



# NIRMALA COLLEGE OF PHARMACY

(A UNIT OF CATECHIST SISTERS OF ST.ANN'S, HYD)

ATMAKURU (Village), Mangalagiri (M), Guntur Dist-522503, A.P, India.

Approved by AICTE & PCI New Delhi & Govt. of A.P, Affiliated to SBTET & A.N University, Guntur

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## DEPARTMENT OF PHARMACEUTICS – COURSE OUTCOMES (CO'S)

Course Code	Course	Course Outcomes
<b>I Semester</b>		
MPH101T	Modern Pharmaceutical Analytical Techniques	<ol style="list-style-type: none"> <li>1. To Determine the Compounds by Spectroscopy Techniques</li> <li>2. To Determine the compounds by Chromatography Techniques</li> <li>3. To Determine the Compounds by Electrochemical methods</li> <li>4. To Interpret the Compounds by Spectroscopic Techniques</li> <li>5. To Interpret the Compounds by Chromatography Techniques</li> </ol>
MPH102T	Drug Delivery System	<ol style="list-style-type: none"> <li>1. The various approaches for development of novel drug delivery systems.</li> <li>2. The criteria for selection of drugs and polymers for the development of delivering system.</li> <li>3. The formulation and evaluation of Novel drug delivery systems.</li> <li>4. Understand the basics of different drug delivery systems.</li> <li>5. Able to understand the importance of Personalized medicine and 3D printing of Pharmaceuticals.</li> </ol>
MPH103T	Modern Pharmaceutics	<ol style="list-style-type: none"> <li>1. Understand the elements of preformulating studies, Optimization Techniques &amp; Pilot Plant Scale Up Techniques.</li> <li>2. Scope and merits of validation as per ICH and WHO guidelines.</li> <li>3. To understand Industrial Management and GMP Considerations.</li> <li>4. Understand the physics of tablet compression and compaction profiles.</li> <li>5. To understand dissolution, diffusion and pharmacokinetic parameters.</li> </ol>
MPH104T	Regulatory Affair	<ol style="list-style-type: none"> <li>1. The Concepts of innovator and generic drugs and drug development process.</li> <li>2. The Regulatory guidance's and guidelines for filing and approval process.</li> <li>3. Preparation of Dossiers and their submission to regulatory agencies in different countries.</li> <li>4. Post approval regulatory requirements for actives and drug products.</li> <li>5. Submission of global documents in CTD/ eCTD formats.</li> </ol>



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MPH 105P	Pharmaceutics Practical I	<ol style="list-style-type: none"> <li>1. To understand the analysis of pharmaceutical compounds by UV spectroscopy.</li> <li>2. To know the estimation of multi component by UV spectroscopy.</li> <li>3. To understand the principle of HPLC.</li> <li>4. To study the Preformulating studies, micromeritic properties, and compressional forces during preparation of tablets.</li> </ol>
<b>II – Semester</b>		
MPH201T	Molecular Pharmaceutics (Nano Tech and TargetedDDS)	<ol style="list-style-type: none"> <li>1. The various approaches for the development of novel drug delivery systems.</li> <li>2. The criteria for selection of drugs and polymers for the development of NTDS.</li> <li>3. The formulation and evaluation of novel drug delivery systems.</li> <li>4. Able to understand the concepts of ex-vivo and in-vivo gene therapy.</li> <li>5. To Study about the Liposomal gene delivery systems.</li> </ol>
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	<ol style="list-style-type: none"> <li>1. The basic concepts in biopharmaceutics and pharmacokinetics.</li> <li>2. The critical evaluation of biopharmaceutic studies involving drug product equivalency.</li> <li>3. The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutical parameters.</li> <li>4. The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination.</li> <li>5. To understand the potential clinical pharmacokinetic problems and application of basics of pharmacokinetics.</li> </ol>
MPH203T	Computer Aided Drug Delivery System	<ol style="list-style-type: none"> <li>1. Computer in pharmaceutical research and development, Statistical modeling in pharmaceutical research.</li> <li>2. Computational modeling of drug disposition.</li> <li>3. Optimization, factorial design, screening design, ethics of computing in pharma research</li> <li>4. Computer aided biopharmaceutical characterization, computer simulation</li> <li>5. Artificial intelligence and robotics.</li> </ol>



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MPH204T	Cosmetic and Cosmeceuticals	<ol style="list-style-type: none"><li>1. To understand the key ingredients used in cosmetics and cosmeceuticals</li><li>2. To know the key building blocks for various formulations</li><li>3. To understand the current technologies in the market</li><li>4. To aware about the scientific knowledge to develop cosmetics and cosmeceuticals with desired safety, stability and efficacy</li><li>5. Aware about the different cosmetic preparations manufactured by industries</li></ol>
MPH205P	Pharmaceutics Practical II	<ol style="list-style-type: none"><li>1. The various approaches for Protein binding studies of a highly protein bound drug &amp; poorly protein bound drug.</li><li>2. Able to understand the concepts of Formulation, Preparation and evaluation of Pharmaceutical Dosage forms.</li><li>3. Know the Improvement of dissolution characteristics of slightly soluble drugs.</li><li>4. To understand the concepts of Quality-by-Design (QbD) in Pharmaceutical Development.</li></ol>
II/II M.Pharm Pharmaceutics	Project work	<ol style="list-style-type: none"><li>1. To understand how to choose and assess the topic for the project.</li><li>2. To know the collection of literature from the relevant sources and carry out research work in the laboratory.</li><li>3. Interpretation, Evaluation and tabulation of results.</li><li>4. To Prepare the thesis and explanation of outcomes of the work to the Evaluators and further research work.</li><li>5. Students are able to improve the communication, presentation skill.</li></ol>



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## DEPARTMENT OF PHARMACEUTICAL ANALYSIS – COURSE OUTCOMES (CO'S)

Course Code	Course	Course outcomes
<b>I Semester</b>		
MPA101T	Modern Pharmaceutical Analytical Techniques	<ol style="list-style-type: none"> <li>1. To Determine the Compounds by Spectroscopy Techniques</li> <li>2. To Determine the compounds by Chromatography Techniques</li> <li>3. To Determine the Compounds by Electrochemical methods</li> <li>4. To Interpret the Compounds by Spectroscopy Techniques</li> <li>5. To Interpret the Compounds by Chromatography Techniques</li> </ol>
MPA102T	Advanced Pharmaceutical Analysis	<ol style="list-style-type: none"> <li>1. The subject deals with the various aspects of impurities, impurity profiling, elemental impurities</li> <li>2. It deals with the characterization of degradation, stability testing of Photopharmaceuticals</li> <li>3. To provide the appropriate analytical skills required for the analytical method development</li> <li>4. To know the analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products</li> <li>5. It deals with the principles of various reagents used in functional group analysis that render necessary support in research methodology.</li> </ol>
MPA103T	Pharmaceutical Validation	<ol style="list-style-type: none"> <li>1. To understand about the validation and how it can be applied to the analytical industry.</li> <li>2. To know about the improvement of the quality of the products.</li> <li>3. It deals with the brief knowledge about validation types, methodology, and its application.</li> <li>4. To know about the carrying out validation of manufacturing process.</li> <li>5. To apply the knowledge of validation to check the performance of instruments and equipment's.</li> </ol>



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MPA104T	Food Analysis	<ol style="list-style-type: none"> <li>1. To provide information about chemical composition, processing, quality control (QC) and contamination of food stuffs.</li> <li>2. To Determine Physical properties, Chemical properties, Physiological properties, Possible Adulterants and contaminants.</li> <li>3. To study analytical procedures for characterizing the properties of foods and their constituents</li> <li>4. To develop the novel methods for the estimation of new products, the improvement of existing procedures and the reduction of manufacturing costs.</li> <li>5. To estimate the amount of pesticides present in Milk and Milk products, Vegetables, other food products.</li> </ol>
MPA105P	Pharmaceutical Analysis Practical - I	<ol style="list-style-type: none"> <li>1. It gives the practical knowledge how to analyze the compounds and their formulations by using advanced techniques such as UV, HPLC, GC. It also gives the hand on experience in the determination of percentage purity by using fluorimetry, photometry.</li> <li>2. This practical provides the knowledge about calibration of glassware used in laboratories such as volumetric flasks, burettes, pipettes also calibration of instruments such as pH meter, UV, FTIR, GC, HPLC</li> <li>3. It gives the practical knowledge about determination of functional group such as -OH, -NH<sub>2</sub> and evaluation tests for fats and oils</li> <li>4. It also deals with the analysis of natural and synthetic colors, pesticides, preservatives, pesticide residues, food additives in food materials.</li> </ol>
<b>II Semester</b>		
MPA201T	Advanced Instrumental Analysis	<ol style="list-style-type: none"> <li>1. To understand the students about various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs.</li> <li>2. Explain the principles, instrumentation of hyphenated techniques such as LC-MS, GC-MS</li> <li>3. Able to interpret the IR, NMR, Mass data of various organic compounds</li> </ol>



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		<ol style="list-style-type: none"> <li>4. It helps the students to know the principle, instrumentation involved in biochromatography</li> <li>5. It helps to inculcate the knowledge about the theoretical and practical skills of the hyphenated instruments.</li> </ol>
MPA202T	Modern Bio-Analytical Techniques	<ol style="list-style-type: none"> <li>1. To determine quantitatively measurement of a concentration of a drug and/or its metabolite or a biomarker in biological fluids</li> <li>2. To determine unwanted components and to selectively extract the compounds of interest are an important part of the bioanalysis</li> <li>3. To determine quantitatively measurement of xenobiotics and biotics (macromolecules, proteins, DNA, large molecule drugs, metabolites) in biological systems.</li> <li>4. To determine compounds by hyphenated techniques</li> <li>5. To determine compounds by chromatography techniques</li> </ol>
MPA203T	Quality Control and Quality Assurance	<ol style="list-style-type: none"> <li>1. Students are able to deal with the various aspects of quality control and quality assurance aspects in pharmaceutical industry</li> <li>2. Enrich the knowledge in important aspects like CGMP, QC tests, documentation, quality certification, GLP and regulatory affairs</li> <li>3. Provide the detailed information about importance, scope of quality certification applicable to pharmaceutical industries</li> <li>4. It gives the detailed knowledge about analysis of raw materials, finished product, packaging materials in process control and developing specifications</li> <li>5. Students are able to understand about manufacturing operations, control, release of finished product, process deviation and expiry date calculations</li> </ol>
MPA204T	Herbal and Cosmetic Analysis	<ol style="list-style-type: none"> <li>1. To impart the knowledge on analysis of herbal products</li> <li>2. To Understand the herbal remedies &amp; toxicity regulations, validation of herbal therapies pharmacokinetic &amp; pharmacodynamic issues.</li> <li>3. Principles of performance evaluation of cosmetic products Study &amp; analysis of raw material and Indian standard specifications</li> <li>4. Analysis of Natural products and monographs WHO guideline in quality assessment of herbal drugs.</li> </ol>



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		5. Determination of herbal drug drug interactions WHO and AYUSH guidelines and challenges for safety monitoring of herbal medicine.
MPA205P	Pharmaceutical Analysis Practical II	<ol style="list-style-type: none"><li>1. Provide the interpretation skills about FTIR, NMR, Mass in the identification of organic compounds.</li><li>2. Practical knowledge about molecule separation and identification using HPLC techniques</li><li>3. It gives the practical knowledge about analytical/bioanalytical method validation, BA/BE studies. Quality control tests for tablets, capsules, parentals and creams</li><li>4. It gives the practical knowledge about the analysis of cosmetics such as hair oil, hair dye, shampoos, creams.</li></ol>
II/II M.Pharm Analysis	Project work	<ol style="list-style-type: none"><li>1. It helps the students to get the handling experience of various instruments</li><li>2. It facilitates to understand the method development and validation of instrumental analysis</li><li>3. It provides the knowledge about the impurity profiling</li><li>4. It helps to get knowledge in the various instruments handling.</li><li>5. Students are able to improve the communication, presentation skill.</li></ol>



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## DEPARTMENT OF PHARMACOLOGY – COURSE OUTCOMES (CO'S)

Course Code	Course	Course outcomes
<b>I Semester</b>		
MPL 101T	Modern Pharmaceutical Analytical Techniques	<ol style="list-style-type: none"> <li>1. To Determine the Compounds by Spectroscopy Techniques</li> <li>2. To Determine the compounds by Chromatography Techniques</li> <li>3. To Determine the Compounds by Electrochemical methods</li> <li>4. To Interpret the Compounds by Spectroscopy Techniques</li> <li>5. To Interpret the Compounds by Chromatography Techniques</li> </ol>
MPL 102T	Advanced Pharmacology-I	<ol style="list-style-type: none"> <li>1. Identify various mechanisms and how the drug acts.</li> <li>2. General pharmacology dealing with basics of pharmacology.</li> <li>3. Information regarding neurohumoral transmission of neurotransmitters.</li> <li>4. Identify, diagnose and treat various cardiac diseases.</li> <li>5. Treatment regimen for neuro pharmacology is understood.</li> </ol>
MPL 103T	Pharmacological and Toxicological Screening Methods-I	<ol style="list-style-type: none"> <li>1. To know about commonly used laboratory animals in various screening methods.</li> <li>2. To know about the various screening methods used in preclinical research.</li> <li>3. To understand the importance of biostatistics and research methodology in the interpretation of results.</li> <li>4. Design and execute a research hypothesis independently</li> <li>5. To know the principles of toxicology and treatment of various poisonings.</li> </ol>





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MPL 104T	Cellular and Molecular Pharmacology	<ol style="list-style-type: none"> <li>1. Explain about the structural and functional role of cells and their organelles</li> <li>2. Understand the signal transduction process.</li> <li>3. Explain about the intercellular and intracellular signaling pathways</li> <li>4. Explain about the principles and applications of various genomic and proteomic tools.</li> <li>5. The role of Pharmacogenomics in health and Pharmacology.</li> </ol>
MPL 105P	Pharmacology Practical – I	<ol style="list-style-type: none"> <li>1. Able to calculate the doses for laboratory animals</li> <li>2. Perform toxicity studies by following the standard guidelines</li> <li>3. Estimate biochemical parameters in body fluids</li> <li>4. Demonstrate the effect of drugs using computer models.</li> </ol>
<b>II Semester</b>		
MPL 201T	Advanced Pharmacology II	<ol style="list-style-type: none"> <li>1. Understand the free radical pharmacology.</li> <li>2. Gain sound knowledge on endocrine pharmacology and treatment regimens.</li> <li>3. Information regarding treatment of infectious diseases.</li> <li>4. Understand brief pharmacological actions of drugs regarding GIT associated diseases.</li> <li>5. Recent advances in treatment regimens of various CNS diseases are known.</li> </ol>
MPL 202T	Pharmacological and Toxicological Screening Methods - II	<ol style="list-style-type: none"> <li>1. Describe the applications of common laboratory animals, explain CPCSEA and OECD guidelines governing the for maintenance, breeding and conduct of experiments on laboratory animals.</li> <li>2. Explain dose, dose calculations grouping of animals, species selection, sex in conducting the animal experimentation</li> <li>3. Toxicological and allergen screening techniques.</li> <li>4. They would have understood the maintenance of laboratory animals</li> </ol>



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		<p>as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes.</p> <p>5. They would have learnt to describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals.</p>
MPL 203T	Principles of Drug Discovery	<ol style="list-style-type: none"> <li>1. Explain about the various phases of drug discovery.</li> <li>2. Understand the applications of genomics, proteomics and bioinformatics in drug discovery.</li> <li>3. Understand the concept of target identification, target validation, lead identification and lead optimization in drug discovery.</li> <li>4. Explain about the concepts of rational drug design</li> <li>5. To know the role and importance of the tools used in Computer aided Drug Design and Discovery.</li> </ol>
MPL 204T	Experimental Pharmacology practical- II	<ol style="list-style-type: none"> <li>1. To know the importance of the role of computer aided drug design in drug discovery</li> <li>2. To study the importance of the role of genomics, proteomics and bioinformatics in drug discovery</li> <li>3. Demonstrate the practical skills required to conduct the preclinical toxicity studies.</li> <li>4. To learn about various types of toxicity studies.</li> <li>5. To understand the mechanism of drug actions at cellular and molecular level.</li> </ol>
MPL 205P	Pharmacology Practical II	<ol style="list-style-type: none"> <li>1. Insilico docking studies on pharmacophore-based screening.</li> <li>2. Practical knowledge on different types of BIOASSAYS by different methods.</li> <li>3. Students gain knowledge on isolated heart experiments on frogs.</li> <li>4. Methods to perform toxicity studies as per OECD guidelines.</li> </ol>



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II/II M.Pharm Pharmacology	Project Work	<ol style="list-style-type: none"><li>1. Review scholarly literature collected from various sources critically for the project and formulate a research problem</li><li>2. Prepare and present a research proposal</li><li>3. Conduct research to achieve research aim and objectives</li><li>4. Propose new ideas/ methodologies or procedures for further improvement of the research problem</li><li>5. Create research document of the findings</li><li>6. Defend the research findings in front of scholarly audience</li></ol>
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