

M. PHARM COURSE OUTCOMES

Course	Outcomes
Department of Pharmaceutics	
Semester-I	
MPAT101T Modern Pharmaceutical Analytical Techniques	MPAT101T (1) Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPH102T Drug Delivery System	MPH102T (1) Compare the concepts of development for novel drug delivery systems.
	MPH102T (2) Signify pathophysiological conditions for development of novel drug delivery systems.
	MPH102T (3) Justify the criteria for selection of drugs and polymers for the development of novel drug delivery systems.
	MPH102T (4) Evaluate novel drug delivery systems.
	MPH102T (5) Develop new technologies utilized for development of new dosage forms.
	MPH102T (6) Defend the recent developments for drug delivery, as per industry need.
MPH103T Modern Pharmaceutics	MPH103T (1) State and perform various elements of preformulation studies.
	MPH103T (2) Differentiate between the Compaction, compression and consolidation parameters
	MPH103T (3) Imbibe the Industrial Management and GMP Considerations
	MPH103T (4) Practice the optimization techniques and pilot plant Scale Up techniques.
	MPH103T (5) Validate and evaluate various processes, dosage forms and equipments.

	MPH103T (6) Estimate dissolution, diffusion and pharmacokinetic parameters from Pharmaceuticals point of view.
MPH104T Regulatory Affair	MPH104T (1) Explain the importance of documentation in Pharma industry with regulatory requirements for product approval process.
	MPH104T (2) Appraise post approval regulatory requirements for drug products with submission of global documents in CTD and ECTD formats for different countries.
	MPH104T (3) Propose the non-clinical drug development approvals for conducting clinical trials.
	MPH104T (4) Elaborate pharmacovigilance and process of monitoring in clinical trials
MPH105P Pharmaceutics Practical I	MPH105P (1) Elaborate the technique and apply skills in formulating dosage forms.
	MPH105P (2) Use factorial design technique to get the formulation of desired characteristics.
	MPH105P (3) Explain and apply the different types of analytical instrumental technique available for quality control of pharmaceuticals. (API's & Formulations).
	MPH105P (4) Interpret scientific data, represent the data in a tabular and/or graphical form.
	MPH105P (5) Demonstrate the effect of the physico-chemical properties on pharmaceutical systems
Semester-II	
MPH201T Molecular Pharmaceutics	MPH201T (1) Interpret the events, concepts and biological process in drug targeting.
	MPH201T (2) Differentiate, formulate and evaluate various novel targeted drug delivery systems.
	MPH201T (3) Summarize the process for Tumor targeting and brain specific delivery.
	MPH201T (4) Appraising the need of pulmonary system, differentiate, formulate and evaluate nasal drug delivery system.
	MPH201T (5) Summarize nucleic acid based therapeutic delivery system.
MPH202T Advanced Biopharmaceutics & Pharmacokinetics	MPH202T (1) Compile the basic concepts in biopharmaceutics and pharmacokinetics with parameters that best describe process of drug absorption.
	MPH202T (2) Elaborate biopharmaceutics considerations in drug product design and its performance.
	MPH202T (3) Develop pharmacokinetic models and parameters that best describe process of drug ADME.
	MPH202T (4) Defend use of Bioavailability and Bioequivalence studies for new drugs or dosage forms, as per industry need.

	MPH202T (5) Estimate the applications of pharmacokinetics and pharmacodynamics of biotechnology drugs.
MPH203T Computer Aided Drug Development	MPH203T (1) Discuss and correlate studies, which is inclusive of history of computers, research and development and use of computers in research.
	MPH203T (2) Elaborate Computational Modeling of Drug Disposition.
	MPH203T (3) Predict the role of computers in formulation development with optimization techniques.
	MPH203T (4) Compile Computer-aided biopharmaceutical characterization.
	MPH203T (5) Discuss with peers Artificial Intelligence (AI) and Robotics.
MPH204T Cosmetic & Cosmeceuticals	MPH204T (1) Describe the regulatory provisions related to the import and manufacture of cosmetics as per the Drugs and Cosmetics Act 1940 and the Rules 1945.
	MPH204T (2) Discuss key building blocks for various formulations.
	MPH204T (3) Explain the various problems related to the skin and hair.
	MPH204T (4) Design cosmeceuticals for various skin, hair and dental problems.
	MPH204T (5) Describe the guidelines for the regulation of herbal cosmetics used in private bodies.
	MPH204T (6) Design cosmetics and cosmeceuticals of desired safety, stability and efficacy with technologies involved in their manufacturing.
MPH205P Pharmaceutics Practical-II	MPH205P(1) Elaborate the technique and apply skills in formulating dosage and cosmetic forms.
	MPH205P(2) Apply software to get the formulation of desired characteristics.
	MPH205P(3) Interpret scientific data, represent the data in a tabular and/or graphical form.
	MPH205P(4) Interpret Pharmacokinetic and pharmacodynamics data perform data analysis using computer Softwares and give conclusion.
	MPH205P(5) Perform Pharmacokinetics studies <i>in-vitro</i> .
	MPH205P(6) Compare between marketed formulations for drug release.
Department of Pharmaceutical Quality Assurance	
Semester-I	
MPAT101T	MPAT101T(1) Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.

Modern Pharmaceutical Analytical Techniques	MPAT101T(2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T(3) Judge the research problems in Pharma. Analysis.
	MPAT101T(4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T(5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MQA102T Quality Management System	MQA102T (1) Discuss the importance of quality.
	MQA102T (2) Identify and use tools for quality improvement.
	MQA102T (3) Locate, Evaluate and Analyse issues in quality.
	MQA102T (4) Establish parameters for quality evaluation of pharmaceuticals.
	MQA102T (5) Prepare, Summarise and build methods for stability testing of drug and drug substances.
	MQA102T (6) Compose statistical approaches for quality.
MQA103T Quality Control and Quality Assurance	MQA103T (1) Compile responsibilities of QA and QC and discuss concept of Good Laboratory Practices (GLP), QSEM and CPCSEA guidelines.
	MQA103T (2) Elaborate Current Good Manufacturing Practices (cGMP) in Pharmaceutical Industry.
	MQA103T (3) Evaluate raw materials, finished products, packaging materials and in process quality control tests for different Pharmaceutical formulations.
	MQA103T (4) Discuss importance of documentation and the scope of quality certifications applicable to Pharmaceutical Industries.
	MQA103T (5) Design manufacturing operations and packaging operations in Pharmaceutical Industry
	MQA103T (6) Discuss importance of documentation and the scope of quality certifications applicable to Pharmaceutical Industries.
MQA104T Product Development and Technology Transfer	MQA104T (1) Describe new product development process and informational content for Investigational new drug application.
	MQA104T (2) Discuss preformulation and its impact on product development.
	MQA104T (3) Sketch and discuss design layout of Pilot plant for different dosage forms.
	MQA104T (4) Explain the significance of Pharmaceutical dosage form and their packaging requirements.
	MQA104T (5) Explain necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D.
MQA105P Pharmaceutical	MQA105P (1) Analyze drugs and formulations by using various sophisticated analytical instruments

Quality Assurance Practical-I	MQA105P(2) Evaluate Quality control tests for tablet, capsules, parenterals and ointment.
	MQA105P(3) Determine the process capability, stability study protocol, accelerated stability studies.
	MQA105P(4) Determine solubility of drugs using surfactant systems and co-solvency method.
Semester-II	
MQA201T Hazards and Safety Management	MQA201T(1) Summarize multidisciplinary nature of environmental studies and various natural resources.
	MQA201T(2) Discuss concept, structure and function of an Ecosystem.
	MQA201T(3) Compile sources and types of Air based hazards.
	MQA201T(4) Adopt the types of chemical based hazards and their prevention.
	MQA201T(5) Select preventive measure and management system for fire and explosion.
	MQA201T(6) Elaborate rules and guidelines for risk assessment and management.
MQA202T Pharmaceutical Validation	MQA202T (1) Summarize concepts of calibration, qualification and validation.
	MQA202T (2) Evaluate qualification of manufacturing equipments and analytical instruments.
	MQA202T (3) Compile qualification of laboratory equipments and validation of utility system.
	MQA202T (4) Design process validation of different dosage forms and validate analytical method for estimation of different drugs.
	MQA202T (5) Elaborate cleaning validation of equipments and computer system validation.
	MQA202T (6) Compile concepts of Intellectual property, patents, copyright, trademark and significance of Transfer Technology.
MQA203T	MQA203T (1) Justify the importance of auditing, parameters involved, departments.
	MQA203T (2) Explain design and develop the methodology for pre auditing, auditing and post auditing of the facility

Audits and Regulatory Compliance	MQA203T (3) Formulate the audit process, constitute the team required to complete the process and assign the role to each member.
	MQA203T (4) Develop the auditing report, authorise the report, investigate NCs, suggest and follow up compliance audit
	MQA203T (5) Prepare the check list for auditing the departments signifying the importance of each component.
	MQA203T (6) Discuss and appraise a pre audit list which shall be the base for auditing for GAMP.
MQA204T Pharmaceutical Manufacturing Technology	MQA204T(1) Describe the common practice in the pharmaceutical industry developments, plant layout and production planning.
	MQA204T(2) Discuss principles and practices of aseptic process technology, non-sterile manufacturing technology and packaging technology.
	MQA204T(3) Explain production principles and practices of non sterile manufacturing process technology.
	MQA204T(4) Elaborate the process of selection of Containers and closures for pharmaceuticals.
	MQA204T(5) Explain principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing.
MQA205P Pharmaceutical Quality Assurance Practical II	MQA205P (1) Analyse drugs and their formulations by various analytical instruments.
	MQA205P (2) Validate sterile and non-sterile dosage form by Process validation
	MQA205P (3) Measure qualification of Pharmaceutical equipments and Analytical instruments
	MQA205P (4) Validate equipment by cleaning validation method.
Department of Pharmaceutical Chemistry	
Semester-I	
MPAT101T Modern Pharmaceutical Analytical Techniques	MPAT101T (1) Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.

	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPC102T Advanced Organic Chemistry – I	MPC102T (1) Explain the different organic intermediates involved in determining the reaction mechanism.
	MPC102T (2) Elaborate the mechanism and applications of SN1, SN2, E1, E2 and various named reactions
	MPC102T (3) Discuss the applications of various synthetic reagents
	MPC102T (4) Explain the various protecting and de-protecting groups
	MPC102T (5) Describe the chemistry, synthesis and mechanism of reactions in heterocyclic compounds
	MPC102T (6) Compile the principle, process and applications of Synthon approach and retrosynthesis.
MPC103T Advanced Medicinal Chemistry	MPC103T (1) Discuss various stages and techniques of drug discovery and their role in drug research
	MPC103T (2) Appraise the structural activity relationship and MOA of the important class of drugs and role of stereochemistry on drug action
	MPC103T (3) Apply peptidomimetics approach and applications
	MPC103T (4) Explain types of Enzyme inhibition and its application in medicine
	MPC103T (5) Elaborate prodrug and Analog development along with its applications
	MPC103T (6) Interpret techniques of combating drug resistance
MPC104T Chemistry of Natural Products	MPC104T (1) Discuss the different types of natural compounds, their chemistry and medicinal importance.
	MPC104T (2) Explain the importance of natural compounds as lead molecules for new drug discovery.
	MPC104T (3) Illustrate rDNA technology tool for new drug discovery.
	MPC104T (4) Elaborate chemistry and physiological significance of vitamins.
	MPC104T (5) Summarise general and advanced methods of structural elucidation of compounds of natural origin.
	MPC104T (6) Describe isolation, purification and characterization of simple chemical constituents from the natural source
MPC105P Pharmaceutical Chemistry Practical I	MPC105P (1) Analyze Pharmacopoeial compounds by various instrumental techniques
	MPC105P (2) Estimation of components by fluorimetry and flame photometry
	MPC105P (3) Synthesize compounds based on rearrangement reaction
	MPC105P (4) Perform purification and characterization of medicinally important synthesized compounds
	MPC105P (5) Estimation of elements and functional groups in organic natural compounds

	MPC105P (6) Perform isolation and typical degradation reactions on plant constituents
Semester-II	
MPC201T Advanced Spectral Analysis	MPC201T (1) Correlate different analytical data using discriminate instruments.
	MPC201T (2) Analyze and conclude the data of unknown structures.
	MPC201T (3) Evaluate data of hyphenated instruments.
	MPC201T (4) Discuss structural elucidation of organic and natural compounds by IR, NMR and MASS spectral data
MPC202T Advanced Organic Chemistry –II	MPC202T (1) Describe the principles and applications of Green chemistry
	MPC202T (2) Illustrate the concept, principle and applications of stereochemistry and asymmetric synthesis
	MPC202T (3) Explain the chemistry of peptide.
	MPC202T (4) Elaborate the concept of Photochemical reactions
	MPC202T (5) Discuss the principles of different types of pericyclic reactions.
	MPC202T (6) Explain the applications of various catalysis used in the reaction.
MPC203T Computer Aided Drug Design	MPC203T (1) Predict and analyzed molecular properties of new molecules and explain various drug design methods
	MPC203T (2) Elaborate the concept of pharmacophore mapping and Virtual Screening
	MPC203T (3) Discuss the Molecular Modeling and Docking technique.
	MPC203T (4) Assess the role of computer aided drug design in drug discovery
	MPC203T (5) Discuss history and development of QSAR
	MPC203T (6) Apply statistically QSAR based applications.
MPC204T Pharmaceutical Process Chemistry	MPC204T(1) Develop synthetic routes that is safe, cost-effective, environmentally friendly, and efficient.
	MPC204T(2) Impart knowledge on the development and optimization of a synthetic route/s.
	MPC204T(3) Discuss pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients and new chemical entities for the drug development phase.
	MPC204T(4) Create and carry out work up and separation procedure.
	MPC204T(5) Predict the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism.

	MPC204T(6) Explain principles and applications of modern chemical instrumentation, experimental design, and data analysis.
MPC205P Pharmaceutical Chemistry Practical II	MPC205P (1) Synthesize organic compounds by adapting different approaches
	MPC205P (2) Interpretation and identification of organic compounds by various analytical techniques
	MPC205P (3) Perform synthesis of organic compounds by various synthetic route as well as techniques
	MPC205P (4) Apply softwares for physicochemical and ADMET properties of drug molecules
	MPC205P (5) Perform experiments based on various computer aided drug design techniques
	MPC205P (6) Reflect the requirement of API through case studies as per regulatory guidelines
Department of Pharmacology	
Semester-I	
MPAT101T Modern Pharmaceutical Analytical Techniques	MPAT101T (1) Explain principle, instrumentation of various spectroscopic and chromatographic technique and their applications in Pharmaceutical research.
	MPAT101T (2) Interpret the spectrums and chromatogram of different methods of analysis.
	MPAT101T (3) Judge the research problems in Pharma. Analysis.
	MPAT101T (4) Examine and interpret the data obtained through experimentation and report the results as per regulatory requirements.
	MPAT101T (5) Utilize different analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
MPL102T Advanced Pharmacology-I	MPL102T (1) Predict Pharmacokinetic and Pharmacodynamics process of lipophilic and hydrophilic drugs.
	MPL102T (2) Differentiate pharmacological actions of drug acting on autonomic nervous system.
	MPL102T (3) Relate concept of drug action on central nervous system with its receptors.
	MPL102T (4) Describe mechanism and pharmacology of prototype drugs acting on CVS disorders and explain their clinical use.
	MPL102T (5) Illustrate feedback mechanism using mechanism and pharmacological action of hormones, autocoids and their antagonists.
MPL103T	MPL103T (1) Describe the various animals used in the drug discovery process.

Pharmacological and Toxicological Screening Methods–I	MPL103T (2) Explain good laboratory practices in maintenance and handling of experimental animals.
	MPL103T (3) Appraise the regulations and ethical requirement for the usage of experimental animals.
	MPL103T (4) Discuss the various preclinical <i>in-vitro</i> , <i>in-vivo</i> and other possible animal alternative models for the screening various pharmacological activities.
	MPL103T (5) Elaborate general principles and evaluation of Immunoassay methods.
MPL104T Cellular and Molecular Pharmacology	MPL104T (1) Analyze the receptor signal transduction processes.
	MPL104T (2) Construct the molecular pathways affected by drugs.
	MPL104T (3) Explain mechanisms and applicability of molecular pharmacology, genomic and proteomic tools.
	MPL104T (4) Distinguish the process of Pharmacogenomics.
	MPL104T (5) Interpret the concept of Immunotherapeutic.
	MPL104T (6) Interpret various Cell culture techniques.
MPL105P Pharmacology Practical-I	MPL105P (1) Demonstrate route of drug administration, blood withdrawal techniques.
	MPL105P (2) Evaluate of effect of drug on CNS activity, analgesic activity, Anti-diabetic activity, Anti-inflammatory activity, diuretic activity, antiulcer activity etc.
	MPL105P (3) Estimate DNA/RNA isolated from biological sample using various techniques.
	MPL105P (4) Demonstrate MTT assay, gel electrophoresis, gene amplification and Protein quantification.
	MPL105P (5) Explain the principle, procedure and applications of enzyme inhibition activity, pharmacokinetics studies, apoptosis determination etc.
	MPL105P (6) Exhibit the extraction techniques of drug from biological samples and their estimation using various analytical techniques.
Semester-II	
MPL201T Advanced Pharmacology II	MPL201T (1) Illustrate feedback mechanism using mechanism and pharmacological action of drug acting on endocrine systems.
	MPL201T (2) Relate concept of mechanism and resistance of drugs acting microbes, fungus, virus and tuberculosis.
	MPL201T (3) Discuss the pharmacotherapy of COPD, Asthma, constipation, diarrhea, Ulcer, inflammation, Rheumatoid Arthritis, immune disorders etc.
	MPL201T (4) Relate significance of rhythm, cycles and biological clock for application of chronotherapy in various disease conditions.

	<p>MPL201T (5) Explain antioxidant scavenging effects on free radicals to cure diabetes, neurodegenerative diseases and cancer etc.</p> <p>MPL201T (6) Conclude the recent advances in the treatment of Alzhemier’s disease, Parkinson’s disease, cancer and diabetes mellitus.</p>
<p>MPL202T Pharmacological and Toxicological Screening Methods–II</p>	<p>MPL202T (1) Summarise the various types of toxicity studies.</p>
	<p>MPL202T (2) Discuss the importance, ethical and regulatory requirements for various type of toxicity studies.</p>
	<p>MPL202T (3) Outline the significance of reproductive toxicity, teratogenicity, Genotoxicity, carcinogenicity studies.</p>
	<p>MPL202T (4) Describe the significance of IND enabling studies and safety pharmacology studies.</p>
	<p>MPL202T (5) Recognize the importance and applications of toxicokinetics studies and alternative methods to animal toxicity testing.</p>
	<p>MPL202T (6) Demonstrate the practical skills require for conducting the preclinical toxicity studies.</p>
<p>MPL203T Principles of Drug Discovery</p>	<p>MPL203T (1) Illustrate various stages in modern drug discovery process.</p>
	<p>MPL203T (2) Appraise role of genomics, proteomics and bioinformatics in drug discovery.</p>
	<p>MPL203T (3) Discuss the different methods for lead identification.</p>
	<p>MPL203T (4) Explain different approaches for rational drug design.</p>
	<p>MPL203T (5) Elaborate role of classical target and biomarker in drug discovery.</p>
	<p>MPL203T (6) Illustrate role of <i>in-vitro</i> screening technique in drug discovery</p>
<p>MPL204T Clinical Research and Pharmacovigilance</p>	<p>MPL204T (1) Elaborate the basic concept of clinical research.</p>
	<p>MPL204T (2) Discuss regulatory requirements for conducting clinical trial.</p>
	<p>MPL204T (3) Summarise the types of clinical trial designs.</p>
	<p>MPL204T (4) Explain the responsibilities of key players involved in clinical trials</p>
	<p>MPL204T (5) Describe in detail about safety monitoring, reporting and close-out activities.</p>
	<p>MPL204T (6) Illustrate the principles of Pharmacovigilance.</p>
<p>MPL205P</p>	<p>MPL205P (1) Demonstrate the determination of unknown concentration of sample by Bioassay method using chicken ilium preparation.</p>
	<p>MPL205P (2) Illustrate the drug effect on rat BP, heart rate and ECG using computer simulation techniques.</p>

Pharmacology Practical II	MPL205P (3) Study the acute oral toxicity, dermal toxicity, repeated dose toxicity studies and drug mutagenicity study as per OECD guidelines.
	MPL205P (4) Assess the ADR reporting and monitoring protocol.
	MPL205P (5) Design the protocol for Clinical trial studies.
	MPL205P (6) Evaluate the efficacy of drugs using In-silico studies like docking studies, Pharmacophore based screening and QSAR studies.