

# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

Modern Pharmaceutical Analytical Techniques (MPL101T)

Type of Course: M.PHARM 2017-18

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/ Week	T Hrs/ Week	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
4	-	-	4	75	-	25	-	-	100

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	<p><b>Spectroscopy:</b></p> <p>a. UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy.</p> <p>b. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy</p> <p>c. Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of Fluorescence spectrophotometer.</p> <p>d. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences And Applications.</p>	%	10
2	<p><b>NMR spectroscopy:</b></p> <p>Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and <sup>13</sup>C NMR. Applications of NMR spectroscopy.</p>	%	10

3	<p><b>Mass Spectroscopy:</b></p> <p>Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, Hrs chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy</p>	%	10
4	<p><b>Chromatography:</b></p> <p>Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following:</p> <p>Paper chromatography</p> <p>Thin Layer chromatography</p> <p>Ion exchange chromatography</p> <p>Column chromatography</p> <p>Gas chromatography</p> <p>High Performance Liquid chromatography Affinity chromatography</p>	%	10
5	<p><b>Electrophoresis:</b></p> <p>a. Electrophoresis:</p> <p>Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following:</p> <p>a) Paper electrophoresis</p> <p>b) Gel electrophoresis</p> <p>c) Capillary electrophoresis</p> <p>d) Zone electrophoresis</p> <p>e) Moving boundary electrophoresis</p> <p>f) Iso electric focusing</p> <p>b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.</p>	%	10

6	<p><b>Potentiometry:</b></p> <p>Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.</p>	%	10
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**\*Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

Advanced Pharmacology - I (MPL102T)

**Type of Course:** M.PHARM 2017-18

**Prerequisite:** The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved

**Rationale:** Upon completion of the course the student shall be able to :  
 • Discuss the pathophysiology and pharmacotherapy of certain diseases  
 • Explain the mechanism of drug actions at cellular and molecular level  
 • Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

**Teaching and Examination Scheme:**

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/ Week	T Hrs/ Week	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
4	-	-	4	75	-	-	-	-	100

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

**Contents:**

Sr.	Topic	Weightage	Teaching Hrs.
1	<b>General Pharmacology:</b> <b>a.)Pharmacokinetics:</b> The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding  <b>b.)Pharmacodynamics:</b> Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors, quantitation of drug receptors interaction and elicited effects	%	12
2	<b>Neurotransmission:</b> a.)General aspects and steps involved in neurotransmission. b.)Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetyl choline). c.) Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters- histamine, serotonin, dopamine, GABA, glutamate and glycine). d.) Non adrenergic non cholinergic transmission (NANC). Co-transmission	%	12

3	<p><b>Systemic Pharmacology:</b></p> <p>A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems</p> <p><b>Autonomic Pharmacology</b></p> <p>Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting neuromuscular junction</p>	%	12
4	<p><b>Central nervous system Pharmacology:</b></p> <p>General and local anesthetics</p> <p>Sedatives and hypnotics, drugs used to treat anxiety</p> <p>Depression, psychosis, mania, epilepsy, neurodegenerative diseases</p> <p>Narcotic and non-narcotic analgesics.</p>	%	12
5	<p><b>Cardiovascular Pharmacology:</b></p> <p>Diuretics, antihypertensives, antiischemics, anti-arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants, anticoagulants, fibrinolytics and anti-platelet drugs</p>	%	12
6	<p><b>Autocoid Pharmacology:</b></p> <p>The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autocoids.</p> <p>Pharmacology of antihistamines, 5HT antagonists</p>	%	12

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# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

## SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

### Pharmacological and Toxicological Screening Methods - I (MPL103T)

**Type of Course:** M.PHARM 2017-18

**Prerequisite:** This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes

**Rationale:** Upon completion of the course the student shall be able to, • Appraise the regulations and ethical requirement for the usage of experimental animals. • Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals • Describe the various newer screening methods involved in the drug discovery process • Appreciate and correlate the preclinical data to humans

#### Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/ Week	T Hrs/ Week	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
4	-	-	4	75	-	-	-	-	100

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

#### Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	<b>Laboratory Animals:</b>  Common laboratory animals: Description, handling and applications of different species and strains of animals.  Transgenic animals: Production, maintenance and applications Anaesthesia and euthanasia of experimental animals. Maintenance and breeding of  laboratory animals.CPCSEA guidelines to conduct experiments on animals  Good laboratory practice.Bioassay-Principle, scope and limitations and methods	%	12

2	<p><b>Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models:</b></p> <p>General principles of preclinical screening. CNS Pharmacology: behavioral and muscle coordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers and multiple sclerosis. Drugs acting on Autonomic Nervous System</p>	%	12
3	<p><b>Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.:</b></p> <p>Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, antiinflammatory and antipyretic agents. Gastrointestinal drugs: anti ulcer, anti -emetic, anti- diarrheal and laxatives</p>	%	12
4	<p><b>Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models:</b></p> <p>Cardiovascular Pharmacology: antihypertensives, antiarrhythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti cancer agents. Hepatoprotective screening methods</p>	%	12
5	<p><b>Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models:</b></p> <p>Immunomodulators, Immunosuppressants and immunostimulants</p> <p>General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin</p> <p>Limitations of animal experimentation and alternate animal experiments.</p> <p>Extrapolation of in vitro data to preclinical and preclinical to humans</p>	%	12

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# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

Cellular and Molecular Pharmacology (MPL104T)

Type of Course: M.PHARM 2017-18

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/ Week	T Hrs/ Week	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
4	-	-	4	75	-	-	-	-	100

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	<b>Cell biology:</b> Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing Cell cycles and its regulation. Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis. Necrosis and autophagy	%	12



2	<p><b>Cell signalling:</b></p> <p>Intercellular and intracellular signaling pathways.</p> <p>Classification of receptor family and molecular structure ligand gated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors.</p> <p>Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol.</p> <p>Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway</p>	%	12
3	<p><b>Principles and applications of genomic and proteomic tools:</b></p> <p>DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy</p> <p>Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinant DNA technology.</p> <p>Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy</p>	%	12
4	<p><b>Pharmacogenomics:</b></p> <p>Gene mapping and cloning of disease gene.</p> <p>Genetic variation and its role in health/ pharmacology</p> <p>Polymorphisms affecting drug metabolism</p> <p>Genetic variation in drug transporters</p> <p>Genetic variation in G protein coupled receptors</p> <p>Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics</p> <p>Immunotherapeutics</p> <p>Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice</p>	%	12

5	<p><b>Cell culture techniques:</b></p> <p>Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application.</p> <p>Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays</p> <p>Principles and applications of flow cytometry</p> <p><b>Biosimilars</b></p>	%	12
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# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

Pharmacology Practical - I (MPL105P)

Type of Course: M.PHARM 2017-18

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/	T Hrs/	Lab Hrs/ Week		External		Internal			
				T	P	T	CE	P	
-	-	12	6	-	100	-	-	50	150

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
	<p><b>PHARMACOLOGICAL PRACTICAL - I:</b></p> <ol style="list-style-type: none"><li>1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer</li><li>2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry</li><li>3. Experiments based on HPLC</li><li>4. Experiments based on Gas Chromatography</li><li>5. Estimation of riboflavin/quinine sulphate by fluorimetry</li><li>6. Estimation of sodium/potassium by flame photometry</li></ol> <p>Handling of laboratory animals.</p> <ol style="list-style-type: none"><li>1. Various routes of drug administration.</li><li>2. Techniques of blood sampling, anesthesia and euthanasia of experimental animals.</li><li>3. Functional observation battery tests (modified Irwin test)</li><li>4. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.</li><li>5. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic and miotic activity.</li></ol>		

1	<p>6. Evaluation of diuretic activity.</p> <p>7. Evaluation of antiulcer activity by pylorus ligation method.</p> <p>8. Oral glucose tolerance test.</p> <p>9. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).</p> <p>10. Isolation of RNA from yeast</p> <p>11. Estimation of proteins by Braford/Lowry's in biological samples.</p> <p>12. Estimation of RNA/DNA by UV Spectroscopy</p> <p>13. Gene amplification by PCR.</p> <p>14. Protein quantification Western Blotting.</p> <p>15. Enzyme based in-vitro assays (MPO, AChEs, <math>\alpha</math> amylase, <math>\alpha</math> glucosidase).</p> <p>16. Cell viability assays (MTT/Trypan blue/SRB).</p> <p>17. DNA fragmentation assay by agarose gel electrophoresis.</p> <p>18. DNA damage study by Comet assay.</p> <p>19. Apoptosis determination by fluorescent imaging studies.</p> <p>20. Pharmacokinetic studies and data analysis of drugs given by different routes of administration using softwares</p> <p>21. Enzyme inhibition and induction activity</p> <p>22. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (UV)</p> <p>23. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (HPLC)</p>	%	
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# PARUL UNIVERSITY - Faculty of Pharmacy

Department of Pharmacy

SYLLABUS FOR 1st Sem M.PHARM 2017-18 PROGRAMME

Seminar Sem-1 (MPLSEM1)

**Type of Course:** M.PHARM 2017-18

**Prerequisite:**

**Rationale:**

**Teaching and Examination Scheme:**

Teaching Scheme			Credit	Examination Scheme					Total
L Hrs/	T Hrs/	Lab Hrs/		External		Internal			
				T	P	T	CE	P	
7	-	-	4	-	-	-	100	-	100

L - Lecture, T - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical