

## M PHARMACY PHARMACEUTICS COURSE OUTCOMES

Course Number & Course Name	CO No	Course Outcome (CO)
<b>MPH101T Modern Pharmaceutical Analytical Techniques (Theory)</b>	Upon completion of this course the graduate is able to	
	C101T1	To Recall selected analytical spectrometric techniques and applications
	C101T2	To gain knowledge on interpretation of NMR spectra instrumentation, applications of C13 & FT NMR
	C101T3	To remember different types of ionization and mass analysers in mass spectroscopy
	C101T4	To analyze pharmaceutical drugs using different chromatographic techniques
	C101T5	To choose different electrophoresis techniques for the separation of mixture of compounds and analysis of crystals by using X-ray crystallographic technique
	C101T6	To elaborate principle and assay of RIA, ELISA and Bioluminescence assays
<b>MPH102T Drug Delivery System (Theory)</b>	Upon completion of this course the graduate is able to	
	C102T1	To recall the basic concepts of sustained release/controlled release formulations based on the physicochemical and biological properties of drugs, polymer science, personalized medicines and telepharmacy.
	C102T2	To explain the principles and fundamentals of Rate controlled drug delivery systems.
	C102T3	To develop the formulation approaches of Gastro-retentive and Buccal drug delivery systems.
	C102T4	To analyze the basic components of Ocular and Transdermal drug delivery systems.
	C102T5	To explain the formulation aspects of protein and peptide delivery.
	C102T6	To elaborate the vaccines and appraise the mucosal and transdermal delivery of vaccines.
<b>MPH103T Modern Pharmaceutics (Theory)</b>	Upon completion of this course the graduate is able to	
	C103T1	To define concepts of preformulation, validation, cGMP, compression, compaction and consolidation parameters
	C103T2	To explain the concepts in preformulation and optimization techniques in pharmaceutical formulation
	C103T3	To develop validation and calibration of master plan as per the regulatory requirements
	C103T4	To classify the policies of CGMP, layout of buildings, equipment and management of production and inventory control.
	C103T5	To explain the physics of tablet compression and distribution of forces in the process of compression
	C103T6	To estimate the diffusion, dissolution and pharmacokinetic parameters in consolidation
	Upon completion of this course the graduate is able to	

<b>MPH104T Regulatory Affair (Theory)</b>	C104T1	To define the concept of innovator and generic drug product development in pharmaceutical industry
	C104T2	To outline the filing and approval process for innovator and generic drug product
	C104T3	To apply the regulatory guidelines required for preparation of Dossiers/CTD and their submission to regulatory agencies in different countries
	C104T4	To compare the regulatory requirements of various countries and international conference on harmonization guidelines
	C104T5	To interpret FDA guidelines on Nonclinical studies of drug development
	C104T6	To elaborate the pharmacovigilance and process of monitoring in clinical trials
<b>Pharmaceutical Practical I MPH105P)</b>	Upon completion of this course the graduate is able to	
	C105P1	To recall the basic principles of analytical techniques and their instrumentation used for drug analysis.
	C105P2	To summarize the preformulation studies and basic polymers / excipients used for various controlled/ sustained drug delivery systems.
	C105P3	To make use of various analytical instruments for estimation of drugs in various formulations.
	C105P4	To simplify the formulation techniques to prepare matrix tablets, floating tablets and transdermal patches.
	C105P5	To assess the drug release from sustained and controlled drug delivery systems.
<b>MPH201T Molecular Pharmaceutics (Nano Tech and Targeted DDS) (Theory)</b>	Upon completion of this course the graduate is able to	
	C201T1	To define the concepts, events and biological process involved in drug targeting to tumor and brain.
	C201T2	To explain the methods of preparation and evaluation of nanoparticles and liposomes.
	C201T3	To develop microspheres, Monoclonal antibodies and other multi particulate carriers for drug delivery.
	C201T4	To analyze the approaches for pulmonary and intra nasal delivery systems.
	C201T5	To explain the concepts of gene therapy and liposomal gene delivery systems.
	C201T6	To discuss the concepts of therapeutic antisense molecules and aptamers as drugs of future.
<b>MPH202T Advanced Biopharmaceutics &amp; Pharmacokinetics (Theory)</b>	Upon completion of this course the graduate is able to	
	C202T1	To define the drug absorption, mechanisms and interpret various factors affecting drug absorption and role of dosage forms.
	C202T2	To explain the basic concepts of Biopharmaceutic considerations in drug product design .
	C202T3	To apply the pharmacokinetic models for the determination of pharmacokinetic parameters.
	C202T4	To analyze the drug product performance by in-vitro, in-vivo and in-situ models.

	C202T5	To determine the bioavailability testing protocol of a drug and compare the bioequivalence among marketed products.
	C202T6	To predict pharmacokinetic and pharmacodynamic drug interactions.
<b>MPH203T Computer Aided Drug Delivery System (Theory)</b>	Upon completion of this course the graduate is able to	
	C203T1	Define role of QbD in Pharmaceutical development and relate the history of Computers to current Pharmaceutical Research and Development
	C203T2	Explain about Computational Modelling Of Drug Disposition
	C203T3	Choose and make use of optimization techniques in formulation development
	C203T4	Analyse and understand the role of Computers in biopharmaceutical characterization, Pharmacokinetics and Pharmacodynamics and clinical development
	C203T5	Explain the importance of Artificial Intelligence (AI), Robotics and Computational fluid Dynamics in pharmaceutical field
	C203T6	Elaborate the importance of Computational fluid Dynamics in pharmaceutical field
<b>MPH204T Cosmetic and Cosmeceuticals (Theory)</b>	Upon completion of this course the graduate is able to	
	C204T1	To match the Indian regulatory requirements for manufacture, sale, import and labelling of cosmetics and cosmeceuticals
	C204T2	To outline the regulatory provisions relating to conditions for obtaining license, loan license, offences and penalties
	C204T3	To develop cleansing and care needs for face, eye lids, lips, body and neck
	C204T4	To examine building blocks for different product formulations of cosmetics and cosmeceuticals
	C204T5	To justify the cosmeceutical products for solving problems related to skin, hair, and oral cavity
	C204T6	To elaborate the regulatory guidelines for herbal cosmetics
<b>MPH205P Pharmaceutics Practical II</b>	Upon completion of this course the graduate is able to	
	C205P1	To recall the basic techniques for the preparation of microspheres, liposomes and solid dispersions.
	C205P2	To compare the dissolution studies of various marketed products.
	C205P3	To develop and evaluate the various novel drug delivery systems.
	C205P4	To test for protein drug binding characteristics, cell permeation and bioavailability of the formulations.
	C205P5	To evaluate the formulated cosmetic preparations.
	C205P6	To design formulations by QbD and DoE concepts, use simulations for estimation of pharmacokinetics and pharmacodynamics.
<b>MPH301T Research Methodology and Biostatistics (Common for all specializations) (Theory)</b>	Upon completion of this course the graduate is able to	
	C301T1	To define the concepts of research methodology
	C301T2	To infer data using biostatistic techniques
	C301T3	To identify the importance of knowledge of medical research
	C301T4	To inspect the laboratory animal facilities
	C301T5	To know the importance of CPCSEA guidelines
	C301T6	To maximize the knowledge regarding declaration of Helsinki
	Upon completion of this course the graduate is able to	

<b>Project Work (Common for all specializations)</b>	PW1	To define the fundamentals , carry out the literature review on the proposed research work and identify the problem
	PW2	To summarise the requirements in the proposed research
	PW3	To develop the research hypothesis
	PW4	To take part in research experiments and documented
	PW5	To evaluate the work done by applying statistic tools
	PW6	To appraise societal application and appreciation

## M. PHARMACY PHARMACEUTICAL ANALYSIS

Course Number & Course Name	CO No	Course Outcome (CO)
MPA101T Modern Pharmaceutical Analytical Techniques	Upon completion of this course the graduate is able to	
	C101T1	To Recall selected analytical spectrometric techniques and applications
	C101T2	To gain knowledge on interpretation of NMR spectra instrumentation, applications of C13 & FT NMR
	C101T3	To remember different types of ionization and mass analysers in mass spectroscopy
	C101T4	To analyze pharmaceutical drugs using different chromatographic techniques
	C101T5	To choose different electrophoresis techniques for the separation of mixture of compounds and analysis of crystals by using X-ray crystallographic technique
	C101T6	To elaborate principle and assay of RIA, ELISA and Bioluminescence assays
MPA102T Advanced Pharmaceutical Analysis	Upon completion of this course the graduate is able to	
	C102T1	To Classify the impurities in drug substance , new drug product and residual solvents as per ICH guidelines
	C102T2	To illustrate the identification of elemental impurities, analytical procedures and C,H, N, S analysis
	C102T3	To explain impurity profiling and degradant characterization as per ICH and WHO guidelines
	C102T4	To assess the stability testing of phytopharmaceuticals as per the regulatory requirements by HPLC/HPTLC
	C102T5	To evaluate the biological vaccines, antitoxins anti serum as per pharmacopoeia
	C102T6	To estimate the drugs by immunoassay procedures
MPA103T Pharmaceutical Validation	Upon completion of this course the graduate is able to	
	C103T1	To know why to perform validation and qualification studies
	C103T2	To get brief outline for qualification of analytical instruments like FTIR,GC,HPLC,HPTLC,UV, pH
	C103T3	To develop knowledge regarding importance of cleaning validation, analytical method validation, computerized system validation
	C103T4	To know motive of patenting
	C103T5	To know importance of IPR
	C103T6	To maximize the knowledge regarding how to file a patent and its procedure
MPA104T Food Analysis	Upon completion of this course the graduate is able to	
	C104T1	To recall the concepts of Bio molecules, their processing digestion absorption and metabolism

	C104T2	To explain different food constituents like lipids and vitamins
	C104T3	To identify food additives and to understand different techniques in determination of food additives
	C104T4	To analyse finished food products and fermentation products
	C104T5	To estimate the concentration of pesticide level in finished goods and various foods and to explain the effect of pests and insects on various foods
	C104T6	To improve knowledge on food regulations and legislations and understand different analytical techniques in food processing
	<b>MPA105P Pharmaceutical Analysis Practical I</b>	Upon completion of this course the graduate is able to
C105T1		To recall the assay of official compounds by different titrations
C105T2		To illustrate the calibration/Validation of different analytical instruments with their compliance
C105T3		To analyse the pharmacopoeial compounds and their formulations by Chromatographic and Spectroscopic techniques
C105T4		To interpret the impurities and residual solvents by Impurity profiling of drugs
C105T5		To determine the Physico-chemical properties of food products
C105T6		To estimate the various constituents in food products
<b>MPA201T Advanced Instrumental Analysis</b>	Upon completion of this course the graduate is able to	
	C201T1	How the HPLC is applied for the analysis of enantiomers and the chiral compounds
	C201T2	To explain the different chromatographic techniques and applications in pharmaceutical
	C201T3	To apply knowledge of CE-MS and SFC for the analysis of pharmaceutical compounds
	C201T4	To analyze the pharmaceutical drugs by using hyphenated mass spectrometric techniques
	C201T5	To gain knowledge how to interpret NMR spectra for structural analysis
	C201T6	To maximize the knowledge about different types of NMR techniques like FTNMR, C13
<b>MPA202T Modern BioAnalytical Techniques</b>	Upon completion of this course the graduate is able to	
	C202T1	To choose various extraction procedures for the sample preparation in bio- analytical method development and its validation according to USFDA and EMEA guidelines.
	C202T2	To explain Bio pharmaceutical considerations and Biopharmaceutics classification system
	C202T3	To summarize the applications of pharmacokinetic and toxicokinetic studies
	C202T4	To classify various cell culture techniques and study of cell viability assays
	C202T5	To evaluate the metabolites and drug metabolizing enzymes
	C202T6	To predict the performance of drug product by bioequivalence studies

<b>MPA203T Quality Control and Quality Assurance</b>	Upon completion of this course the graduate is able to	
	C203T1	To know what is the importance of GLP
	C203T2	To explain the cGMP guidelines according to schedule M,USFDA
	C203T3	To organize the stores used for storage of raw materials
	C203T4	To analyze the raw materials as per IP, BP, USP
	C203T5	To know the importance of documentation in pharmaceutical industries
	C203T6	To adapt proper manufacturing operations and controls
<b>MPA204T Herbal and Cosmetic Analysis</b>	Upon completion of this course the graduate is able to	
	C204T1	To define herbal remedies, to recall efficacy and validation of herbal products and to recall WHO and AYUSH guidelines
	C204T2	To explain adulteration and deterioration types causes and determination techniques and to illustrate regulatory requirements for setting herbal drug industry
	C204T3	To experiment with the analytical techniques in testing of natural products and drugs
	C204T4	To compare methods in determination of herbal drugs in monographs of different pharmacopoeias
	C204T5	To determine the herbal drug-drug interactions according to WHO and AYUSH guidelines
	C204T6	To estimate cosmetic products, finished products and raw materials fir the presence of different impurities and chemical constituents to meet specifications as per Bureau Indian standards
<b>MPA205P Pharmaceutical Analysis Practical II</b>	Upon completion of this course the graduate is able to	
	C205P1	How organic compounds spectra are interpret
	C205P2	To demonstrate different instrumental techniques
	C205P3	To develop bioanalytical techniques for different pharmaceutical drugs
	C205P4	To analyze raw materials as per official monographs and remember the quality control tests for various pharmaceuticals
	C205P5	To determine adulteration of herbal compound
	C205P6	To estimate cosmetic products