



ADITYA COLLEGE OF PHARMACY



(Affiliated to JNTUK, Approved by AICTE)

(ADITYA NAGAR, ADB ROAD, SURAMPALEM 533 437, E.G. Dt, Ph.9949876664, 08852-200005)

Website: www.acop.edu.in, Email: srisaiadityapharmacy@yahoo.com, office@acop.edu.in

I M. PHARMACY(Pharmacology) – I SEMESTER (PCI)

S.NO	Course	Course code and number	Course outcome
1	Modern Pharmaceutical Analytical techniques (Theory) (MPL101T)	C _{(MPL101T)1}	Recall and relate the instrumental methods of analysis such as electrochemical, spectroscopic, chromatographic and electrophoretic techniques with volumetric methods of analysis. (UNDERSTAND, ANALYSE)
		C _{(MPL101T)2}	Demonstrate the interaction of EMR with matter and its phenomenon in various spectroscopic techniques; affinity of matter with stationary and mobile phase; temperature induced physical & chemical changes in matter; potential differences in sample solutions and to study various factors affecting the analysis. (REMEMBER, UNDERSTAND, EVALUATE)
		C _{(MPL101T)3}	Identify and categorise organic and inorganic compounds with different functional groups and to understand their structure at atomic, ionic, group and molecular level to recommend an appropriate spectroscopic technique for analysis. (UNDERSTAND, EVALUATE, APPLY)
		C _{(MPL101T)4}	Demonstrate the theory, principle, construction and working of instrument components and the methodology employed for the analysis of drugs in various samples. (UNDERSTAND)
		C _{(MPL101T)5}	Illustrate X-ray crystallographic techniques, electrophoretic methods, thermal methods and electrochemical methods. (APPLY)
		C _{(MPL101T)6}	Summarize the applications of various analytical techniques in relation to characterization, isolation, identification and estimation of various categories of compounds. (REMEMBER, APPLY, ANALYSE)
2	Advanced Pharmacology-I (Theory) (MPL102 T)	C _{(MPL102T)1}	Describe the basic principles of pharmacokinetic and pharmacodynamic parameters of drugs, drug receptor interactions and elicited effect (REMEMBER)
		C _{(MPL102T)2}	Summarize the various biogenesis pathways involved in synthesis of Neurotransmitters and their physiological role and to Illustrate pharmacology of Drugs acting on peripheral nervous system. (UNDERSTAND)
		C _{(MPL102T)3}	Enumerate the pharmacology of drugs acting on central nervous system, General and local anesthetics etc. (REMEMBER)
		C _{(MPL102T)4}	Differentiate the relative pros and cons in the use of drugs for various cardiac complications . (ANALYZE)



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		C _{(MPL102T)5}	Appraise the drugs acting on hematopoietic system. (EVALUATE)
		C _{(MPL102T)6}	Explain the role of autocooids and related drugs. (UNDERSTAND)
3	Pharmacological and Toxicological Screening Methods – I (Theory) (MPL103T)	C _{(MPL103T)1}	Enumerate the basic knowledge on regulations and ethical requirement for the maintenance and breeding of laboratory animals and the role of transgenic animals in preclinical research, CPCSEA guidelines, GLP, Bioassays (REMEMBER)
		C _{(MPL103T)2}	Predict General principles of in vivo, invitro, screening techniques for drugs acting on CNS and ANS (EVALUATE)
		C _{(MPL103T)3}	Identify the newer screening methods and techniques for drug acting on respiratory, reproductive and gastrointestinal system. (REMEMBER)
		C _{(MPL103T)4}	Demonstrate the screening methods for new Substances acting on cardiovascular system. (UNDERSTAND)
		C _{(MPL103T)5}	Appraise the new screening methods of the newer drugs for metabolic disorders. (EVALUATE)
		C _{(MPL103T)6}	Conclude and predict the in vivo, in vitro screening models for immune modulators, and to discuss General principles of immunoassay and extrapolation of in vitro/preclinical data to human. (EVALUATE)
4	Cellular and Molecular Pharmacology (Theory) (MPL 104 T)	C _{(MPL104T)1}	Describe the basic structure and function of genome in the living organism and the importance of siRNA and micro-RNA, Gene mapping, Gene sequencing (REMEMBER)
		C _{(MPL104T)2}	Summarize various phases of cell cycle, apoptosis, necrosis and autophagy (UNDERSTAND)
		C _{(MPL104T)3}	Construct the role of intercellular and intracellular signaling pathways of receptors and secondary messengers in cell signaling pathways (CREATE)
		C _{(MPL104T)4}	Appraise the principles and applications of genomic and proteomic tools DNA Electrophoresis, PCR, SDS page, ELISA western blotting, Recombinant DNA technology and Gene therapy. (EVALUATE)
		C _{(MPL104T)5}	Analyse the significance of Pharmacogenomics and immunotherapeutic (ANALYZE)
		C _{(MPL104T)6}	Build the various cell culture techniques, Principles and applications of cell viability/ glucose uptake/Calcium influx assays, flow cytometry and Biosimilars (CREATE)



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5	Pharmacology Practical-I (Practical) (MPL105PA)	C_{(MPL105PA)1}	Recall various pharmacopeial compounds & their formulations, and to carry out their analysis using UV-VIS spectroscopy, HPLC, gas chromatography, fluorimetry, flame photometry and demonstrate the techniques for handling laboratory animals. (REMEMBER)
		C_{(MPL105PA)2}	Demonstrate the various routes of drug administration. (UNDERSTAND)
		C_{(MPL105PA)3}	Analyze the techniques of anesthesia, euthanasia of experimental animals and understand blood sampling techniques. (ANALYZE)
		C_{(MPL105PA)4}	Asses and interpret functional battery tests like the modified Irwin test. (EVALUATE)
		C_{(MPL105PA)5}	Identify various techniques for the evaluation of anxiogenics, CNS stimulants, depressants, analgesic, miotic, anesthetic, anxiolytics, anticonvulsant, diuretic activity and show the evaluation of antiulcer activity by pylorus ligation method. (REMEMBER)
		C_{(MPL105PA)6}	Determine oral glucose tolerance assay. (APPLY)
6	Pharmacology Practical-II (Practical) (MPL105PB)	C_{(MPL105PB)1}	Demonstrate the isolation of RNA from yeast and identify DNA from sources like bacteria, cauliflower, onion, goat liver. (UNDERSTAND)
		C_{(MPL105PB)2}	Assess the estimation of protein by Bradford/Lowry's method in samples, estimation of RNA/DNA by UV spectroscopy, amplification of gene by PCR and quantification of protein using western blotting. (EVALUATE)
		C_{(MPL105PB)3}	Describe different assays like some enzyme based in-vitro assays and cell viability assays. (REMEMBER)
		C_{(MPL105PB)4}	Assess DNA fragmentation assay by agarose gel electrophoresis, DNA damage study by Comet assay and determining apoptosis by fluorescent imaging. (EVALUATE)
		C_{(MPL105PB)5}	Analyze the pharmacokinetics profiles of drugs via different routes of administration and evaluating enzyme inhibition activity. (ANALYZE)
		C_{(MPL105PB)6}	Calculate the estimation of drugs in biological fluids and other biological samples using appropriate techniques like UV and HPLC (APPLY)
7	Seminars/ Assignments	C.1	Recall the fundamentals of proposed topic and carry out literature review. (REMEMBER)
		C.2	Classify/ compare, interpret the various methods and techniques (ANALYZE)
		C.3	Assemble the collected data in chronological order and develop writing skills (CREATE)
		C.4	Analyze the data and interpret the relationships (ANALYZE)
		C.5	Evaluate and conclude the given topic. (EVALUATE)



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		C.6	Design research in given concept and improve presentation skills.(CREATE)
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1	Advanced pharmacology-II (Theory) (MPL 201 T)	C_{(MPL201T)1}	Describe the functions of hormones and to list out drugs acting on endocrine system, corticosteroids and calcium regulation. (REMEMBER)
		C_{(MPL201T)2}	Summarize the principles of chemotherapy and illustrate the mechanism of action of antibiotics, Antifungal, antiviral, and anti-TB drugs. (UNDERSTAND)
		C_{(MPL201T)3}	Appraise the chemotherapeutic agents for Protozoal Helminthic infections and cancer. (EVALUATE)
		C_{(MPL201T)4}	Enumerate the inflammatory mediators, allergic /hypersensitivity reactions and simplify pharmacotherapy of asthma and COPD, Immunosuppressants and stimulants (REMEMBER)
		C_{(MPL201T)5}	Assess the mechanism of drugs acting on GIT and applications of chrono pharmacology ,applications of chronotherapy in various disease. (EVALUATE)
		C_{(MPL201T)6}	Determine and elaborate the role of free radicals in etiopathology of various diseases and adapt the recent Advances in treatment of various diseases. (APPLY)
2	Pharmacological and toxicological screening methods-II(Theory) (MPL202T)	C_{(MPL202T)1}	Recall types of toxicology, to list out the regulatory guide lines for conducting toxicity studies OECD, ICH, EPA and Schedule Y, and its importance in drug development. (REMEMBER)
		C_{(MPL202T)2}	Determine Acute, sub-acute and chronic- oral, dermal and inhalational toxicity studies as per OECD guidelines. Acute eye ,dermal irritation and skin sensitization studies. (APPLY)
		C_{(MPL202T)3}	Construct reproductive toxicology, teratogenicity, Genotoxicity and In vivo carcinogenicity studies. (CREATE)
		C_{(MPL202T)4}	Categorize IND enabling studies -Definition, Importance, Industry Perspective, list of studies for IND submission (ANALYSE)
		C_{(MPL202T)5}	Summarize , and mention the importance of safety pharmacological studies, Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2-



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			GI, renal and other studies. (Tier-1 and 2). (UNDERSTAND)
		C_{(MPL202T)6}	Assemble the Importance and applications of toxicokinetic Studies and Alternative methods to animal toxicity testing. (CREATE)
3	Principles of Drug Discovery (Theory) (MPL203T)	C_{(MPL203T)1}	Recall the modern drug discovery process, target Discovery and validation and role of transgenic animals in target validation, Lead identification and Lead Optimization, Bioinformatics. (REMEMBER)
		C_{(MPL203T)2}	Relate the concepts of lead identification in combinatorial chemistry, high throughput screening and in silico lead discovery techniques. (ANALYSE)
		C_{(MPL203T)3}	Identify the computational structure of prediction of protein structure and the NMR and X-ray crystallography in protein structure prediction. (REMEMBER)
		C_{(MPL203T)4}	Contrast the Rational Drug Design Methods and Virtual Screening techniques. (ANALYSE)
		C_{(MPL203T)5}	Interpret the various molecular Docking studies and to assess the importance of QSAR and SAR studies. (UNDERSTAND)
		C_{(MPL203T)6}	Elaborate the Statistical methods used in QSAR-PLS,3D-QSAR(COMFA AND COMSIA) and compile the Prodrug design process. (APPLY)
4	Clinical Research and Pharmacovigilance (Theory) (MPL204T)	C_{(MPL204T)1}	Recall various regulatory requirements for clinical trials, Ethical Committee for biomedical research and human participants, Schedule Y,ICMR and informed consent (REMEMBER)
		C_{(MPL204T)2}	Formulate the types and designs of clinical trial and to infer roles and responsibilities of Clinical Trial Personnel. (CREATE)
		C_{(MPL204T)3}	Construct the documentation process of clinical trials and to identify the possible Adverse Drug Reactions. (CREATE)
		C_{(MPL204T)4}	Explain the roles and responsibilities of Pharmacovigilance. (UNDERSTAND)
		C_{(MPL204T)5}	Appraise various methods of ADR reporting and tools used in Pharmacovigilance. (EVALUATE)
		C_{(MPL204T)6}	Predict principles and concepts of Pharmacoepidemiology, Pharmacoconomics and safety pharmacology. (EVALUATE)



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5	Pharmacological Practical -III (Practical) (MPL205PA)	C _(MPL205PA) 1	Demonstrate the dose response relationship, effect of agonist drugs on DRC. (UNDERSTAND)
		C _(MPL205PA) 2	Illustrate the study of antagonist /potentiating agents on DRC using suitable isolated tissue preparation. (UNDERSTAND)
		C _(MPL205PA) 3	Appraise the drug concentrations by various bioassay methods using isolated tissue preparations (EVALUATE)
		C _(MPL205PA) 4	Calculate the PA2 values of various antagonists using isolated tissue preparations. (APPLY)
		C _(MPL205PA) 5	Identify the effects of various drugs on isolated heart Preparations. (REMEMBER)
		C _(MPL205PA) 6	Analyze the rat BP, heart rate and ECG. (ANALYZE)
6	Pharmacological Practical -IV (Practical) (MPL205PB)	C _(MPL205PB) 1	Demonstrate the drug absorption studies by averted rat ileum preparation (UNDERSTAND)
		C _(MPL205PB) 2	Enumerate the acute, subacute and chronic toxicity studies as per OECD guidelines. (REMEMBER)
		C _(MPL205PB) 3	Calculate the Repeated dose toxicity studies-Serum biochemical, haematological, urine analysis (APPLY)
		C _(MPL205PB) 4	Appraise Drug mutagenicity study using mice bone-marrow chromosomal aberration. (EVALUATE)
		C _(MPL205PB) 5	Define Protocol for clinical trial, ADR monitoring (REMEMBER)
		C _(MPL205PB) 6	Summarize In-silico docking studies/ pharmacophore-based screening/QSAR studies and ADR reporting (UNDERSTAND)
7	Seminars/Assignments	C.1	Recall the fundamentals of proposed topic and carry out literature review.(REMEMBER)
		C.2	Classify/ compare, interpret the various methods and techniques(ANALYSE)
		C.3	Assemble the collected data in chronological order and develop writing skills(CREATE)
		C.4	Analyze the data and interpret the relationships(ANALYSE)
		C.5	Evaluate and conclude the given topic.(EVALUATE)
		C.6	Design research in given concept and improve presentation skills.(CREATE)
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S.NO	Course	Course code and number	Course outcome
1	Research Methodology & Biostatistics (MRM301T)	C _(MRM301T) 1	Demonstrate the general research methodology including, study design and strategies to eliminate errors/bias (UNDERSTAND)
		C _(MRM301T) 2	Explain the importance of biostatistics in pharmacy: statistical tests of significance, non-parametric tests, null hypothesis, P values and degree of freedom (UNDERSTAND)
		C _(MRM301T) 3	Discuss the Medical Research regarding values in medical ethics, conflicts between autonomy and beneficence and criticisms of orthodox medical ethics (UNDERSTAND)
		C _(MRM301T) 4	Describe the ethics committees, online business practice, conflicts of interest and vendor relationships (UNDERSTAND)
		C _(MRM301T) 5	Explain the CPCSEA guidelines for laboratory animal facility (UNDERSTAND)
		C _(MRM301T) 6	Explain about the Declaration of Helsinki regarding basic principles for all medical research and medical research combined with medical care (UNDERSTAND)
2	Journal Club	C.1	Select the scientific concept based on literature and define the objectives of research.
		C.2	Outline the hypothesis and summarize the concept for presentation.
		C.3	Arrange for a meeting, discuss SOWT analysis, the design and methods used in concept.
		C.4	Categorize the variables and their inter relationships.
		C.5	Conclude the results and to discuss its significance.
		C.6	Evaluate the concept for societal needs, acknowledge and improve presentation skills.
3	Project Work	C.1	Enumerate the fundamentals, carry out literature review on proposed research topic and identify research problem.
		C.2	Discuss the requirements to perform the proposed research.
		C.3	Assemble the research hypothesis.
		C.4	Design and take part in research experiments meticulously and documentation as per format.
		C.5	Assess and conclude the results using statistical analysis.
		C.6	Conclude the societal application and appreciation.



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