

**JSS Academy of Higher Education & Research, Mysuru  
JSS Colleges of Pharmacy, Mysuru**

**Program Outcomes and Course Outcomes of PharmD Program**

**Program Outcomes**

**Outcome 1 - Development of patient centered knowledge and skills:** The student should understand and possess the knowledge and skills required to demonstrate the ability to provide patient centered pharmaceutical care services.

**Outcome 2 - Development of pharmaceutical care plan:** The student should be able to formulate a pharmaceutical care plan by working in close relation with healthcare professionals, and patient/care taker in order to ensure the enhanced therapeutic outcome in the patient. Also, the pharmaceutical care plan includes maximization of therapeutic benefit by detecting, preventing and resolving drug related problems. The student should be able to recommend pharmaceutical care plan based on evidence, and follow-up and document the outcomes of the pharmaceutical care service.

**Outcome 3 – Hospital and community pharmacy management:** The student should be able to accurately interpret prescriptions, dispense medications and manage drug distribution system adhering to patient needs, in compliance with policies and guidelines of the hospital pharmacy, good community pharmacy practice and the recommendations of regulatory agencies. Also able to prepare inventory, procure, and use appropriate methods of drug storage and adopt appropriate techniques of drug distribution to ensure correct dispensing of medicines.

**Outcome 4 – Promote public healthcare program:** The student should be able to participate in various public health care programs of the nation including disease prevention initiatives to improve public health. Contribute to the development and promotion of national health policies including rational drug use program and essential drug policy.

**Outcome 5 – Ethics and professional integrity:** The student should deliver the duties in accordance with legal, ethical, social, economic, and professional guidelines with integrity. Able to provide patient care services by making rational and ethical decisions that represent the best interest of the patient and the society, and respect the patient, healthcare professionals, and the privacy and confidentiality of health information.

**Outcome 6 - Analytical, critical and decision making skills:** The student should be able to retrieve, understand, interpret, apply, analyze, synthesize, and evaluate information. Able to apply critical thinking and interpretational skills to identify, manage, and prevent problems and make appropriate decisions.

**Outcome 7 - Communication skills:** The student should be able to communicate effectively with patients/caretakers, healthcare professionals. Able to effectively counsel, provide medicines information, and educate patients, caretakers & healthcare professionals about medication therapy and other health related

issues. Effective communication includes use of both oral and written communications skills and various communication techniques.

**Outcome 8 - Leadership and entrepreneurship skills:** The student should be able to achieve leadership skills through team work and by involving in organizing various community outreach programs with sound decision making skills. Also the student should enhance the entrepreneurial skills by finding or creating new prospects in challenging professional environments.

**Outcome 9 - Interprofessional collaborative practice:** Student should be able to identify unique opportunities for professional collaboration towards patient-centered pharmaceutical care services and demonstrate the ability to interact and work with multidisciplinary healthcare teams.

**Outcome 10 - Design and conduct of need based research:** The student should be able to understand the research needs of the region/nation, and design and conduct the research that would add value to the health care requirements of the patients and community/ society.

**Outcome 11 - Digital literacy:** Students should be able to use computers and gadgets to search, retrieve, analyze, store, create, present and exchange information, and interact and participate in interactive networks through the Internet or through any other digital platform to enrich pharmaceutical care services.

**Outcome 12 - Life-long learning:** The student should be able to recognize knowledge and skill deficits that exist in the effective delivery of health care needs of the patient/society. As a life-long learner, student should be able to identify and analyze issues emerging in the advancing healthcare delivery, and set learning goals, locate, interpret appropriate resources, and assess progress toward meeting learning goals.

## Course Outcomes

Sl. No.	Name of the Program	Name of the Course	Course Outcome
1.1	Pharm.D. – First Year	Human Anatomy and Physiology	<ol style="list-style-type: none"> <li>1. They would have learnt the gross anatomy, histology and physiology of various organs of the human body.</li> <li>2. They would identify the various tissues and organs associated with the different organ systems with help of charts and specimens.</li> <li>3. They would have studied the coordination in functioning of different organs of each system.</li> <li>4. They would have understood the several physiological homeostatic mechanisms and their imbalances in human body.</li> <li>5. They would have learnt the interlinked mechanisms in the maintenance in normal and physical exercise conditions.</li> <li>6. They would have learnt and performed the hematological tests parameters, blood pressure recording, heart rate, pulse and respiratory volumes.</li> </ol>
1.2		Pharmaceutics	<ol style="list-style-type: none"> <li>1. Upon completion of this program the student will know the formulation aspects of different dosage forms do different pharmaceutical calculation involved in formulation and appreciate the importance of good formulation for effectiveness.</li> </ol>
1.3		Medicinal Biochemistry	<ol style="list-style-type: none"> <li>1. To understand the importance of metabolism of substrates.</li> <li>2. Will acquire chemistry and biological importance of biological macromolecules.</li> <li>3. To acquire knowledge in qualitative and quantitative estimation of the biological macromolecules.</li> <li>4. To know the interpretation of data emanating from a Clinical Test Lab.</li> <li>5. To know how physiological conditions influence the structures and reactivity's of biomolecules.</li> </ol>

		6. To understand the basic principles of protein and polysaccharide structure.
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1.4	Pharmaceutical Organic Chemistry	<ol style="list-style-type: none"><li>1. To be able to give systematic names to simple organic compounds and poly functional group.</li><li>2. To achieve an understanding of the behavior of organic compounds and to establish a foundation for studies into natural and synthetic products of pharmaceutical interest.</li><li>3. To acquire the knowledge and understanding of the basic experimental principles of pharmaceutical organic chemistry.</li><li>4. To draw the structures and synthesize simple pharmaceutically active organic compounds.</li><li>5. To describe detailed mechanisms for common reactions.</li><li>6. To be able to run experimental techniques, procedures and safe laboratory practices.</li></ol>
1.5	Pharmaceutical Inorganic Chemistry	<ol style="list-style-type: none"><li>1. Well acquainted with the principles of limit tests.</li><li>2. Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceutical.</li><li>3. Knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals</li><li>4. Appreciate the importance of inorganic pharmaceuticals in</li></ol>

			<p>preventing and curing the disease.</p> <ol style="list-style-type: none"> <li>To have been introduced to a variety of inorganic drug classes.</li> <li>To know the analysis of the inorganic pharmaceuticals their applications.</li> </ol>
<b>1.6</b>		<p>Remedial Mathematics</p> <p>Remedial Biology</p>	<ol style="list-style-type: none"> <li>Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.</li> <li>Create, use and analyze mathematical representations and mathematical relationships</li> <li>Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy</li> <li>Perform abstract mathematical reasoning</li> </ol> <p>The main aim of this course is to make aware the students to understand and learn about</p> <ol style="list-style-type: none"> <li>Cell biology ( Basic Nature of Plant cell and Animal cell)</li> <li>Classification System of both Plants &amp; Animals</li> <li>Various tissue system and organ system in plant and animals</li> <li>Theory of evolution</li> <li>Anatomy and Physiology of plants and animals</li> </ol>
<b>2.1</b>		Pathophysiology	<ol style="list-style-type: none"> <li>Students will define the basic pathogenesis of human disease</li> <li>Students will define and explore the most common etiologies and predisposing factors associated with human disease</li> <li>Students understands the basis for some laboratory tests and other diagnostic procedures</li> <li>Students will make correlations between pathophysiology and clinical skills they are learning in their allied health science programs.</li> <li>Students will understand how the</li> </ol>

	Pharm.D.- Second Year		various organ systems are interrelated, and use this understanding to promote a holistic approach towards the evaluation and treatment of patients
2.2		Pharmaceutical Microbiology	<ol style="list-style-type: none"> <li>1. Students can able to demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection; application of molecular techniques to medical microbiology; microbial susceptibility and resistance to antimicrobial agents; replication of viruses, viral immunology and pathogenesis, detection of viruses</li> <li>2. Students can able to understanding of various infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify a unknown organisms in clinical samples, and describe the pathogenesis of important pathogens</li> <li>3. Students Demonstrate a basic understanding of the pathogenesis of some important fungal infections of humans, and be able to identify and isolate them from clinical samples</li> <li>4. Students Work cooperatively as part of a small group and Critically assess and interpret scientific literature</li> <li>5. Students can Analyze and report on complex research questions, and solve problems, plan a work program or diagnostic strategy and learn independently</li> <li>6. Students can able to demonstrate safe working practices in microbiology, adhere to microbiological requirements for safe work procedures</li> </ol>

2.3		Pharmacognosy & Phytopharmaceuticals	<p>This course is one of the most advanced introductions in Herbal Medicines that is offered. Will learn and get experience about</p> <ol style="list-style-type: none"> <li>1. Herbs and their Science</li> <li>2. Classification of Medicinal Plants, Phytochemistry, Carbohydrates, Lipids,</li> <li>3. Terpenes, Polyphenols, Alkaloids, Pharmacology, Toxicity, Formulations and Preparations of Herbal Medicines</li> <li>4. How herbs influence our physiology and can be helpful against several disorders.</li> <li>5. Relations between Phyto-therapy and the Elderly, Phytotherapy and Children, Understanding Herbal Action, and Understanding the Materia Medica.</li> <li>6. The recognition of medicinal plants, identification of adulteration and Contamination.</li> <li>7. Ethnobotany &amp; Ethno pharmacology in drug discovery process.</li> <li>8. DNA Finger printing.</li> </ol>
2.4		Pharmacology - I	<ol style="list-style-type: none"> <li>1. The student would have learnt about the different drugs used with an emphasis on its classification, Pharmacodynamic and pharmacokinetic aspects, adverse effects, Therapeutic uses.</li> <li>2. They would have studied, dose, route of administration, precautions, and contraindications.</li> <li>3. They would have understood the pharmacological aspects of drugs used to treat ailment of different organ systems of the body.</li> <li>4. They would appreciate the importance of drug discovery by preclinical and clinical trials.</li> <li>5. They would appreciate the importance of pharmacology subject as a basis of therapeutics.</li> <li>6. They would apply the knowledge of</li> </ol>



			drugs and its detailed description therapeutically in clinical case scenario.
<b>2.5</b>		Community Pharmacy	<ol style="list-style-type: none"> <li>1. Students will provide patient- centered care to diverse patients using the best available evidence and in consideration of patients' circumstances to devise, modify, implement, document and monitor pharmacotherapy care plans, either independently or as part of healthcare team</li> <li>2. Students will demonstrate knowledge of the business and professional practice management skills in community pharmacies.</li> <li>3. Students will educate patients through counseling &amp; provide health screening services to public</li> <li>4. Students will identify symptoms of minor ailments and provide appropriate medication</li> <li>5. Students will participate in prevention programs of communicable diseases</li> <li>6. Students will exhibit professional ethics by promoting safe and appropriate medication use throughout society</li> </ol>
<b>2.6</b>		Pharmacotherapeutics– I	<ol style="list-style-type: none"> <li>1. Students will be able to describe the pathophysiology and management of cardiovascular, respiratory and endocrine diseases</li> <li>2. Students will be developing Patient case based Assessment Skills</li> <li>3. Students will be able to describe the quality use of medicines issues surrounding the therapeutic agents in the treatment of these diseases</li> <li>4. Students will have developed clinical skills in the therapeutic management of these conditions</li> <li>5. Continue to develop communication skills.</li> <li>6. Students will provide patient –</li> </ol>

			centred care to diverse patients using the evidence based medicine
<b>3.1</b>	Pharm. D. – Third Year	Pharmacology -II	<ol style="list-style-type: none"> <li>1. In continuation with the previous year, this subject would have continued describing about the different drugs used for treatment of diseases.</li> <li>2. The students would have learnt about drugs used to cancer, inflammation, respiratory system, GIT, immune system and hormones.</li> <li>3. They would have understood the principles of animal toxicology and bioassay procedures.</li> <li>4. They would have learnt in depth knowledge on cell, macromolecules, cell signaling, DNA replication and cell cycle.</li> <li>5. They would appreciate the importance of gene and its structure, genome, gene expression, recombinant DNA technology and other associated aspects.</li> <li>6. They would have finally learnt to apply the knowledge of drugs practically using simulated pharmacological experiments.</li> </ol>
<b>3.2</b>		Pharmaceutical Analysis	<ol style="list-style-type: none"> <li>1. To understand the importance of analysis in pharmaceutical industry</li> <li>2. To understand the knowledge about assay of pharmaceutical substance and product</li> <li>3. To develop basic practical skills using instrumental techniques</li> <li>4. To inculcate theoretical knowledge on various instrumental techniques adopted for analysis of pharmaceuticals</li> <li>5. To develop various methodologies for assay of drugs and pharmaceuticals with the skills and knowledge gained</li> <li>6. To understand and gain knowledge</li> </ol>

			on trouble shooting in adopting various methodologies using instrumental techniques
<b>3.3</b>		Pharmacotherapeutics – II	<ol style="list-style-type: none"> <li>1. Students will be able to describe the pathophysiology and management of cardiovascular, respiratory and endocrine diseases</li> <li>2. Students will be developing Patient case based Assessment Skills</li> <li>3. Students will be able to describe the quality use of medicines issues surrounding the therapeutic agents in the treatment of these diseases</li> <li>4. Students will have developed clinical skills in the therapeutic management of these conditions</li> <li>5. Continue to develop communication skills.</li> <li>6. Students will provide patient – centred care to diverse patients using the evidence based medicine</li> </ol>
<b>3.4</b>		Pharmaceutical Jurisprudence	<p>Upon Completion of the subject student learnt:</p> <ol style="list-style-type: none"> <li>1. About Professional ethics</li> <li>2. They understood the various concepts of the Pharmaceutical Legislation in India.</li> <li>3. They understood the various parameters in the Drug and Cosmetic Act and rules.</li> <li>4. They understood the various concepts of Drug policy, DPCO, Patent and Designing act.</li> <li>5. They came to know about the labelling requirements and packaging guidelines for Drugs and Cosmetics.</li> <li>6. They understood the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act.</li> <li>7. They came to know about the salient features of different laws which have been prescribed by the Pharmacy Council of India from</li> </ol>

			time to time including International Laws.
<b>3.5</b>		Medicinal Chemistry	<ol style="list-style-type: none"> <li>1. To understand the chemistry of drugs with respect to their biological activity.</li> <li>2. To know the metabolism, adverse effect and therapeutic activity of drugs.</li> <li>3. To understand the different modern techniques of drug design.</li> <li>4. To appreciate the SAR of some important drug classes.</li> <li>5. To acquire knowledge in the chemotherapy for cancer and microbial diseases and different anti-viral agents.</li> <li>6. To have been introduced to a variety of drug classes and some pharmacological properties.</li> </ol>
<b>3.6</b>		Pharmaceutical Formulations	<ol style="list-style-type: none"> <li>1. Students will understand the principle involved in formulation of various pharmaceutical dosage forms, prepare various pharmaceutical formulation, perform evaluation of pharmaceutical dosage forms, understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations.</li> </ol>
<b>4.1</b>		Pharmacotherapeutics -III	<ol style="list-style-type: none"> <li>1. Initiate drug therapy and the anticipated therapeutic goals by therapeutic intervention</li> <li>2. Know the effective use of non-pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.</li> <li>3. Demonstrate the ability to effectively communicate and work collaboratively together with others in the small group setting</li> </ol>

			4. Have moral reasoning, ethical judgement and professionalism
<b>4.2</b>	Pharm.D.- Fourth Year	Hospital Pharmacy	<ol style="list-style-type: none"> <li>1. Know Various Drug Distribution Methods;</li> <li>2. Know The Professional Practice Management Skills In Hospital Pharmacies;</li> <li>3. Provide Unbiased Drug Information To The Doctors;</li> <li>4. Know The Manufacturing Practices Of Various Formulations In Hospital Set Up;</li> <li>5. Appreciate The Practice Based Research Methods; And</li> <li>6. Appreciate the stores management and inventory control.</li> </ol>
<b>4.3</b>		Clinical Pharmacy	<ol style="list-style-type: none"> <li>1. Monitor drug therapy of patient through medication chart review and clinical review;</li> <li>2. Obtain medication history interview and counsel the patients;</li> <li>3. Identify and resolve drug related problems;</li> <li>4. Detect, assess and monitor adverse drug reaction;</li> <li>5. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and</li> <li>6. Retrieve, analyze, interpret and formulate drug or medicine information.</li> </ol>
<b>4.4</b>		Biostatistics & Research Methodology	<ol style="list-style-type: none"> <li>1. Know the various statistical methods to solve different types of problems</li> <li>2. Operate various statistical software packages</li> <li>3. Appreciate the importance of Computer in hospital and Community Pharmacy</li> <li>4. Appreciate the statistical technique in solving the pharmaceutical problems</li> </ol>

4.5		Biopharmaceutics & Pharmacokinetics	<ol style="list-style-type: none"> <li>1. Broader understanding about the concepts of biopharmaceutics and pharmacokinetics.</li> <li>2. Ability to calculate the various pharmacokinetic parameters by using various mathematical models.</li> <li>3. Ability to design a basic protocol for the conduct of BA/BE study and the interpretation of the BA/BE data</li> <li>4. Preparedness to use the concepts of pharmacokinetic principles in the clinical contexts.</li> <li>5. Ability to design and perform <i>in-vitro</i> dissolution studies for various drugs as per the standards of official monographs</li> <li>6. Basic understanding about the concepts of <i>in-vitro-in-vivo</i> correlations (IVIVC)</li> </ol>
4.6		Clinical Toxicology	<ol style="list-style-type: none"> <li>1. Developing general working knowledge of the principles and practice of clinical toxicology</li> <li>2. Demonstrating an understanding of the health implications of toxic exposures and commonly involved chemicals for toxicity</li> <li>3. Demonstrating and applying an understanding of general toxicology principles and clinical management practice</li> <li>4. Demonstrating and applying an understanding of the history, assessment, and therapy considerations associated with the management of a toxic exposure</li> <li>5. Demonstrating and apply an understanding of the characteristics of and treatment guidelines for specific toxic substances</li> <li>6. Proposing several preventive approaches to reduce unintentional poisonings</li> <li>7. Enabling the pharmacist to function as contributing health care team</li> </ol>

			member when faced with a toxic exposure experience, including emergencies.
4.7		Pharmacotherapeutics I & II	<ol style="list-style-type: none"> <li>1. The pathophysiology of selected disease states and the rationale for drug therapy.</li> <li>2. The therapeutic approach to management of these diseases.</li> <li>3. The controversies in drug therapy.</li> <li>4. The importance of preparation of individualized therapeutic plans based on diagnosis.</li> <li>5. Needs to identify the patient- specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).</li> <li>6. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy.</li> <li>7. Summarize the therapeutic approach to management of these diseases including reference to the latest available evidence.</li> <li>8. Discuss the controversies in drug therapy.</li> <li>9. Discuss the preparation of individualized therapeutic plans based on diagnosis.</li> <li>10. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).</li> </ol>
5.1		Clinical Research	<ol style="list-style-type: none"> <li>1. Know the new drug development process.</li> <li>2. Understand the regulatory and ethical requirements.</li> <li>3. Appreciate and conduct the clinical</li> </ol>

	Pharm.D.- Fifth Year		<p>trials activities</p> <ol style="list-style-type: none"> <li>4. Know safety monitoring and reporting in clinical trials</li> <li>5. Manage the trial coordination process</li> <li>6. Know the new drug development process.</li> <li>7. Understand the regulatory and ethical requirements.</li> <li>8. Appreciate and conduct the clinical trials activities</li> <li>9. Know safety monitoring and reporting in clinical trials</li> <li>10. Manage the trial coordination process</li> </ol>
5.2		Pharmacoepidemiology & Pharmacoeconomics	<ol style="list-style-type: none"> <li>1. Describe the methods used in Pharmacoepidemiology</li> <li>2. Demonstrate competency in the design, conduct and evaluation of Pharmacoepidemiology studies.</li> <li>3. Describe the methods used in Pharmacoeconomic analysis.</li> <li>4. Demonstrate competency in the design, conduct and evaluation of Pharmacoeconomic studies.</li> </ol>
5.3		Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring	<ol style="list-style-type: none"> <li>1. Ability to apply the concepts of Pharmacokinetics to individualize the drug dosage regimen in clinical settings.</li> <li>2. Ability to design a dosage regimen of a drug based on its route of administration</li> <li>3. Ability to design and implement pharmacokinetic services such as <ul style="list-style-type: none"> <li>• Intravenous to Oral conversion of dosage regimens</li> <li>• Therapeutic Drug Monitoring Services</li> </ul> </li> <li>4. Broader understanding about the significance of altered pharmacokinetics, Pharmacogenetics and</li> </ol>



			<p>Pharmacometrics.</p> <ol style="list-style-type: none"><li>5. Ability to adjust the dosage regimen for patients with renal / hepatic impairments</li><li>6. Ability to assess the drug interaction issues in the clinical settings</li><li>7. Ability to design and implement therapeutic drug monitoring services for various drugs</li></ol>
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