.</p> <p>10. C.O. Wilson, J.M. Beale, J.H. Block, Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th Edn., Lippincott Williams and Wilkins, 2010</p>			

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	22/02/2019	Chromatographic Techniques

PROGRAMME	MASTER OF SCIENCE IN APPLIED CHEMISTRY - PHARMACEUTICAL	SEMESTER	IV
COURSE CODE AND TITLE	16P4CPHT15EL: PHARMACEUTICAL CHEMISTRY IV – DRUG DESIGN	CREDIT	4
HOURS/WEEK	5	HOURS/SEM	90
FACULTY NAME	DR. JORPHIN JOSEPH, DR. GRACE THOMAS, DR. MIDHUN DOMINIC C.D., MR. SENJU DEVASSYKUTTY, DR. JUNE CYRIAC		

**COURSE OBJECTIVES**

COURSE OBJECTIVES
To know the principles of drug design and development, QSAR, CADD and combinatorial chemistry
To illustrate the structure and mechanism of actions of antineoplastic drugs, drugs acting on ANS and drug acting on CNS.
To deduce the synthetic strategies for different classes of drugs.

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>Module I : Drug Design and Development (14 h)</b>				
1	Development of new drugs	PPT		
2	Procedures followed in drug design.	PPT		
3	Concept of lead compounds	PPT		
4	Lead modification & lead optimization	PPT		
5	Phytochemicals as lead compounds.	PPT	Assignment	
6	Prodrugs and soft drugs	PPT		
7	Functions and properties of prodrugs and its effect and significance with relation to pharmacological activity	PPT		
8	Endogenous compounds as drugs- neurotransmitters, natural hormones	Lecture		
9	Peptidomimetics in drug design	Lecture		
10	SAR	PPT		
11	Factors affecting bioavailability	PPT		

12	Resonance and inductive effects	PPT		
13	Isosterism	PPT		
14	Bioisosterism	PPT		
<b>Module II : QSAR (12h)</b>				
15	QSAR-Introduction	Lecture		
16	QSAR- perspectives and parameters involved in studies of QSAR	Lecture		
17	Types of QSAR models	Lecture		
18	Classification of parameters utilized in QSAR studies	Lecture		
19	Statistical concept of QSAR-1	Lecture		
20	Statistical concept of QSAR-2	PPT		
21	Hansch model of QSAR	Lecture		
22	De Novo model of QSAR	Lecture		
23	Hammett model of QSAR equations	Lecture		
24	Taft model of QSAR equations	Lecture		
25	Applications of QSAR in drug design	PPT/Lecture		
26	Revision	Lecture	Quiz	
<b>Module III: Computer Aided Drug Design(CADD) (10h)</b>				
27	Introduction to drug discovery	Lecture	Q & A Session	
28	Target and Lead Identification	Lecture		
29	Virtual screening-Concept	Lecture		
30	Ligand based virtual screening	Lecture		
31	Structure based virtual screening			
32	Drug Likeness – ADME	PPT/Lecture		
33	Pharmacophore Screening	PPT/Lecture		
34	Molecular modeling- Quantum mechanics and Molecular mechanics	PPT/Lecture		
35	Docking studies-Advantages of CADD	Lecture		
36	Pharmacokinetics and Pharmacodynamics	PPT		
<b>Module IV: Combinatorial Chemistry (10h)</b>				
37	Combinatorial chemistry-Introduction	Lecture		
38	Combinatorial approaches-I	PPT/Lecture		
39	Combinatorial approaches-II	PPT/Lecture		
40	Peptide and small molecule libraries	PPT/Lecture	Q & A Session	
41	Applications, methodology	PPT/Lecture		
42	Combinatorial Organic Synthesis-I	Lecture		
43	Combinatorial Organic Synthesis-II	PPT/Lecture		
44	Assays and Screening of Combinatorial libraries	PPT/Lecture		
45	Introduction to High Throughputs Screening-I	PPT/Lecture		
46	Introduction to High Throughputs Screening-II	PPT/Lecture		
<b>Module V: Antineoplastic drugs (10h)</b>				
47	Cancer chemotherapy	PPT/Lecture	Video	

48	Role of alkylating agents	PPT/Lecture		
49	Antimetabolites and folate antagonists in the treatment of cancer	PPT/Lecture		
50	Carcinolytic antibiotics and mitotic inhibitors	PPT/Lecture	Q & A Session	
51	Plant derived drugs - vincristine, taxol	PPT/Lecture		
52	Hormones and their antagonists.	PPT/Lecture		
53	Recent developments in cancer chemotherapy-immunological interventions	PPT/Lecture	Video	
54	<i>Synthesis</i> : 5-fluorouracil, 6-mercaptopurine			
55	<i>Synthesis</i> : methotrexate, tamoxifen.	Lecture		
56	Revision	PPT/Lecture		
<b>Module VI: Drugs acting on ANS (14h)</b>				
57	Introduction to autonomic nervous system and classification	PPT/Lecture	Q & A Session	
58	Mechanism of action and uses of Adrenergic agonists : Clonidine, oxymetazoline, salbutamol	PPT/Lecture		
59	Mechanism of action and uses of Adrenergic blockers: $\alpha$ and $\beta$ adrenoreceptor antagonists	PPT/Lecture		
60	Mechanism of action and uses of ergot alkaloids-Pronethalol, propranolol, atenolol, metoprolol, pindolo.	PPT/Lecture		
61	<i>Synthesis</i> : Salbutamol, Metoprolol	PPT/Lecture		
62	Mechanism of action and uses of Cholinergic stimulants: nicotinic and muscarinic receptors, acetyl choline, pilocarpine and carbachol.	Lecture		
63	<i>Synthesis</i> : Carbachol	Lecture		
64	Mechanism of action cholinergic blockers: atropine, hyoscine	Lecture		
65	<i>Synthesis</i> : atropine	Lecture		
66	Uses and mode of action of nicotinic antagonists: Decamethonium and suxamethonium	Lecture		
67	Anti-cholinesterases: Competitive inhibitors-physostigmine and neostigmine	Lecture		
68	Organo phosphorous compounds and nerve gases.	Lecture		
69	Revision	Lecture		
70	Revision	Lecture		
<b>Module VII: Drugs acting on CNS (20h)</b>				
71	Hypnotics	PPT/Lecture	Q & A Session	
72	Sedatives	Lecture		
73	Anxiolytic agents	Lecture		
74	Benzodiazepines, buspirone and meprobamate	Lecture		

75	Synthesis: Enflurane, Etomidate, Meprobamate	Lecture		
76	Anticonvulsants: Convulsions, types of epilepsy	Lecture		
77	Barbiturates-hydantoins, oxazolidinediones, succinimides and benzodiazepines	PPT/Lecture		
78	Synthesis: Phenobarbital, Diazepam, Chlordiazepoxide, Ethosuximide, Denzimol, Topiramate	Lecture		
79	Analeptics: Xanthines, amphetamines, nikethamide and ethamivan	Lecture		
80	Synthesis: Nikethamide, Ethamivan	Lecture		
81	Centrally acting muscle relaxants: Glyceryl ethers-mephenesin	Lecture		
82	Alkane diol derivatives-meprobamate, benzodiazepines-librium, diazepam and baclofen.	Lecture		
83	Anti-parkinson's agents: Dopamine agonists	PPT/Lecture		
84	Dopamine releasing agents and synthetic anticholinergics.	Lecture		
85	Synthesis: Levodopa, Diphenhydramine	Lecture		
86	Drugs for Alzheimer's disease: Cholinergic agonists	Lecture		
87	Acetylcholine esterase inhibitors	Lecture		
88	<i>Synthesis</i> : Tacrine	Lecture		
89	Revision			
90	Quiz			
<b>Reference</b>	<p><i>Essentials of Pharmaceutical Chemistry</i>, Donald Carins; Pharmaceutical Press, 3 Edn.  <i>Medicinal Chemistry &amp; Drug Discovery</i>, Alfred Burger, John Wiley 6 Edn, 2007  <i>Fundamentals of Medicinal Chemistry</i>, G. Thomas. Wiley Publications 2006  <i>An Introduction to Medicinal Chemistry</i>, Graham L Patrick, Oxford University Press  <i>Computer aided Drug design</i>, TJ PERUN7 CL Propst, Marcel &amp; Dekker, 2007.  <i>Introduction to Principles of Drug Design</i>, Smith HJ, Willims H Edn. Wright Boston  <i>Computer Aided Drug Design</i>, Pope &amp; Perruns, Academic Press, NY.  <i>Organic Chemistry of Drug Design and Drug Action</i>, Richard B Silverman Academic Press  <i>Computational Medicinal Chemistry for Drug Discovery</i>, P Bultinck, P DeVinter.  <i>Medicinal Chemistry</i>, Alex Gringauz, Wiley India.</p>			

#### INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	02/01/2019	Phytochemicals as lead compounds – Prepare a note