M Pharm Course Outcomes (COs)

Course Code	Course Name	Course outcome
Specialization: Pharmaceutics		
M Pharm 1st Semester		
MPH101T	Modern Pharmaceutical Analytical Techniques	Scope This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. Objectives After completion of course student is able to know, 1. Chemicals and Excipients 2. The analysis of various drugs in single and combination dosage forms 3. Theoretical and practical skills of the instruments
MPH102T	Drug Delivery System	SCOPE This course is designed to impart knowledge on the area of advances in novel drug delivery systems. OBJECTIVES Upon completion of the course, student shall be able to understand 1. The various approaches for development of novel drug delivery systems. 2. The criteria for selection of drugs and polymers for the development of delivering system 3. The formulation and evaluation of Novel drug delivery systems.
MPH103T	Modern Pharmaceutics	Scope Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries. Objectives Upon completion of the course, student shall be able to understand 1. The elements of preformulation studies. 2. The Active Pharmaceutical Ingredients and Generic drug Product development 3. Industrial Management and GMP Considerations. 4. Optimization Techniques & Pilot Plant Scale Up Techniques 5. Stability Testing, sterilization process &

		packaging of dosage forms.
MPH104T	Regulatory Affair	Scope Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory documents : filing process of IND, NDA and ANDA 1. To know the approval process of 2. To know the chemistry, manufacturing controls and their regulatory importance 3. To learn the documentation requirements for 4. To learn the importance and Objectives: Upon completion of the course, it is expected that the students will be able to understand 1. The Concepts of innovator and generic drugs, drug development process 2. The Regulatory guidance's and guidelines for filing and approval process 3. Preparation of Dossiers and their submission to regulatory agencies in different countries 4. Post approval regulatory requirements for actives and drug products 5. Submission of global documents in CTD/ eCTD formats 6. Clinical trials requirements for approvals for conducting clinical trials 7. Pharmacovigilence and process of monitoring in clinical trials.
MPH105P	Pharmaceutics Practical I	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
M Pharm 2nd Semester		
MPH201T	Molecular Pharmaceutics (Nano Tech and TargetedDDS)	Scope This course is designed to impart knowledge on the area of advances in novel drug delivery systems. Objectives Upon completion of the course student shall be able to understand

		1. The various approaches for development of novel drug delivery systems. 2. The criteria for selection of drugs and polymers for the development of NTDS 3. The formulation and evaluation of novel drug delivery systems.
MPH202T	Advanced Biopharmaceutics & Pharmacokinetics	Scope This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts. Objectives Upon completion of this course it is expected that students will be able understand, 1. The basic concepts in biopharmaceutics and pharmacokinetics. 2. The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination. 3. The critical evaluation of biopharmaceutic studies involving drug product equivalency. 4. The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters. 5. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic
MPH203T	Computer Aided Drug Delivery System	Scope This course is designed to impart knowledge and skills necessary for computer applications in pharmaceutical research and development who want to understand the application of computers across the entire drug research and development process. Basic theoretical discussions of the principles of more integrated and coherent use of computerized information (informatics) in the drug development process are provided to help the students to clarify the concepts. Objectives Upon completion of this course it is expected that students will be able to

		understand, 1. History of Computers in Pharmaceutical Research and Development 2. Computational Modeling of Drug Disposition 3. Computers in Preclinical Development 4. Optimization Techniques in Pharmaceutical Formulation 5. Computers in Market Analysis 6. Computers in Clinical Development 7. Artificial Intelligence (AI) and Robotics 8. Computational fluid dynamics(CFD)
MPH204T	Cosmetic and Cosmeceuticals	Scope This course is designed to impart knowledge and skills necessary For the fundamental need for cosmetic and cosmeceutical products. Objectives Upon completion of the course, the students shall be able to understand 1. Key ingredients used in cosmetics and cosmeceuticals. 2. Key building blocks for various formulations. 3. Current technologies in the market 4. Various key ingredients and basic science to develop cosmetics and cosmeceuticals 5. Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.
MPH205P	Pharmaceutics Practical II	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
Specialization: Pharmaceutical Chemistry		
M Pharm 1st Semester		
MPC101T	Modern Pharmaceutical Analytical Techniques	Scope This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. Objectives After completion of course student is able to know about chemicals and excipients 1. The analysis of various drugs in single and combination dosage forms

		2. Theoretical and practical skills of the instruments
MPC1012T	Advanced Organic Chemistry -I	Scope The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery. Objectives Upon completion of course, the student shall be to understand 1. The principles and applications of reterosynthesis 2. The mechanism & applications of various named reactions 3. The concept of disconnection to develop synthetic routes for small target molecule. 4. The various catalysts used in organic reactions 5. The chemistry of heterocyclic compounds
MPC103T	Advanced Medicinal chemistry	Scope The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design. Objectives At completion of this course it is expected that students will be able to understand 1. Different stages of drug discovery 2. Role of medicinal chemistry in drug research 3. Different techniques for drug discovery 4. Various strategies to design and develop new drug like molecules for biological targets 5. Peptidomimetics
MPC104T	Chemistry of Natural Products	Scope The subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin. Objectives At completion of this course it is expected that students will be able to understand- 1. Different types of natural compounds and their chemistry and medicinal importance

		2. The importance of natural compounds as lead molecules for new drug discovery 3. The concept of rDNA technology tool for new drug discovery 4. General methods of structural elucidation of compounds of natural origin 5. Isolation, purification and characterization of simple chemical constituents from natural source
MPC105P	Pharmaceutical Chemistry Practical I	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
M Pharm 2nd Semester		
MPC201T	Advanced Spectral Analysis	Scope This subject deals with various hyphenated analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are LC-MS, GC-MS, ATR-IR, DSC etc. Objectives At completion of this course it is expected that students will be able to understand- 1. Interpretation of the NMR, Mass and IR spectra of various organic compounds 2. Theoretical and practical skills of the hyphenated instruments 3. Identification of organic compounds
MPC202T	Advanced Organic Chemistry -II	Scope The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery. Objectives Upon completion of course, the student shall able to understand 1. The principles and applications of Green chemistry 2. The concept of peptide chemistry. 3. The various catalysts used in organic reactions 4. The concept of stereochemistry and asymmetric synthesis.

MPC203T	Computer Aided Drug Design	Scope The subject is designed to impart knowledge on the current state of the art techniques involved in computer assisted drug design. Objectives At completion of this course it is expected that students will be able to understand 1. Role of CADD in drug discovery 2. Different CADD techniques and their applications 3. Various strategies to design and develop new drug like molecules. 4. Working with molecular modeling softwares to design new drug molecules 5. The in silico virtual screening protocols
MPC204T	Pharmaceutical Process Chemistry	Scope Process chemistry is often described as scale up reactions, taking them from small quantities created in the research lab to the larger quantities that are needed for further testing and then to even larger quantities required for commercial production. The goal of a process chemist is to develop synthetic routes that are safe, cost-effective, environmentally friendly, and efficient. The subject is designed to impart knowledge on the development and optimization of a synthetic route/s and the pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients (APIs) and new chemical entities (NCEs) for the drug development phase. Objectives At completion of this course it is expected that students will be able tounderstand 1. he strategies of scale up process of apis and intermediates 2. The various unit operations and various reactions in process chemistry
MPC205P	Pharmaceutical Chemistry Practical II	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
Specialization: Pharmacognosy		
M Pharm 1st Semester		
MPG101T		Scope

	Modern Pharmaceutical Analytical Techniques	This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. Objectives After completion of course student is able to know about chemicals and excipients 1. The analysis of various drugs in single and combination dosage forms 2. Theoretical and practical skills of the instruments
MPG102T	Advanced Pharmacognosy-1	SCOPE To learn and understand the advances in the field of cultivation and isolation of drugs of natural origin, various phytopharmaceuticals, nutraceuticals and their medicinal use and health benefits. OBJECTIVES Upon completion of the course, the student shall be able to know the 1. advances in the cultivation and production of drugs 2. various phyto-pharmaceuticals and their source, its utilization and medicinal value. 3. various nutraceuticals/herbs and their health benefits 4. Drugs of marine origin 5. Pharmacovigilance of drugs of natural origin
MPG103T	Phytochemistry	SCOPE Students shall be equipped with the knowledge of natural product drug discovery and will be able to isolate, identify and extract and the phytoconstituents OBJECTIVES Upon completion of the course, the student shall be able to know the, 1. different classes of phytoconstituents, their biosynthetic pathways, their properties, extraction and general process of natural product drug discovery 2. phytochemical fingerprinting and structure elucidation of phytoconstituents.
MPG104T	Industrial Pharmacognostical Technology	SCOPE To understand the Industrial and commercial

		potential of drugs of natural origin, integrate traditional Indian systems of medicine with modern medicine and also to know regulatory and quality policy for the trade of herbals and drugs of natural origin. OBJECTIVES By the end of the course the student shall be able to know, 1. the requirements for setting up the herbal/natural drug industry. 2. the guidelines for quality of herbal/natural medicines and regulatory issues. 3. the patenting/IPR of herbals/natural drugs and trade of raw and finished materials.
MPG105P	Pharmacognosy Practical I	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
M Pharm 2nd Semester		
MPG201T	Medicinal Plant biotechnology	SCOPE To explore the knowledge of Biotechnology and its application in the improvement of quality of medicinal plants OBJECTIVES Upon completion of the course, the student shall be able to, 1. Know the process like genetic engineering in medicinal plants for higher yield of Phytopharmaceuticals. 2. Use the biotechnological techniques for obtaining and improving the quality of natural products/medicinal plants
MPG202T	Advanced Pharmacognosy-II	SCOPE To know and understand the Adulteration and Deterioration that occurs in herbal/natural drugs and methods of detection of the same. Study of herbal remedies and their validations, including methods of screening OBJECTIVES Upon completion of the course, the student shall be able to know the, 1. validation of herbal remedies 2. methods of detection of adulteration and

		evaluation techniques for the herbal drugs 3. methods of screening of herbals for various biological properties
MPG203T	Indian system of medicine	SCOPE To make the students understand thoroughly the principles, preparations of medicines of various Indian systems of medicine like Ayurveda, Siddha, Homeopathy and Unani. Also focusing on clinical research of traditional medicines, quality assurance and challenges in monitoring the safety of herbal medicines. OBJECTIVES After completion of the course, student is able to 1. To understand the basic principles of various Indian systems of medicine 2. To know the clinical research of traditional medicines, Current Good Manufacturing Practice of Indian systems of medicine and their formulations.
MPG204T	Herbal cosmetics	SCOPE This subject deals with the study of preparation and standardization of herbal/natural cosmetics. This subject gives emphasis to various national and international standards prescribed regarding herbal cosmeceuticals. OBJECTIVES After completion of the course, student shall be able to 1. understand the basic principles of various herbal/natural cosmetic preparations 2. current Good Manufacturing Practices of herbal/natural cosmetics as per the regulatory authorities
MPG205P	Pharmacognosy Practical II	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
Specialization: Pharmacology		
M Pharm 1st Semester		
MPL101T	Modern Pharmaceutical Analytical Techniques	Scope This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer,

		IR, HPLC, GC etc. Objectives After completion of course student is able to know about chemicals and excipients 1. The analysis of various drugs in single and combination dosage forms 2. Theoretical and practical skills of the instruments
MPL102T	Advanced Pharmacology-I	Scope The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved Objectives Upon completion of the course the student shall be able to : 1. Discuss the pathophysiology and pharmacotherapy of certain diseases 2. Explain the mechanism of drug actions at cellular and molecular level 3. Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases
MPL 103T	Pharmacological and Toxicological Screening Methods-I	Scope This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes Objectives Upon completion of the course the student shall be able to 1. Appraise the regulations and ethical requirement for the usage of experimental animals. 2. Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals 3. Describe the various newer screening methods involved in the drug discovery process 4. Appreciate and correlate the preclinical data to humans

MPL104T	Cellular and Molecular Pharmacology	Scope: The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process. Objectives: Upon completion of the course, the student shall be able to 1. Explain the receptor signal transduction processes. 2. Explain the molecular pathways affected by drugs. 3. Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process. 4. Demonstrate molecular biology techniques as applicable for pharmacology
MPL105P	Pharmacology Practical I	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
M Pharm 2nd Semester		
MPL201T	Advanced Pharmacology II	Scope The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved Objectives Upon completion of the course the student shall be able to: 1. Explain the mechanism of drug actions at cellular and molecular level 2. Discuss the Pathophysiology and pharmacotherapy of certain diseases 3. Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases
MPL 202T	Pharmacological and Toxicological Screening Methods-II	Scope: This subject imparts knowledge on the preclinical safety and toxicological evaluation of drug & new

		chemical entity. This knowledge will make the student competent in regulatory toxicological evaluation. Objectives: Upon completion of the course, the student shall be able to 1. Explain the various types of toxicity studies. 2. Appreciate the importance of ethical and regulatory requirements for toxicity studies. 3. Demonstrate the practical skills required to conduct the preclinical toxicity studies.
MPL203T	Principles of Drug Discovery	Scope: The subject imparts basic knowledge of drug discovery process. This information will make the student competent in drug discovery process Objectives: Upon completion of the course, the student shall be able to 1. Explain the various stages of drug discovery. 2. Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery 3. Explain various targets for drug discovery. 4. Explain various lead seeking method and lead optimization 5. Appreciate the importance of the role of computer aided drug design in drug discovery
MPL204T	Experimental Pharmacology practical- II	Scope: This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students onconceptualizing, designing, conducting, managing and reporting of clinical trials.This subject also focuses on global scenario of Pharmacovigilance in differentmethods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development and post market surveillance. Objectives: Upon completion of the course, the student shall be able to, 1. Explain the regulatory requirements for conducting clinical trial 2. Demonstrate the types of clinical trial designs 3. Explain the responsibilities of key players

		involved in clinical trials 4. Execute safety monitoring, reporting and close-out activities 5. Explain the principles of Pharmacovigilance 6. Detect new adverse drug reactions and their assessment 7. Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance
MPL205P	Pharmacology Practical II	Practical complementary to the theoretical discussions. Practical allows the verification of different processes/methods discussed in theory classes through experiments This is helpful for developing an insight on the subject.
M Pharm 3rd & 4th Semester (All specialization)		
MRM 301T	Research Methodology and Biostatistics	At the end of the course students will be able to 1. Develop the ability to apply the methods while working on a research project work 2. Describe the appropriate statistical methods required for a particular research design 3. Choose the appropriate research design and develop appropriate research hypothesis for a research project 4. Develop a appropriate framework for research studies
JC302P JC401P	Journal Club	Develop the ability to design power point presentation (ppt) and discussion on advancement in pharmaceutical research.
PP303P PP402P	Discussion/ Presentation (Proposal Presentation)	Develop the ability to design the appropriate research hypothesis and methodology for a pharmaceutical research project.
RW304P RW403P	Research Work and Colloquium	Develop the ability to perform the research based on a research hypothesis and methodology, data generation, processing of data, data analysis, report writing and publication of research work.