

Punjab Technical University

Scheme and Syllabus of M.Sc. Pharmaceutical Chemistry

1st Semester

Sr. No.	Subject Code	Subject	Load Distribution			Marks Distribution		
			L	T	P	Internal	External	Total
1.	MSPC-101	Advanced Organic Chemistry including Heterocyclic Chemistry	4	-	-	20	80	100
2.	MSPC-103	Analytical Techniques-I	4	-	-	20	80	100
3.	MSPC-105	Spectral Analytical Technique	4	-	-	20	80	100
4.	MSPC-107	Organic and Analytical Laboratory	-	-	8x2	20	80	100
							Total	400

2nd Semester

Sr. No.	Subject Code	Subject	Load Distribution			Marks Distribution		
			L	T	P	Internal	External	Total
1.	MSPC-102	Biochemistry	4	-	-	20	80	100
2.	MSPC-104	Chemistry of Natural Products	4	-	-	20	80	100
3.	MSPC-106	Chemistry of Drugs-I	4	-	-	20	80	100
4.	MSPC-108	Chemistry of Natural Products-Lab	-	-	8x2	20	80	100
							Total	400

3rd Semester

Sr. No.	Subject Code	Subject	Load Distribution		Marks Distribution		
			L	P	Internal	External	Total Marks
1.	MSPC-201	Chemistry of Drugs II	4	-	20	80	100
2.	MSPC-203	Chemistry of Drugs III	4	-	20	80	100
3.	MSPC-205	Drug Design and Development	4	-	20	80	100
4.	MSPC-207	Drug Synthesis Lab		16	20	80	100
Total			28Hrs.		80	320	400

4th Semester

- **Project Work**
- **Max. Marks: 400**
(Thesis : 200 and Viva-voce and Presentation: 200)

First Semester

MSPC-101 Advanced Organic Chemistry including Heterocyclic Chemistry

- 1) Stereoisomerism: Optical isomerism, Chirality & compounds showing optical activity.
- 2) Configuration, assignment and determination of configuration (D,L & R,S).
- 3) Conformations of acyclic and cyclic systems
- 4) Prostereoisomerism, topicity, homotopicity, diastereotopicity, enantiotopicity, Stereoselective and stereospecific reactions.
- 5) Organic reactions and mechanism: Substitution reactions; bimolecular and unimolecular, aromatic electrophilic and nucleophilic substitutions.
- 6) Elimination reactions; bi and unimolecular eliminations, 1,2-elimination, synelimination, 1,3- elimination reactions.
- 7) Addition reactions; nucleophilic addition to carbonyl group, addition involving bridged intermediated.
- 8) Pericyclic reactions (2+2, 4+2), Electrocyclic and sigmatropic rearrangements (1,3;1,5).
- 9) Selective Name Reactions: Aldol, Perkin, Deckmann condensation, Cannizaro, Hoffman, Schmidt, Curtius, reamer tiemann, Reformatsky & Grignard reactions.
- 10) Friedel craft, Oppenauer oxidation, Michael addition, sharpless asymmetric epoxidation
- 11) Beckmann rearrangement, Claisen rearrangements, benzylic acid rearrangements, Bayer-Villiger reaction
- 12) Heterocyclic compounds: Heterocyclic ring systems with one hetero atom: structure, synthesis and reactions of aziridine, oxirane, thiranes, pyrrole, furan, thiophene, lactam and pyridine.
- 13) Heterocyclic ring systems with two & three heteroatoms: structure, synthesis and reactions of imodazole, oxazole, thiazole, pyrazole, pyrimidine, pyrazine & triazole

Books Recommended

1. **I.L. Finar**: Organic Chemistry, Vol. II, 1st edn., Pearson Education Pvt. Ltd., Delhi.
2. **DC Gautam**, Heterocyclic Chemistry, RBSA publisher, Jaipur.
3. **PS Kalsi**, Stereochemistry Conformation and Mechanism, 6th edn, New Age pub.

First Semester

MSPC-103 Analytical Techniques – I

- 1). Computation of analytical result, significant figures, concept of error, precision and accuracy.
- 2). Standard deviation, rejection of doubtful values with reference to volumetric and gravimetric analysis.
- 3). Calibration of analytical equipments
- 4). **Fundamentals of Volumetric Analysis:** Solubility product, effect of temperature, pH and solvent on solubility of precipitates.
- 5). Common ion effect, Buffers, Hydrolysis of salts, Methods of expressing concentrations, primary and secondary standards.
- 6). **Neutralization Reactions:** Theory of indicators and neutralization indicators, Selection of indicators.
- 7) **Oxidation – Reduction titrations:** Principles of oxidation reduction titrations, Redox indicators, Iodimetric and Iodometric titration.
- 8) **Precipitation Titration :** Theory of Precipitation titrations, Methods of determining end point.
- 9) **Gravimetric Analysis:** Methods of gravimetric analysis, co – precipitation, post-precipitation, digestion, thermogravimetry.
- 10) **Complexometric Titration:** Principles of complexometric titration, chelating Agents, Complexometric methods using EDTA, indicators and titrations with disodium edetate.
- 11) **Nonaqueous Titration:** General discussion and principles of titrations in non – aqueous medium, aprotic, protogenic and amphiprotic solvents, titration with perchloric acid and sodium methoxide
- 12) **Chromatography Analysis:** Classification of Chromatographic processes, Basic principles and theory of Adsorption Chromatography, Partition Chromatography, TLC, Paper Chromatography,
- 13) HPLC, Gas Chromatography and ion - exchange chromatography, General Instrumentation and Pharmaceutical application

Books Recommended

1. Vogel's Text book of Quantitative Chemical Analysis
2. Pharmaceutical Analysis by P.C. Kamboj

First Semester

MSPC-105 Spectral Analytical Techniques

1) Ultraviolet and Visible Absorption Spectroscopy:

Introduction, fundamental laws of photometry (Lamberts Beer's Law), Radiation Sources (Hydrogen/Deuterium Lamp, tungsten filament lamp, xenon lamp) monochromatic, prism (corn, Littrow), resolution of prisms, Detectors (Photovoltaic cell, phototubes, photo multiplier tubes, silicon photo diodes) Filters (glass and absorption) single and double beam spectrophotometer & sample handling. Factors affecting Hmax, Woodward-Fieser rules, Fieser-Kuhn rule & Nielson rule, pharmaceutical application of UV spectroscopy.

2) Infrared spectroscopy:

Introduction, requirements of molecule to absorb in IR. Calculations of fundamental frequency. Molecular vibrations, radiation sources (incandescent wire source, Nernst glower, Globar, Mercury arc and carbon dioxide laser); Detectors (Thermal/thermocouple, bolometer, pyroelectric, Golay pneumatic and photon detector). Dispersive and nondispersive spectrophotometer (schematic optics of double beam spectrophotometer). Vibrational frequency, factors affecting vibrational frequency, pharmaceutical applications.

3) Mass spectrometry:

Introduction, components of mass spectrometer ionization sources-electron impact ionization, field ionization, chemical ionization. ESI, APCI, Nitrogen rule, Determination of molecular formula, mass fragmentation of compounds belonging to different functional groups, and heterocyclic compounds. Hyphenation with G.C. L.C., Pharmaceutical applications.

4) NMR spectroscopy:

Introduction, principle, quantum description, classical relaxation process, chemical shift, spin-spin splitting, continuous wave NMR spectrometer, introduction to ¹³C NMR spectroscopy. Factors affecting chemical shift, coupling constant, factors affecting coupling constant, ¹³C Heteronuclear coupling, Non-first order spectra, methods to resolve non-first order spectra, NOE, Introduction to COSY, HOMO-COR, HETCOR, TOCSY, NOESY and Hyphenation with L.C. Pharmaceutical applications.

Books Recommended

1. **Robert M. Silverstein**; Spectrometric identification of organic compounds; 6th edition John Wiley & sons, Inc, 2005.
2. **Jag Mohan**; Organic spectroscopy principles & applications 2nd edn, Narosa publishing houses, 2004.
3. **P.S. Kalsi**; Spectroscopy of organic compounds; 5th Edn, New age international Publishers 2004.
4. **William Kemp**; Organic Spectroscopy, 3rd edition, Palgrave, 2004
5. **Donald L. Pavia**; Garry M. Lampman; George S. Kriz: Introduction to spectroscopy, 3rd edition, Harcourt college Publishers, 2004.

First Semester

MSPC-107 Organic and Analytical Laboratory (Practical)

1. Practical involving identification of organic compounds in a mixture: Separation of individual components, their characterization and submission of one derivative each.
2. Synthesis of organic compounds involving minimum two steps; purification and analytical profile to be submitted for each synthesized compound.
3. Stereomodel-use workshop.

Second Semester

MSPC-102 Biochemistry (Theory)

- 1). Biological properties of water, pH, ionization, biological buffers, titration of amino acids, proteins and their three dimensional structure, weak and strong interactions
- 2). Basic structure of Carbohydrates (Monosaccharides, Disaccharides & Polysaccharides)
- 3). **Structures and functions of nucleic acids:** Purines, Pyrimidines, Nucleosides, Nucleotides, Internucleotide bonding, Tautomerism.
- 4). **Structures and functions of lipids:** Neutral lipids, Phospholipids, Isoprenoids, Phosphatidylinositol, Biological effectors
- 5). **Vitamins:** water soluble and fat soluble. Hormones, their structure and functions
- 6). **Enzymes:** General properties of enzymes and co-enzymes, their nature, classification and nomenclature of enzymes, fundamentals of steady state kinetics, enzyme inhibition, isozymes.
- 7). **Biological Membrane and Cell Wall:** Properties of lipid aggregates, Micelles, Liposomes, Structure and properties, Membrane proteins and their functions, Fluid Mosaic Model, Membrane Mediated Transport, Membrane Equilibrium and Permeability, Chemical and Physical Composition and Biosynthesis of Cell Wall components
- 8). **Carbohydrate metabolism:** Glycolysis, biochemistry of alcoholic and lactic acid fermentation, Citric acid cycle & its regulation.
- 9) EDP pathway, Disaccharide and Polysaccharide Metabolism, Gluconeogenesis, regulation of carbohydrate metabolism
- 10) Electron Transport Chain
- 11) Mechanism of Oxidative Phosphorylation energetics of oxidative Phosphorylation energy yield by oxidative phosphorylation
- 12) **Biochemistry of Lipid Metabolism:** Biosynthesis and catabolism of fatty acids, neutral lipids, phospholipids and cholesterol, glyoxylate cycle, regulation of fatty acid metabolism
- 13) **Biosynthesis of Amino acids** (conversion of nitrogen to ammonia, conversion of ammonia into amino acids by way of glutamic and glutamine, conversion of citric acid intermediates to amino acids, and feedback regulation of amino acid biosynthesis)
- 14) Urea cycle, nitrogen fixation and nitrogenase complex
- 15) **Nucleotide metabolism:** Biosynthesis and catabolism of nucleotides, regulation of Nucleotide Metabolism

Books Recommended

1. **Lehninger A. L, Nelson D.L & Cox M.M.** (1993) Principles of Biochemistry
2. Instant notes in biochemistry by **Hames & Hooper**
3. **Harpers** illustrated biochemistry

Second Semester

MSPC-104 Chemistry of Natural Products (Theory)

- 1) General methods for Isolation, Purification, Identification & Standardization of Natural Products.
 - a). **Carbohydrates:** Introduction, stereoisomerism, mutarotation, configuration & ring structure of monosaccharides (glucose), Structure elucidation of disaccharides (Sucrose, lactose) & polysaccharides (starch).
 - b). **Alkaloids:** General introduction, Classification, Isolation, and Purification. Structure elucidation of atropine, quinine, cinchonine and morphine.
 - c). **Terpenoids:** General introduction, Isolation, Purification, Structure elucidation of Citral, Menthol & Camphor.
 - d). **Steroids:** General introduction, isolation, purification & structure elucidation of sterols with special reference to cholesterol.
 - e) **Glycosides:** Introduction, Classification, General structure elucidation of Anthraquinone & Cardioglycoside.
 - f) Flavonoids and Coremarious

Books Recommended

1. **I.L. Finnar:** Organic Chemistry, Vol II, 1st Indian edn, Pearson Education Pvt. Ltd. Indian Branch, Delhi. 2002 (latest edition).
2. **O.P. Agarwal:** Chemistry of Natural Products, Vol. I and II, 7th edn, Goel Publishing House, Meerut, 1983.

Second Semester

MSPC-106 Chemistry of Drugs - I (Theory)

- 1) Introduction to Pharmaceuticals, Historical development, Classification drugs, Nomenclature of Pharmaceuticals & Drug metabolism reactions.
- 2) Structure, stereochemistry, nomenclature, mode of action, specific clinical applications and structure activity relationships, biosynthesis of naturally occurring compounds and synthesis of prototypical drugs in each category.
(Chemical & Pharmacological) for the following classes of drugs.
- 3) **Hormones:** Sex hormones and related compounds (Estrogens, Androgens, Progestational agents, Anabolic steroids, Contraceptives), Adrenal cortex hormones, Thyroid hormones and antithyroid drugs, pancreatic hormones, Hypothalamus hormones.
- 4) **Vitamins:** Fat soluble vitamins (A,D,E and K), water soluble vitamins (Folic acid, B12 and C).
- 5) Adrenergic and cholinergic drugs (Agonist & antagonists):
- 6) **Cholinergic agents:** Autonomic blocking and related drugs. Antispasmodic and antiulcer drugs. Antiparkinsonism drugs.
- 7) Structure, stereochemistry, nomenclature, mode of action, specific clinical applications and structure activity relationships, biosynthesis of naturally occurring compounds and synthesis of prototypical drugs in each category
(Chemical & Pharmacological) for the following classes of drugs.
- 8) **Cardiovascular drugs:** Vasodilators, Antihypertensive agents, Antihypercholesterolemic drugs, Antiarrhythmic drugs, Sclerosing agents, Coagulants and anticoagulants, Cardiotonic compounds, Cardiac glycosides & inotropic agents Synthetic hypoglycemic agents.
- 9) **Diuretics:** Osmotic agents, Acidifying salts, Mercurials, Purines and related heterocycles, Sulfonamides, Benzothiadiazene and related compounds, Chlorothiazides and analogs.
- 10). Stereochemistry, nomenclature, mode of action, specific clinical applications, structure activity relationships, biosynthesis of naturally occurring compounds and synthesis of prototypical drugs in each category (Chemical & Pharmacological) for the following classes of drugs.
- 11). **General Anaesthetics:** Theories of General Anaesthetics, Ethers, Halogenated hydrocarbons, Cyclopropane, Nitrous oxide, Barbiturates, Adjuvants to general anaesthetics, metabolism of volatile anaesthetics.
- 12). **Local Anaesthetics:** Cocoa alkaloids – Cocaine and Synthetic compounds,

Esters, Amides, Miscellaneous anaesthetics.

- 13). **CNS Active Drugs: CNS Depressants:** Hypnotics and sedatives: Barbiturates, Non barbiturates, Amides and Imides, Bezodiazepines, Aldehydes and derivatives, Methaqualone and other miscellaneous agents. Anticonvulsants Barbiturates, hydantoins, oxazolidinediones, succinmides, benzodiazepines, Thenacemide, Glutethimide

Books Recommended:

1. Wilson and Gisvolds Textbook of Organic Medicinal and Pharmaceuticals Chemistry, 8th edition, edited by R.F. Doerge, J.B. Lippincott Company, Philadelphia, 1982.
2. Pharmaceutical Chemicals in Perspective, B.G. Reuben and H.A. Wittcoff, John Wiley & Sons, New York, 1989.
3. W.C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia, U.S.A.
4. H. Singh and V. K. Kapoor, Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, New Delhi 2005 (Latest edition)

Second Semester

MSPC-108 Chemistry of natural products (Practical)

1). Extraction and analysis of the following natural products:

- a. Eugenol and cinnamon leaf oil or cloves
- b. Piperine from black pepper
- c. Curcumin from turmeric
- d. Pectin from orange peels
- e. Carotene from carrots
- f. Alkaloid from cinchona bark

2) Chromatography Techniques

Third Semester

MSPC-201 CHEMISTRY OF DRUGS -II

Structure, stereochemistry (wherever involved), nomenclature, mode of action, specific clinical applications and structure activity relationships, and synthesis of prototypical drugs in each category (Chemical & Pharmacological) for the following classes of drugs.

- 01. Antibacterials:** Penicillines, Cephalosporins, Tetracyclines, Aminoglycosides, Chloramphenicol, Macrolides, Lincomycins, Polypeptide antibiotics, Polyene antibiotics. Sulfonamides and Sulfones, fluoroquinolones, Trimethoprim and other unclassified antibiotics.
- 02. Antimycobacterials:** Sulfanilamides, p-Aminosalicylic acid derivatives, Thioamides, Thiourea derivatives, Thiosemicarbazones, Isoniazid, Kanamycin sulfate, Capreomycin, Rifampin, Pyrazinamide, Anthionamide, Clofazimine, Cyclosporin, Dapsone, Sulfazem. & Antileprotic agents.
- 03. Anthelmintics:** Introduction. Tetrachloroethylene, Piperazines, Gentian violet, Pyrantel pamoate, Thiabendazole, Mabendazole, baphenium hydroxynaphthoate, Dichlophene, Niclosamide, levamisole hydrochloride, Tetramisole, Niridazole, Biothional, Antimonypotassium tartarate, Stibiophen, Sodium Stibocaptate.
- 04. Antiamoebic and antiprotozoal drugs:** Emetine hydrochloride, 8-Hydroxyquinoline, Iodochlorohydroxyquinol, Metronidazole, Diloxanide furoate, Bilamical hydrochloride, Hydroxystilbamidine isothinate, Pentamidine isothionate, Nifurtimox, Suramin sodium, Carbarsone, Glycobiarsol, Melarsoprol, Sodium stibogluconate, Dimercaprol, Diethylcarbamazine citrate, Centarsona, Acetarsona, Antimony potassium tartarate, Bismuth sodium thioglycollate, Sulphonamide, Stibiophen, Bismuth sodium thioglycollamate, Furazolidone.

Books Recommended:

1. Wilson and Gisvolds Textbook of Organic Medicinal and Pharmaceuticals Chemistry, 8th edition, edited by R.F. Deorge, J.B. Lippincott Company, Philadelphia, 1982.
2. Singh H. and Kapoor, V.K., Medicinal and Pharmaceutical Chemistry, (Latest edition 2010) Vallabh Prakashan, New Delhi
3. Pharmaceutical Chemicals in Perspective. B.G. reuben and H.A. Wittcoff, John Wiley & Sons, New York, 1989.
4. W.C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia, U.S.A.

Suggested Readings:

1. Strategies of Organic Drug Synthesis and Design, D. Lendnicer, John Wiley and Sons, New York. 1998.

Third Semester

MSPC-203 CHEMISTRY OF DRUGS –III

Structure, stereochemistry (wherever involved), nomenclature, mode of action, specific clinical applications and structure activity relationships, biosynthesis of naturally occurring compounds and synthesis of prototypical drugs in each category (Chemical & Pharmacological) for the following classes of drugs.

- 01. Antiviral agents:** Introduction, Screening methodology, Admantane derivatives (Amantadine, Rimantadine), Idozuridine, Trifluridine, Vidarabine, Ribavarain, Acycloguanosine, Inospiplex, Methisazone, Zidovudine, Acyclovir, Ganciclovir, Foscarnet, Human interferon.
- 02. Antineoplastic agents:** Alkylating agents (Nitrogen mustards, Aziridines, Sulfonic acid Esters, Epoxides, Nitrosoureas, Triazines, Phosphamides, Mitomycin, comparative activity of alkylating agents). *Antimetabolites:* Antifolates (Methotrexate), Mercaptopurine, Thioguanine, fluorouracil, Floxuridine, Cytarabine, Azathioprine, antitumor, antibiotics, Dactinomycin, Daunorubicin, Aclacinomycin, Mithramycin, Bleomycin, *Miscellaneous compounds:* Cisplatin, Taxol, Gunazole, Pipobromin, *Antitumor alkaloids:* Vincristine, vinblastin. *Hormones agonist and antagonists:* Steroids, Tamoxifen, Mitotane, Dromastanolone propionate, Testalactone, Megastrol acetate Immunotherapy.
- 03. Antimalarials:** Cinchona alkaloids, 4-Aminoquinolines, 8-Aminoquinolines, 9-Aminoacridines, Biguanides, Pyrimidines. Sulfones, Mefloquine and Sulfonamides.
- 04. Antifungal drugs:** Fatty acids and their derivatives (Propionic acid, zinc propionate, sodium caprylate, zinc caprylate, undecylenic acid, Zinc undecylenate, Triacetin) . Salicylanilids, Salicyclic acid, Tolnaftate, p-chloromethoxylenol, Acrisocrin, Fluconazole, Itraconazole, Haloprogin, Clotrimazole, Econazole, Miconazole, Ketoconazole, Flucytosine, Griseofulvin, Polyene antibiotics (Nystatin, Amphoetericin-B), Chlorophenesin, Dithranol.
- 05. Diagnostic Agents and Organic Pharmaceutical Aids:** *Diagnostic agents:* Introduction, Radiopharmaceuticals, Pharmacopoeial examples of therapeutic & diagnostic agents. Precaution & safety measures for handling & disposing.

Books Recommended:

1. Wilson and Gisvolds Textbook of Organic Medicinal and Pharmaceuticals Chemistry, 8th Edition, edited by R.F. Deorge, J.B. Lippincott Company, Philadelphia, 1982.
2. Singh H. and Kapoor, V.K., Medicinal and Pharmaceutical Chemistry, (Latest ed. 2010) Vallabh Prakashan, New Delhi
3. Pharmaceutical Chemicals in Perspective. B.G. reuben and H.A. Wittcoff, John Wiley & Sons, New York, 1989.
4. W.C. Foye, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia, U.S.A.

Suggested Readings:

1. Strategies of Organic Drug Synthesis and Design, D. Lendnicer, John Wiley and Sons, New York. 1998

Third Semester

MSPC-205 DRUG DESIGN AND DRUG DEVELOPMENT

1. **Introduction to Drug Design & Drug Development:** Definition, History (Chronological Evolution), Drug design approaches, Lead optimization, de Novo drug design.

Quantum Mechanics: Introduction to quantum mechanics, postulates of quantum mechanics, Schrodinger equation, Perturbation theories of drug action, Pullman's dispositive bond theory, Role of charge transfer process in drug action, conformational aspects & molecular orbital calculations, molecular orbital approach to drug design with examples.

2. **Drug Receptor Interactions:** Historical background, Receptor theories, Forces involved in drug receptor interactions; covalent & non-covalent interactions; Agonist & Antagonists.

QSAR Analysis: Parameters & Biological data for QSAR, Design of Test series in QSAR: Craig plot, Topliss operational scheme, cluster analysis. Quantitative models: Hansch (Extrathermodynamic), Free Wilson (Additivity model), Mixed approach.

Statistical method for QSAR: Regression analysis, multiple regression, stepwise multiple regression, Partial least square analysis. Validation of QSAR models.

3. **Computer Aided Drug Designing:** Computer requirement hardware, software, Data base and information retrieval techniques. Graphical description of chemical structure. Molecular interactions and interactive graphics. Introduction of molecular mechanics, molecular dynamics & quantum mechanics (semiempirical & *ab initio* methods). Modelling in medicinal chemistry-uses and limitations. Logico structural approaches. Activity feature selection within a group of compounds, Activity profile selection.
4. **Pharmacokinetics in Drug designing:** Pharmacokinetics, Environmental pharmacokinetics. Single and two compartment pharmacokinetics. Pharmacokinetics of drug metabolism. Dissection of a drug molecule in to biofunctional moieties. Modulation of pharmacokinetics by molecular manipulations, Modulation of distribution of pharmaceas over various compartments, Modulation of time-concentration relationship. Lipinski Rule, QSPR, Biopharmaceutics. Generic equivalence and non-equivalence. Role of biopharmaceutics in Drug designing.
5. **Peptidomimetics:** Peptidomimetics research, Rational design of Peptidomimetics, nonpeptide, Ligands for peptide receptors, Applications of oligonucleotides in antiviral and antitumoral chemotherapy. Antisense nucleotides designing. Carbohydrate based Therapeutics.
6. **Prodrug Approach:** Basic concept, Common prodrugs. Reversal of prodrugs-chemical and enzymatic. Application of prodrug approach to alter taste and odour, reduction of pain at injection site, reduction of gastrointestinal irritability. Alteration of drug solubility, increasing chemical stability. Prevention of presystemic metabolism. Prolongation of drug action, Site specific drug delivery. Reduction in drug toxicity

Books Recommended:

1. The Organic Chemistry of Drug Design and Drug Action. by R.B. Silverman, Academic Press, 1992.
2. Drug Designs- A series of monographs in medicinal chemistry edited by A.J. Ariens. 1st edition. Vol. I, II, V, VIII & IX (only relevant chapters).
3. Comprehensive medicinal chemistry. Pergamon Press. 1990, Vol.4.
4. Burger's Medicinal Chemistry & Drug Discovery . Fifth edition vol-.I, Willey Interscience.

Third Semester

MSPC-207 DRUG SYNTHESIS LAB

Preparation of organic drugs involving more than two steps synthesis and obtaining their UV (If Chromospheres is present) IR, H-NMR spectra and their interpretation. The following compounds will be covered for synthesis.

- Acetanilide
- Barbituric acid
- Hippuric acid
- Diketoperazine
- Paracetamol
- 2-amino-5-bromopyridine
- Nitrazepam
- Sulfanilamide
- Sulfathiazole
- Diphenhydantoin
- Phenylbutazone
- Nifedipine
- Alcofenac
- Baclofen
- Brimindiene
- Tolmetin
- Procarbazine
- Ketoprofen
- Amphetamine
- Tetrahydroisoquinoline

Note: Any other experiment (s) may be included in support of the theoretical aspect of course.

Fourth Semester

M.Sc. Pharmaceutical Chemistry

Project Work

Max. Marks: 400

Thesis : 200

Viva-voce and Presentation: 200

- The research work on an allotted research project based on the related discipline completed by the candidate on the stipulated time (6 months).
- Two hard bound copy to be submitted by the candidate in the Institute.
- The thesis evaluated by external examiner appointed/approved by the University.
- The final marks allotted by the external examiners and supervisors after completion of viva-voce and presentation.