

**Sacred Heart College (Autonomous)**

**Department of Chemistry**

**MSc Applied Chemistry - Pharmaceutical**

**Course Plan**

**Academic Year 2014 – 15**

**Semester 4**

**COURSE PLAN****ACADEMIC YEAR 2014-15**

<b>PROGRAMME</b>	:	<i>M.Sc. Applied Chemistry</i>	<b>LECTURE HOURS</b>	:	<i>90</i>
<b>SEMESTER</b>	:	<i>4</i>	<b>CREDITS</b>	:	<i>4</i>
<b>SUBJECT TITLE</b>	:	<i>BACTERIOLOGY AND BIOCHEMISTRY</i>	<b>SUBJECT CODE</b>	:	<i>CH4T13</i>
<b>COURSE TEACHERS</b>	:	<i>Dr. V.S. Sebastian (VSS) ; Dr. Franklin J (FJ) ; Dr. Abi T.G (ATG); Senju Devassykkutty (SD)</i>			
<b>Instructional Hours</b>	:				

**FJ**

	No. of Session	Session Topic and Discussion Theme	Value additions	
<i>UNIT 1 : Introduction to Microbiology (9 hours)</i>	1	A general study of viruses,		
	2	fungi and protozoa.		
	3	Morphology,	ICT	
	4	classification of bacteria		
	5	scientific nomenclature		
	6	Growth requirements of bacteria and nutrient media.		
	7	Staining of bacteria,		
	8	theories of staining.	Power point presentation	
	9	General principles of microbial control- sterilization and disinfection.		
	10	Types of immunity.		
	11	Antigens and antibodies:		
	12	theories of antigen-antibody reactions,.		
	13	applications of antigen-antibody reactions.		
	14	Interferons.		
	15	Vaccines and sera -		
	16	general study of the preparation of different types of vaccines,		
	17	sera and toxoids.		
	18	AIDS		
	<b>FIRST INTERNAL EXAMINATION</b>			
	No. of Session	Session Topic and Discussion Theme	Value additions	

*Unit 2: Immunity (9 Hours)*

<b>Unit V: Biological Oxidation and Metabolism (27 Hours)</b>	1	ATP and ADP.	Power point presentation	
	2	Oxidative phosphorylation.	Power point presentation	
	3	Cytochromes.		
	4	Food as a source of energy. Calorific value of food.		
	5	Basal metabolism. Respiratory quotient.		
	6	Carbohydrate metabolism: Glycogenesis		
	7	Glycolysis. Blood sugar level.		
	8	Cori cycle.	Power point presentation	
	9	The role of insulin.		
	10	The citric acid cycle. Genetic and metabolic disorders.		
	11	Diabetes mellitus (type 1 and type 2). Lipaemia.		
	12	Lipid metabolism. Oxidation of fatty acids.		
	13	Ketogenesis and ketosis.		
	14	Biosynthesis of fatty acids.		
	15	Essential fatty acids.		
	16	Prostaglandins-		
	17	nomenclature, structure.		

	18	biosynthesis		
	<b>SECOND INTERNAL EXAMINATION</b>			
	19	Metabolism of amino acids	Power point presentation	
	20	Metabolism of proteins.		
	21	Oxidative deamination		
	22	trans amination reactions.		
	23	Urea formation-		
	24	ornithine cycle		
	25	Inborn errors of metabolism		
	26	Revision		
	27	Revision		
<b>END SEM EXAMINATION</b>				
<b>Text Books</b>	<ul style="list-style-type: none"> <li>❖ 01. M.J. Pelczar Jr., E.C.S. Chan, N.R. Krieg, Microbiology, 88th Edn., Tata McGraw Hill, 1993.</li> <li>❖ 02. L. Prescott, J. Harley, D. Klein, Microbiology, 6th Edn., McGraw Hill, 2005.</li> <li>❖ 03. Lehninger Principles of Biochemistry, 5th Edn., W.H. Freeman, 2008.</li> </ul>			

**VSS**

<i>Unit III</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>		
<i>Unit III Amino acids, Proteins and Nucleic Acids (18 Hours)</i>	1	Cells-classification			
	2	Cell division.			
	3	Essential amino acids.			
	4	Primary structure of proteins			
	5	amino acid analysis.			
	7	Ramachandran plot and secondary structure of proteins			
	8	Tertiary structure and structural motifs- cloning and bioinformatics.			
	9	protein folding and domain structure of proteins.			
	<b>1<sup>st</sup> Internal Examination</b>				
	10	Quaternary structure of proteins.			
	11	Purification and characterization of proteins.	Power Point Presentation		
	12	Functions of proteins. Chemical synthesis of proteins-			
	13	protecting groups, solid phase peptide synthesis.			
	14	DNA and RNA.			
	15	Double helical structure of DNA.			
	16	Replication of DNA. RNA- classification of RNA.			
	17	Genetic code. Nucleic acids as carriers of genetic information. Protein biosynthesis.			
	18	DNA fingerprinting technique. Elementary principles of Recombinant DNA technology, gene therapy			
<b>2<sup>nd</sup> Internal Examination</b>					

<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.J. Pelczar Jr., E.C.S. Chan, N.R. Krieg, Microbiology, 88th Edn., Tata McGraw Hill, 1993.</li> <li>❖ L. Prescott, J. Harley, D. Klein, Microbiology, 6th Edn., McGraw Hill, 2005.</li> <li>❖ Lehninger Principles of Biochemistry, 5th Edn., W.H. Freeman, 2008.</li> </ul>			
<b>SD</b>				
<i>Unit IV</i>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>	
<b>Unit IV: Enzymes and Hormones (18 Hours)</b>	1	Nomenclature and classification of enzymes		
	2	Mechanism of enzyme action.		
	3	Substrate specificity of enzymes	Power Point Presentation	
	4	Enzyme inhibition.		
	5	Isoenzymes.		
	6	Allosteric enzymes.		
	7	Enzyme synthesis. Enzymes and digestion of food.		
	8	Clinical uses of enzymes..		
	9	Immobilization of enzymes		
	7	Clinical tests for sugar and cholesterol.		
	8	ELIZA.		
	9	Functions and modes of actions of hormones		
	<b>I<sup>st</sup> Internal Examination</b>			
10	Pituitary, thyroid,			
11	parathyroid, pancreatic,			

	12	adrenal hormones. Male and female sex hormones. Antihormone		
	13	adrenal hormones		
	14	adrenocortical hormones.		
	15	Male and female sex hormones		
	16	Antihormone		
	17	Revision		
	18	Revision		
	<b>2<sup>nd</sup> Internal Examination</b>			
<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.J. Pelczar Jr., E.C.S. Chan, N.R. Krieg, Microbiology, 88th Edn., Tata McGraw Hill, 1993.</li> <li>❖ L. Prescott, J. Harley, D. Klein, Microbiology, 6th Edn., McGraw Hill, 2005.</li> <li>❖ Lehninger Principles of Biochemistry, 5th Edn., W.H. Freeman, 2008.</li> </ul>			
	<b>ATG</b>			
	<b>Unit VI</b>	<b>No. of Sessions</b>	<b>Session Topic and Discussion Theme</b>	<b>Value additions</b>
	<b>Blood Composition and Acid Base Balance (9 Hours)</b>	1	Blood groups-Rh factor.	
		2	Blood transfusion.	
		3	Composition of blood cells.	Power Point Presentation
		4	Chemistry of haemoglobin.	
		5	Anaemias. Plasma proteins.	Group Discussion



		6	Blood clotting- factors and mechanism. Coagulants.		
		7	Regulation of acid base balance.		
		8	Acidosis and alkalosis.		
		9	Renal function- formation and composition of urine		
		<b>I<sup>st</sup> Internal Examination</b>			
	<i>Text Books</i>	<ul style="list-style-type: none"> <li>❖ M.B. Smith, Organic Synthesis, 3rd Edn., Wavefunction Inc., 2010.</li> <li>❖ F.A. Carey, R. I. Sundberg, Advanced Organic Chemistry, Part A and B, 5th Edn., Springer, 2007.</li> <li>❖ W. Carruthers, I. Coldham, Modern Methods of Organic Synthesis, 4th Edn., Cambridge University Press, 2004.</li> <li>❖ J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, Oxford University Press, 2001.</li> <li>❖ R. Noyori, Asymmetric Catalysis in Organic Synthesis, John Wiley &amp; Sons, 1994.</li> </ul>			

Programme: **M.Sc Applied Chemistry – 2014-15**

Semester: Semester 4 Course: **CH4T14**

**ADVANCES IN PHARMACEUTICAL OPERATIONS**

**Course Objectives**

To enable the students

C1 - To learn in detail Pharmaceutical Dosage forms and Drug delivery Systems.

C2- To have a thorough idea on formulation and development of drugs

C3 -To have basic idea about diagnostic techniques and chromatographic techniques

C4- To get basic idea about IPR

Session	Topic/Module	Hour	Teacher/invited persons etc.	Method of teaching *
Session 1	<b>Unit 1 Pharmacognosy</b> Pharmacognosy of the official drugs frequently used in pharmacy: their sources and constituents.	27 Hrs	Dr Jinu George	Lecture & Power point
Session 2	senna, belladonna,			
Session 3	digitalis, stramonium,			
Session 4	vasaka, cinnamon,			
Session 5	cinchona, ergot,			
Session 6	cannabis, ipecacuanha,			

Session 7	rauwolfia, liquorice,			
Session 8	ginger, cloves			
Session 9	pyrethrum, santonica,			
Session 10	nutmeg, nuxvomica,			
Session 11	cardamom, umbelliferous fruits like Cumin,			
Session 12	Fennel,			
Session 13	Caraway, Opium			
Session 14	Aloes, Asafoetida,			
Session 15	Vinca rosea, Brammi ( two varieties).			
Session 16	Fixed oils used in pharmacy-their sources. Essential oil used in pharmacy-their sources.			
Session 17	Extraction & Composition of fixed oils			
Session 18	Analysis & Constituents of fixed oils			
Session 19				

Session 20	Elementary study of adulteration of fixed oils.			
Session 21	Fixed Oils: Castor oil, Olive oil, Shark liver oil.			
Session 22	Essential Oils: Eucalyptus oil, Turpentine oil. 1.5 Shark liver oil			
Session 23	A brief study of the substances used as pharmaceutical necessities			
Session 24	Starches, Gum Acacia,			
Session 25	Gum Tragacanth,			
Session 26	Agar Agar, Gelatin, Talc,			
Session 27	Kaolin. Bentonite.			
	<b>Unit 2 Dispensing</b>			
Session 1	Principles of dispensing medicaments.			
Session 2	Incompatibilities and its overcoming.	9 Hrs	Dr . Jinu George	Lecture

Session 3	Preparation of pills, tablets, capsules.			
Session 4	Preparation of injectables, suppositories,			
Session 5	Coating of tablets.			
Session 6	Newer Drug Delivery systems-			
Session 7	Site specific drug delivery systems in cancer chemotherapy to brain and CNS,			
Session 8	Site specific drug delivery systems in cancer chemotherapy to GIT, to kidney and urinary tract.			
Session 9	Implanted mechanical pumps.			
	<b>Unit 3 Forensic Pharmacy</b>			
Session 1	Pharmaceutical Legislation in India.	18 Hrs	Dr Grace Thomas	Lecture
Session 2	Legal aspects of trade in drugs.			
Session 3	The drug Act and Drug rules.			

Session 4	The drug Act and Drug rules.			
Session 5	The drug Act and Drug rules.			
Session 6	The Pharmacy Act.			
Session 7	The Pharmacy Act.			
Session 8	The Pharmacy Act.			
Session 9	The dangerous Drug Act and Rules.			
Session 10	The Drugs and Cosmetic Act and rules			
Session 11	The Drugs and Cosmetic Act and rules			
Session 12	The Drugs and Cosmetic Act and rules			
Session 13	Introduction to Pharmacopeia B.P, I.P			
Session 14	general standard analysis,			
Session 15	Intellectual Property Rights (IPR)			
Session 16	Patents,			
Session 17	Trademarks, Copy rights,			
Session 18	Patent Act			

	<b>Unit 4 Pharmaceutical Operations</b>			
Session 1	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP	18 Hrs	Dr. Joseph John	Lecture
Session 2	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP of evaporation,			
Session 3	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP extraction			
Session 4	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP extraction			
Session 5	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP crystallization,			
Session 6	Principles involved, apparatus and machinery used in general pharmaceutical operations of IP/BP distillation.			
Session 7	Chromatographic techniques: theory of chromatography,			
Session 8	Applications of adsorption, partition, chromatographic methods.			

Session 9	Thin layer and column chromatographic methods.			
Session 10	LC, HPLC,			
Session 11	GC and GPC.			
Session 12	Column matrices.			
Session 13	Detectors.			
Session 14	Affinity and chiral columns.			
Session 15	Electrophoresis - general ideas			
Session 16	Solvent extraction,			
Session 17 Session 18	Liquid – liquid extraction, use of oxine. Ultra centrifugation dithiazone - in extraction.			

SI No	Topic/Module	Hour/ session	Teacher/inv ited persons etc.	Method of teaching *	Remarks: Books, reference etc



	<b>Unit 5 Diagnostic Agents and Tests</b>				C3 &C4
Session 1	Radiopaques	18 Hrs	Dr. Grace Thomas	Lecture	
Session 2	Organo iodo compounds.				
Session 3	Compounds used in function tests,				
Session 4	Dyes				
Session 5	Radio isotopes,				
Session 6	RIA, ELISA.				
Session 7	Dyes used in pharmacy:  Fluorescein, mercurochrome,				
Session 8	Acridine dyes.				
Session 9	Colouring agents: official colours,				
Session 10	colour code.				
Session 11	Liver and gastric function tests				
Session 12	Liver and gastric function tests				
Session 13	Liver and gastric function tests				

Session 14	Liver and gastric function tests				
Session 15	kidney function tests.				
Session 16	Kidney function tests.				
Session 17	Kidney function tests.				
Session 18	Kidney function tests				

## References

01. G. Patrick, Medicinal Chemistry, BIOS. 2001.
02. T. Nogrady, D.F. Weaver, Medicinal Chemistry, Oxford University Press, 2005.
03. W.O. Foye, T.L. Lemke, D.A. Williams, Principles of Medicinal Chemistry, 4<sup>th</sup>Edn., Williams & Wilkins, 1995.
04. J.P. Remington, Remington's Pharmaceutical Sciences, Vol.13, , 19<sup>th</sup> Edn., Mack,1990.
05. D. Sriram , P. Yogeswari, Medicinal Chemistry, Pearson Education India, 2010.
06. K. D. Tripathi, Essentials of Medical Pharmacology, 6<sup>th</sup> Edn.,Jaypee, 2008
07. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics, 10<sup>th</sup>Edn., McGraw Hill, 2001.
08. S.S. Kadam, Principles of Medicinal Chemistry, Vol.I& II, Pragati Books, 2008.
09. A. Kar, Medicinal Chemistry, New Age International, 2007.
10. C.O. Wilson, J.M. Beale, J.H. Block, Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12<sup>th</sup> Edn., Lippincott Williams and Wilkins, 2010

Programme: **M Sc Pharmaceutical Chemistry**

Semester: IV

Course: **CH4T15 - Medicinal Chemistry**

Term – I (Before I Internal tests) – 30 % of the syllabus					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	Unit 1: Drugs acting on ANS 1.1, 1.2, 1.3	6 hrs	Dr Jorphin Joseph	Lecture ICT enabled	1. G.L. Patrick, Medicinal Chemistry, BIOS, 2001 2. D. Sriram, P.Yogeswari, Medicinal Chemistry 3. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics
2	Unit 2: Drugs acting on CVS 2.1, 2.2, 2.3, 2.5	6 hrs	Dr. Grace Thomas	Lecture ICT enabled	
3	Unit 3: Chemotherapy 3.1, 3.2	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4	Unit 4: Antineoplastic Drugs 4.1	6 hrs	Senju Devassykutty	Lecture	
5	Unit 6: Miscellaneous class of compounds 6.1, 6.2	6 hrs	June Cyriac	Lecture ICT enabled	

\*ICT enabled, Lecture method (conventional)

Term – II – 40 % of the syllabus ( before the second Internal tests)					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	Unit 1: Drugs acting on ANS 1.4, 1.5, 1.6	6 hrs	Dr. Jorphin Joseph	Lecture ICT enabled	1. J.P. Remington, Remington's Pharmaceutical Sciences 2. G.L. Patrick, Medicinal
2	Unit 2: Drugs acting on CVS 2.6, 2.7 Unit 3: Chemotherapy 3.6 – Antiprotozoal and	6 hrs	Dr. Grace Thomas	Lecture ICT enabled	

	anti malarial agents				Chemistry, BIOS, 2001 3. A. Kar, Medicinal Chemistry 4. S.S. Kadam, Principles of Medicinal Chemistry
3	Unit 3: Chemotherapy 3.3, 3.4	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4	Unit 4: Antineoplastic Drugs 4.2 Unit 5: Psychopharmacological Agents 5.1, 5.2	6 hrs	Senju Devassykutty	Lecture	
5	Unit 6: Miscellaneous class of compounds 6-3, 6.4, 6.5	6 hrs	June Cyriac	Lecture ICT enabled	

	Term – III – 30 % of the syllabus (before the model examination)				
Sl No	Topic/Module	Hour/ session	Teacher/invite d persons etc.	Method of teaching *	Remarks: Books, reference etc
1	Unit 1: Drugs acting on ANS 1.7, 1.8, 1.9	6 hrs	Dr Jorphin Joseph	Lecture ICT enabled	1. C.O. Wilson, J.M. Beale, J. Block, Textbook of Organic Medicinal and Pharmaceutical Chemistry 2. G.L. Patrick, Medicinal Chemistry, BIOS, 2001 3. W.O. Foye, T.L. Lemke, D.A. Williams, Principles of Medicinal Chemistry
2	Unit 3: Chemotherapy 3.6 - Remaining	6 hrs	Dr. Grace Thomas	Lecture ICT enabled	
3	Unit 3: Chemotherapy 3.5	6 hrs	Midhun Dominic C D	Lecture ICT enabled	
4	Unit 5: Psychopharmacological Agents 5.3, 5.4, 5.5	6 hrs	Senju Devassykutty	Lecture	
5	Unit 6: Miscellaneous class of compounds 6.6, 6.7	6 hrs	June Cyriac	Lecture ICT enabled	