

**Program outcomes, program specific outcomes and course outcomes for all programs offered by the institution**

Upload COs for all courses (exemplars from Glossary-Notes)	Department	Upload a description of Mechanism of Communication
<b>M. PHARM</b>		
<p><b>Program Outcomes-M. Pharm (Pharmaceutics)</b></p> <ol style="list-style-type: none"> <li>1. Pharmaceutical Sciences knowledge: Apply the knowledge of mathematics, science, pharmaceutical fundamentals, and a Pharmacy specialization to the solution of complex Pharmaceutical problems.</li> <li>2. Physicochemical properties of Formulations: The knowledge of importance of physical properties of the different pharmaceutical ingredients and the factors influencing them is very valuable for pharmaceutical dosage form design.</li> <li>3. Unit Operations: Pharm. Engineering renders knowledge about the basic unit operations that are taking place in pharmaceutical industry and the different factors associated with it. This information is useful for both pharmaceutics and pharmaceutical engineering.</li> <li>4. Entrepreneurship: The knowledge on different pharmaceutical dosage forms are imparted on students. This knowledge comes while handling a pharmacy or a manufacturing unit or in the further courses.</li> <li>5. Design/Development of solutions: The information on solid dosage forms like tablets and capsules, their formulation and quality control serve as an important prerequisite for dosage form design.</li> <li>6. Application oriented Knowledge: The knowledge of biopharmaceutics enables the students to visualize the effect of pharmacokinetic (ADMET) parameters on the biological effect of the drug. The correlation of pharmacokinetics and pharmacodynamics is thus introduced and is experimentally explained to them. PO6: Environment and Sustainability: Enable extension of pharmaceutical dosage forms and enables the students to learn about different packaging materials used in pharmaceutical industry and the factors governing their use.</li> <li>7. Conduct investigations of complex problems: To understand biopharmaceutical principles and</li> </ol>	Pharmaceutical Sciences	<ul style="list-style-type: none"> <li>• University website.</li> <li>• Curriculum books (Academic calendar).</li> <li>• Notice boards.</li> <li>• Lesson plans.</li> <li>• Brochure.</li> <li>• Student awareness workshops.</li> <li>• Student orientation programmes.</li> </ul>

<p>pharmacokinetic principles through different compartment models, multiple dosage regimens, non-linear pharmacokinetics, and assessment of bioavailability and bioequivalence.</p> <ol style="list-style-type: none"> <li>8. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.</li> <li>9. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.</li> <li>10. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.</li> <li>11. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes</li> </ol>		
<p><b>Program Specific Outcomes:</b>  <b>M. Pharm (Pharmaceutics)</b></p> <ol style="list-style-type: none"> <li>1. Impart knowledge on the novel drug delivery systems, approaches, criteria for selection of polymers and drugs and their formulation and evaluation.</li> <li>2. To know various preformulation elements, industrial management and GMP considerations, Pilot Plant Scale Up Techniques, Stability testing, sterilization and packaging of dosage forms.</li> <li>3. To impart knowledge and skills in generic drug development, various regulatory filings the approval process, and concept of generics across the globe.</li> <li>4. To impart knowledge and skills for dose calculations, dose adjustments and apply biopharmaceutics theories in practical problem solving. The pharmacokinetic models, bioequivalence and potential clinical pharmacokinetic problem analysis.</li> <li>5. Skill development in Pharmaceutical research, Pharmacoinformatics, in drug development in Computational modelling, Preclinical development, clinical development, Artificial Intelligence and Robotics, and Computational fluid dynamics</li> <li>6. To impart knowledge and skills necessary for cosmetics and cosmeceuticals, their safety and</li> </ol>	<p>Pharmaceutical Sciences</p>	

<p>efficacy and current technologies in cosmetic industry.</p> <p>7. To gain knowledge in use of advanced instrumentation, formulation and evaluation of controlled release formulations, floating drug delivery systems, transdermal drug delivery systems, micromeritics, and mathematical simulations.</p>		
<b>Course Outcomes – M. Pharm</b>		
<p><b>M. Pharm. (Pharmaceutics)</b>  <b>Modern Pharmaceutical Analytical Techniques (MATI&amp;II)</b>  <b>(common for all streams)</b></p> <p>To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments • To develop basic practical skills using instrumentation techniques • Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals • To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances • To apply the knowledge learnt in developing new procedures of their own design • Comparing various methods of analysis and their outcomes</p>	Pharmaceutical Sciences	
<p><b>Product Development &amp; Packaging Technology (MPT-I)</b></p> <p>Describe new concepts in pharmaceutical packaging and their control. Explain the pharmacopoeial testing, defects and stability of blister and strip packaging materials. Demonstrate sterilization of packaging materials used in parenterals, ophthalmic and aerosols as per their legal requirement.</p>		
<p><b>(BIOPHARMACEUTICS/PHARMACOKINETICS AND NOVEL DRUG DELIVERY SYSTEM) (MPT-II)</b></p> <p>This course gives a detailed information about transporting a pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect. The various approaches for development of novel drug delivery systems.</p> <p>•Also it refers to approaches, formulations, technologies. and svstems for transporting a</p>		

pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect with suitable drug delivery. • Vaccine delivery and different mode of application approach for clinical use. • They know the different types of Drug carrier used in the process of drug delivery which serves to improve the selectivity, effectiveness, and/or safety of drug administration. • The students will know the latest drug delivery knowledge and think to develop new formulation based on the individual Requirement. • Recent developments in protein and peptide for parenteral delivery approaches will give new dimension of drug deliver for antibiotics, insulin, etc.

**Program Outcomes: -**

**M. Pharm (Pharmacognosy)**

1. In a broad sense, the student acquire knowledge on plant products with therapeutic activity and on active principles with pharmaceutical, cosmetic and food interest, or their toxicity, derived from plant species.
2. The student has an overview of the various uses of plant species and acquire knowledge on techniques applicable to their quality control.
3. The programme focus is on the utility of natural products in the present-day scenario.
4. The programme covers all the leading subjects related to natural products like Recent advances in Pharmacognosy especially in the area of medicinal plants used as anti-cancer agents, anti-diabetic agents, hepatoprotective drugs, plants as an adaptogens and immunomodulators and also subjects like Phytochemistry, Industrial Pharmacognosy, Standardization of medicinal plants etc.
5. Critically evaluate the use of plant and plant products as medicinal agents.
6. The possible programme outcome will be patent, publications, thesis or dissertation etc.

**Program Specific Outcomes**

**M. Pharm. (Pharmacognosy)**

<ol style="list-style-type: none"> <li>1. The Students get an opportunity to learn the techniques of isolation, purification and characterization of phytoconstituents by various sophisticated chromatographic techniques like TLC, HPLC, HPTLC and GC etc.</li> <li>2. The students know various aspects of plant drug standardization.</li> <li>3. The students know the advancements in cultivation and production of drugs.</li> <li>4. To understand the role of natural products in drug discovery and development.</li> <li>5. The Students get trained in various spectral techniques like UV, IR, NMR &amp; Mass Spectroscopy.</li> <li>6. The students also learn to develop effective herbal formulations &amp; cosmetics by bioactivity guided fractionation.</li> </ol>		
<p><b>Course Outcomes:</b>  <b>M. Pharm. (Pharmacognosy)</b></p> <p><b>ADVANCES IN PHARMACOGNOSY (MPG-I)</b>  Separation of the active constituents obtained from natural sources (alkaloids – glycosides – hallucinating and anticancer drugs) in addition to the different methods of separation (chromatography).</p> <p><b>Phytochemistry &amp; Biogenesis (MPG-II)</b>  The course aims to provide students with the necessary skills for:</p> <ul style="list-style-type: none"> <li>•To identify these active ingredients either in pure form of a mixture- as well as the different methods to evaluate these components and how to deal with the side effects of some components (if any) and how to overcome it and solve problems as well as how to deal with poisoning and abuse substances.</li> <li>• Herbal Drug discovery and development.</li> <li>• Optimisation of Lead compounds.</li> <li>• After finishing the course, the students get professional, Practical skills &amp; time management skills in extraction, Isolation and Phytochemical analysis of Natural products.</li> <li>• Phytochemical documentation.</li> </ul>		

<p><b>Cultivation &amp; Standardization of medicinal plants (MPG-III)</b></p> <p>In this subject the student learns about the various methods and guidelines for evaluation and standardization of medicinal plants &amp; their cultivation.</p>		
<p><b>M. Pharm (Pharmacology)</b></p>		
<p><b>Program Outcomes</b></p> <p><b>M. Pharm. (Pharmacology)</b></p> <p>The programme covers all the leading subjects related to pharmacology especially in the area of medicinal plants used as anti-cancer agents, anti-diabetic agents, hepatoprotective drugs, plants as an adaptogens and immunomodulators.</p>		
<p><b>Program Specific Outcomes</b></p> <p><b>M. Pharm. (Pharmacology)</b></p> <p>To impart knowledge and skills of drugs both from plant and synthetics origin, their safety and efficacy for the use in humans.</p>		
<p><b>Course Outcomes</b></p> <p><b>M. Pharm. (Pharmacology)</b></p> <p><b>Basic principles of drug therapy and clinical pharmacology (MPL-I)</b></p> <p>The students would appreciate the knowledge in the field of pharmacology pertaining to the principles of drug therapy and clinical research. • They would get a better understanding in the regulatory requirements for conducting clinical trial. • They would understand the types of clinical trial designs. • They would study the responsibilities of key players involved in clinical trials • They would have an understanding of the safety monitoring, reporting and close-out activities. • They would have studied the principles of Pharmacovigilance.</p>		
<p><b>Recent advances and emergent trends in pharmacological sciences (MPL-II)</b></p>		

The students would appreciate the knowledge on the recent advances and emergent trends in pharmacological sciences.

### **Pharmacological Methods & Toxicology (MPL-III)**

The students would appreciate the knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity. • They would have better understanding in the regulatory aspects for the toxicological evaluation of drugs and chemicals. • They would have studied the various types of toxicity studies and their procedure. • They would appreciate the importance of ethical and regulatory requirements for toxicity studies. • They would have studied the practical skills required to conduct the preclinical toxicity studies. • They would appreciate the use of experimental animals for the different toxicological studies.

## **M. Pharm. (Pharmaceutical Chemistry)**

### **Program Outcomes**

#### **M. Pharm. (Pharmaceutical Chemistry)**

1. Ability to independently carry out research/ investigation and development work to solve practical problems.
2. Ability to write and present a substantial technical report/ documents.
3. Ability to demonstrate a degree of mastery over the area as per the specialization of the program.
4. Ability to independently develop the business proposal in the specialized area.
5. Ability to use software and technology in research analysis and product/ process design.

### **Program Specific Outcomes**

#### **M. Pharm. (Pharmaceutical Chemistry)**

1. Are able to design, carry out, record and analyse the results of chemical experiments.
2. Are able to clearly communicate the results of scientific work in oral, written and electronic

<p>formats to both scientists and the public at large.</p> <ol style="list-style-type: none"> <li>3. Are able to explore new areas of research in both chemistry and allied fields of science and technology.</li> <li>4. Are able to relate the structure and physical properties of drugs to their pharmacological activity.</li> <li>5. Describe the synthesis of important target compounds.</li> <li>6. Describe the current challenges and opportunities in Pharmaceutical chemistry in light of contemporary developments in the field of drug discovery.</li> <li>7. Describe the overall process of drug discovery, and the role played by medicinal chemistry in this process.</li> <li>8. Find gainful employment in industry or government, be accepted at graduate or professional schools, or find employment in school systems as instructors or administrators.</li> </ol>		
<p><b>Course Out Comes</b>  <b>M. Pharm. (Pharmaceutical Chemistry):</b></p> <p><b>Drug designing including Organic name reactions (MPC-I)</b>  A detailed understanding of the processes involved in the design, development and discovery of medicinal compounds.</p>		
<p><b>Chemistry of Natural products (MPC-II)</b>  To attain detailed knowledge about chemistry of medicinal compounds from natural origin. • To understand general methods of structural elucidation of medicinally active natural compounds. • To attain knowledge regarding isolation and purification of medicinal compounds from natural origin. • To characterize products by physical and spectroscopic means including IR, NMR, GC, and MS. • To identify different types of natural products, their occurrence, structure, biosynthesis and properties. • To know the use of natural products as starting materials.</p>		
<p><b>Medicinal Chemistry (MPC-III)</b></p>		



It provides students with up-to-date knowledge in receptor theories, enzyme kinetics, principles of drug actions, modern methods of drug design, metabolism and pharmacokinetics and advanced organic chemistry.

### **M. Pharm (Pharmacy Practice)**

#### **Program Outcomes**

##### **M. Pharm. (Pharmacy Practice)**

- Understanding the importance of clinical laboratory tests used in the evaluation of disease states, and interpretation of test results required to arrive at a differential, provisional and final diagnosis. This includes compiling, analyzing and interpreting the data in an appropriate manner.
- Develop skills including detection of drug interactions, contra-indications, drug-related problems like adverse drug reactions, medication management skills.

#### **Program Specific Outcomes**

##### **M. Pharm. ((Pharmacy Practice)**

- Gain sufficient knowledge and expertise in detection and management of adverse drug reactions, drug interactions, medication errors, if any, answering any drug related queries of patients and make necessary suggestions to the medical and paramedical staff towards resolution of any drug related problems and needs of patients. Learn the pros and cons of patient's drug therapy and disease management by studying the patient record files, besides going through medication charts and interviewing patients or their attendants and consulting medical and nursing staff of the ward.
- Understanding the importance of clinical laboratory tests used in the evaluation of disease states, and interpretation of test results required to arrive at a differential, provisional and final diagnosis. This includes compiling,

<p>analyzing and interpreting the data in an appropriate manner.</p>		
<p><b>Course Out Comes</b>  <b>M. Pharm. (Pharmacy Practice)</b></p> <p><b>CLINICAL PHARMACY,  PHARMACOKINETICS AND TOXICOLOGY  (MPP-I)</b></p> <p>Students will demonstrate knowledge of and ability to use principles of therapeutics, quality improvement, communication, economics, health behaviour, social and administrative aspects, health policy and legal issues in the practice of pharmacy. Students will use knowledge of drug distribution methods in hospital and apply it in the practice of pharmacy. Students will effectively apply principles of drug store management and inventory control to medication use. Students will provide patient-centred care to diverse patients using the best available evidence and monitor drug therapy of patient through medication chart review, obtain medication history interview and counsel the patients, identify drug related problems. Students will engage in innovative activities by making use of the knowledge of clinical trials. Students will exhibit professional ethics by producing safe and appropriate medication use throughout society.</p>		
<p><b>APPLIED PHARMACOTHERAPEUTICS  INCLUDING PATHOPHYSIOLOGY (MPP-II)</b></p> <p>With the increasing role of clinical pharmacists in pharmaceutical care that aims at maximizing the benefits and reducing the hazard of drug therapy, students need to be aware about the fundamentals of pathophysiology and applied pharmacotherapeutics so that they understand the etiology and pathogenesis and choice of drug therapy well. This paper aims to enhance the competencies of students in understanding drug therapy and disease management in the changing world where clinical pharmacists are becoming an integral part of the healthcare system and are delivering their professional services in maximizing the outcome of drug therapy.</p> <p><b>HOSPITAL AND COMMUNITY PHARMACY</b></p>		

<p><b>(MPP-III)</b>          In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up. Knowledge is also imparted regarding emerging disciplines like pharmacoconomics, pharmacogenomics, pharmacoepidemiology and pharmacovigilance.</p>		