



# VIGNAN

## INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

(Approved By AICTE, PCI New Delhi & Affiliated to JNTUK - Kakinada)

An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Institution

### Program Outcomes:

Program outcomes are statements conveying the intent of a program of study. Specifically, program outcomes refer to what a student should know or be able to do at the end of a program. They are often seen as the knowledge and skills students will have obtained by the time they have received their intended degree.

### Program Outcomes for M.Pharmacy (Pharmaceutics) Program

- PO1 Scholarship of Knowledge:** Analyze the importance of pharmaceutical sciences and technology in enhancing the quality of life for individuals within society by ensuring the quality of medications.
- PO2 Critical Thinking:** Critically analyze complex pharmaceutical problems, make intellectual and creative advances, and conduct research within a wider theoretical, practical, and policy context.
- PO3 Problem Solving:** Apply original and lateral thinking to solve pharmaceutical problems, evaluate multiple potential solutions, and determine feasible and optimal outcomes while considering public health, safety, cultural, societal, and environmental factors in the relevant field of expertise.
- PO4 Research Skills:** Gather information through literature survey and experiments, employ appropriate research methods and tools, design and conduct experiments, analyze and interpret data, demonstrate higher-order thinking skills and a broader perspective, and contribute to the development of scientific knowledge in pharmaceutical sciences.
- PO5 Usage of modern tools:** Apply suitable methodologies, resources, and contemporary technological aids, such as prediction and modeling tools, to intricate pharmaceutical tasks while comprehending their constraints.
- PO6 Collaborative and Multidisciplinary work:** Collaborative scientific research requires self-management, teamwork, open-minded decision-making, objectivity, and rational analysis to achieve common goals and foster learning among participants.
- PO7 Communication:** Effectively communicate with the pharmaceutical community and wider society, showcasing confidence in understanding and creating impactful reports and documentation while adhering to standards. Display proficiency in delivering compelling presentations and facilitating clear instruction exchange.

- PO8 Research outcomes and Entrepreneurship:** Acquire ability to share research outcomes with various stakeholders through publications and presentations. Contribute as a reliable resource for industry research, consultation, and training partnerships. Demonstrate entrepreneurial skills by identifying business opportunities and taking initiative.
- PO9 Practices and Social Responsibility:** Show ethical behavior and social responsibility through professional and intellectual honesty, adherence to ethical codes, awareness of the ethical impact of research and academic work, evaluation of research outcomes on professional fields, and acknowledging the duty to contribute to the community for sustainable societal progress.
- PO10 Life-long Learning:** Life-long Learning: Demonstrate the awareness of the necessity for ongoing learning and possess the readiness and capability to participate in independent learning endeavours, exhibiting a strong sense of eagerness and dedication to consistently enhance knowledge and expertise.

## Course Outcomes:

Course Outcomes are narrower statements that describe what students are expected to know, and be able to do at the end of each course. These relate to the skills, knowledge, and behaviour that students acquire in their enrolment through the course.

Name of the Course	Course Code	Course Outcome Code	Course Outcome Statements
Modern Pharmaceutical Analytical Techniques	MPH101T	MPH101T.1	The students will also be in a position to apply their knowledge in Pharmaceutical Analysis
		MPH101T.2	The analysis of various drugs in single and combination dosage forms
		MPH101T.3	Theoretical and Practical skills of the Analytical instruments.
		MPH101T.4	Apply the Skill in developing the New Analytical methods for the validation Procedure
		MPH101T.5	learn the principle, instrumentation and applications of electrophoresis and X ray crystallography
		MPH101T.6	Perceive the fundamentals of immunological assays.
Drug Delivery System	MPH102T	MPH102T.1	Categorize drugs in various novel drug delivery systems based on their physico-chemical and biological approaches
		MPH102T.2	Select polymers based on the properties and their application in drug delivery system
		MPH102T.3	Develop the concept of tele pharmacy, 3D printing, bioelectronic medicine and personalized medicine
		MPH102T.4	Analyse the principals and fundamentals of rate-controlled drug delivery systems
		MPH102T.5	Assess various formulation and evaluation of drug delivery systems
		MPH102T.6	Apply knowledge of protein drugs and biological products such as vaccines in their development and evaluation
Modern Pharmaceutics	MPH103T	MPH103T.1	Perceive the key elements of preformulation studies
		MPH103T.2	Explain various optimization techniques in formulation development
		MPH103T.3	Analyze various types of validation protocols with effective application
		MPH103T.4	Justify current good manufacturing practices in pharma industries.
		MPH103T.5	Theoretically explain various stages of tablet compression process
		MPH103T.6	Estimate various dissolution parameters
Regulatory Affairs	MPH104T	MPH104T.1	Learn the stages of drug development process
		MPH104T.2	Understand new drug approval processes
		MPH104T.3	Learn about technical documentation
		MPH104T.4	Perceive electronic common technical documentation
		MPH104T.5	Learn about design and control of clinical trials
		MPH104T.6	Discussion on pharmacovigilance aspects

Pharmaceutics Practical I	MPH105P A	MPH105PA.1	Apply and interpret UV Vis spectrophotometry for the analysis of pharmacopoeial compounds.
		MPH105PA.2	Conduct advanced laboratory experiments using High-Performance Liquid Chromatography (HPLC)
		MPH105PA.3	Demonstrate the use of Gas chromatography in estimation of drugs.
		MPH105PA.4	Perform and interpret various spectrofluorometric and flame photometric methods.
		MPH105PA.5	Demonstrate an understanding of the pharmaceutical preformulation process.
		MPH105PA.6	Study of Micromeritic properties of powders and granulation.
Pharmaceutics Practical II	MPH105P B	MPH105PB.1	Evaluate the effect of particle size on dissolution of tablets.
		MPH105PB.2	Assess the impact of binders on dissolution rate of tablets
		MPH105PB.3	Conduct in-vitro dissolution profiles of marketed controlled-release and sustained-release formulations.
		MPH105PB.4	Formulate and evaluate sustained release matrix tablets
		MPH105PB.5	prepare and characterize floating tablet dosage forms
		MPH105PB.6	Formulate and evaluate osmotically controlled drug delivery systems and assessing their performance.
Seminar/ Assignment	MPH106S	MPH106S.1	Analyze the impact of pharmaceutical sciences and technology on improving quality of life.
		MPH106S.2	Apply critical thinking skills to complex pharmaceutical problems.
		MPH106S.3	Utilize innovative and creative thinking methods to address pharmaceutical issues from unique and unconventional perspectives.
		MPH106S.4	Demonstrate research skills by conducting literature surveys and experiments.
		MPH106S.5	understand the constraints associated with modern tools and effectively incorporate them into their work.
		MPH106S.6	Engage in collaborative scientific research, demonstrating self-management, teamwork, open-minded decision-making, and rational analysis.
Molecular Pharmaceutics (Nano Technology and Targeted DDS) (NTDS)	MPH201T	MPH201T.1	Understand various approaches for development of novel drug delivery systems
		MPH201T.2	Learn about criteria for selection of polymers
		MPH201T.3	Learn about criteria for selection of drugs in novel drug delivery systems
		MPH201T.4	Studies relevant to formulation of targeted drug delivery systems
		MPH201T.5	Understand nucleic acid based therapeutic delivery system
		MPH201T.6	Description of various quality control tests for novel drug delivery systems

Advanced Biopharmaceutics & Pharmacokinetics	MPH202T	MPH202T.1	Description and assessment of drug absorption processes
		MPH202T.2	Justify the developed pharmacokinetic model based on obtained data
		MPH202T.3	Critical evaluation of bioavailability and bioequivalence studies
		MPH202T.4	Development of dosage regimens using pharmacokinetic knowledge
		MPH202T.5	Understand in vitro -in vivo correlations
		MPH202T.6	Application of pharmacokinetics to understand clinical problems
Computer Aided Drug Delivery System	MPH203T	MPH203T.1	Understand the history and applications of computers in pharmaceutical research and development.
		MPH203T.2	Construct statistical modelling principles & optimization using computer applications.
		MPH203T.3	Develop the basic computational modelling principles for drug disposition.
		MPH203T.4	Interpret computer simulation in pharmacokinetics and pharmacodynamics.
		MPH203T.5	Identify the role of computers in R&D, clinical development
		MPH203T.6	Explain pharmaceutical automation and computational fluid dynamics
Formulation Development of Pharmaceutical and Cosmetic Products	MPH204T	MPH204T.1	Assess drug excipient compatibility studies
		MPH204T.2	Justify the usage of additives in different formulations
		MPH204T.3	Estimate drug solubility by phase solubility analysis
		MPH204T.4	Explain various theories of dissolution
		MPH204T.5	Plan for stability studies as per international guidelines
		MPH204T.6	Explain about the composition of regularly used cosmetics
Pharmaceutics Practical III	MPH205PA	MPH205PA.1	Interpret the effect of different factors on microencapsulation process
		MPH205PA.2	Formulate and evaluate sodium alginate beads
		MPH205PA.3	Design and formulate liposomes
		MPH205PA.4	Improve the dissolution rate of a poorly soluble drug by solid dispersion technique
		MPH205PA.5	Estimate the effect of protein binding on drug diffusion
		MPH205PA.6	Estimate the permeability of drugs by in vitro method

Pharmaceutics Practical IV	MPH205PB	MPH205PB.1	Proficient in utilizing Design Expert® Software for Design of Experiments (DoE) and formulation data analysis.
		MPH205PB.2	Understand the significance of Quality-by-Design in pharmaceutical development.
		MPH205PB.3	Adept in computer simulations for pharmacokinetics and pharmacodynamics.
		MPH205PB.4	Formulation and evaluation of creams, shampoos, toothpastes, multi-vitamin syrups, and tablets
		MPH205PB.5	Equip to develop a clinical data collection manual, execute sensitivity analysis, and population modelling.
		MPH205PB.6	Hands-on experience in developing and evaluating creams, shampoos, toothpastes, multi-vitamin syrups, and tablets using optimization techniques.
Seminar/ Assignment	MPH206S	MPH206S.1	Analyze the impact of pharmaceutical sciences and technology on improving quality of life.
		MPH206S.2	Apply critical thinking skills to complex pharmaceutical problems.
		MPH206S.3	Utilize innovative and creative thinking methods to address pharmaceutical issues from unique and unconventional perspectives.
		MPH206S.4	Demonstrate research skills by conducting literature surveys and experiments.
		MPH206S.5	Understand the constraints associated with modern tools and effectively incorporate them into their work.
		MPH206S.6	Engage in collaborative scientific research, demonstrating self-management, teamwork, open-minded decision-making, and rational analysis.
Research Methodology and Biostatistics*	MRM301T	MRM301T.1	Explain qualitative and quantitative aspects of clinical study design
		MRM301T.2	Interpret Various Biostatistical methods in Modern Pharmaceutical Techniques
		MRM301T.3	Describe various ethical guidelines for biomedical research.
		MRM301T.4	Enumerate various CPCSEA guidelines for laboratory animal facility.
		MRM301T.5	Discuss the principals of Declaration of Helsinki for Medical Research.
		MRM301T.6	Understand Research writing and Review of Literature
Journal Club	MRM302S	MRM302S.1	Understanding and debating current topics of active interest in their field
		MRM302S.2	Apply skills to use search engines for selection of scientific articles of their interest
		MRM302S.3	Analyse the critical thinking skills in appraisal of the scientific literature
		MRM302S.4	Create a scientific report on the critically appraised article
		MRM302S.5	Evaluate detailed knowledge of a specific area of research including the literature published in that area, its underlying concepts, theories and assumptions.
		MRM302S.6	Apply ability to write various types of manuscripts

Discussion and Presentation	MRM303S	MRM303S.1	Identify relevant information, defining and explaining topics under discussion
		MRM303S.2	Demonstrate complexity, insight, cogency, independent thought, relevance and persuasiveness
		MRM303S.3	Demonstrate Command of voice modulation, voice projection, and pacing to support their presentation
		MRM303S.4	Evaluate information and use and apply relevant theories
		MRM303S.5	Demonstrate breadth of reading, use sources, show independence and flexibility of thought
		MRM303S.6	Analyze and Demonstrate problem solving skills and apply theoretical knowledge
Research Work and Colloquium	MRM304S	MRM304S.1	Identify and discuss the role, importance and concepts to the research process in pharmacology
		MRM304S.2	Discuss the complex issues in selecting a research problem, selecting an appropriate research design, and implementing a research project.
		MRM304S.3	Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.
		MRM304S.4	Establish motivation for any topic of interest and develop a thought process for technical presentation.
		MRM304S.5	Organize a detailed literature survey and build a document with respect to technical publications. Analysis and comprehension of proof-of-concept and related data.
		MRM304S.6	Analysis and comprehension of proof-of-concept and related data and Make use of new and recent technology for creating technical reports
Journal Club	MRM401P	MRM401P.1	Understanding and debating current topics of active interest in their field
		MRM401P.2	Apply skills to use search engines for selection of scientific articles of their interest
		MRM401P.3	Analyze the critical thinking skills in appraisal of the scientific literature
		MRM401P.4	Create a scientific report on the critically appraised article
		MRM401P.5	Evaluate detailed knowledge of a specific area of research including the literature published in that area, its underlying concepts, theories and assumptions.
		MRM401P.6	Apply ability to write various types of manuscripts
Discussion and Presentation	MRM403P	MRM403P.1	Identify relevant information, defining and explaining topics under discussion
		MRM403P.2	Demonstrate complexity, insight, cogency, independent thought, relevance and persuasiveness
		MRM403P.3	Demonstrate Command of voice modulation, voice projection, and pacing to support their presentation
		MRM403P.4	Evaluate information and use and apply relevant theories
		MRM403P.5	Demonstrate breadth of reading, use sources, show independence and flexibility of thought
		MRM403P.6	Analyze and Demonstrate problem solving skills and apply theoretical knowledge

Research Work and Colloquium	MRM404P	MRM404P.1	Identify and discuss the role, importance and concepts to the research process in pharmacology
		MRM404P.2	Discuss the complex issues in selecting a research problem, selecting an appropriate research design, and implementing a research project.
		MRM404P.3	Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.
		MRM404P.4	Establish motivation for any topic of interest and develop a thought process for technical presentation.
		MRM404P.5	Organize a detailed literature survey and build a document with respect to technical publications. Analysis and comprehension of proof-of-concept and related data.
		MRM404P.6	Analysis and comprehension of proof-of-concept and related data and Make use of new and recent technology for creating technical reports