



### Programme Outcomes (POs) for Degree Pharmacy

PO1	<b>Pharmacy Knowledge:</b> Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	<b>Planning Abilities:</b> Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	<b>Problem analysis:</b> Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO4	<b>Modern tool usage:</b> Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO5	<b>Leadership skills:</b> Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO6	<b>Professional Identity:</b> Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO7	<b>Pharmaceutical Ethics:</b> Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO8	<b>Communication:</b> Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO9	<b>The Pharmacist and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO10	<b>Environment and sustainability:</b> Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO11	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### Program Specific Outcomes (PSOs) for Degree Pharmacy

PSO 1.	Apply the knowledge of basic science, life sciences and fundamental process involved in pharmaceuticals.
PSO 2.	Impart theoretical & Practical knowledge among students in the various fields of pharmaceutical sciences viz., Pharmaceutics, Pharmaceutical Chemistry, Pharmacology and Pharmacognosy.
PSO 3.	Imbibe research culture amongst the students and make them competent enough to fulfill the needs of Pharmaceutical Industry.
PSO 4.	Upgrade practical skills of the students through industrial training and visits to accustom students' of working and culture of Pharmaceutical Industry.
PSO 5.	Promote the development of communication skills, leadership qualities, ethics and regulatory aspects of Pharmacy profession among the students.



Year	Semester	Course with code	Course outcome number	Course Outcome: Upon completion of the course, the learner shall be able to:
<b>FIRST YEAR B. PHARMACY</b>	<b>Semester- I</b>	<b>Human Anatomy and Physiology I</b>	101.1	Outline different levels of organization of human body.
			101.2	Explain the gross morphology, structure and functions of various organs of the human body.
			101.3	Describe the various homeostatic mechanisms and their imbalances.
			101.4	Identify the various tissues and organs of different systems of human body.
			101.5	Perform the various experiments related to special senses and nervous system.
		<b>Pharmaceutical Analysis I</b>	102.1	Understand the principles of volumetric and electro chemical analysis
			102.2	Carryout various volumetric and electrochemical titrations
			102.3	Develop analytical skills
			102.4	Outline the ionization, acidity, basicity and pKa of organic compounds.
			102.5	Describe the Redox titrations
		<b>Pharmaceutics I</b>	103.1	Summarize the history of profession of pharmacy
			103.2	Explain the basics of different dosage forms
			103.3	Interpret pharmaceutical calculations and pharmaceutical incompatibilities
			103.4	Relate the professional way of handling the prescription
			103.5	Outline the Preparation of various conventional dosage forms
		<b>Pharmaceutical Inorganic Chemistry</b>	104.1	Summarize importance of inorganic compounds in pharmacy
			104.2	Interpret the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
			104.3	Understand the medicinal and pharmaceutical importance of inorganic compounds
			104.4	Explain measurements, calculations along with methods for buffers
			104.5	Describe pharmaceutical aspects of radiopharmaceuticals.
		<b>Communication skills</b>	105.1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
			105.2	Communicate effectively (Verbal and Non Verbal)
			105.3	Learn effective management of the team as a team player
			105.4	Develop interview skills.
			105.5	Inculcate the body language and personality development
<b>Remedial Biology</b>	106BT.1	Know the classification and salient features of five kingdoms of life.		
	106BT.2	Understand the basic components of anatomy.		
	106BT.3	Describe physiology of different systems of plants		
	106BT.4	Know the basic components of anatomy of animals with special reference to human body		
	106BT.5	Explain physiology of different systems of animals with special reference to humans.		



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<b>FIRST YEAR B. PHARMACY</b>	<b>Semester-I</b>	<b>Remedial Mathematics</b>	106MT.1	Know the theory and their application in Pharmacy
			106MT.2	Solve the different types of problems by applying theory
			106MT.3	Appreciate the important application of mathematics in Pharmacy
			106MT.4	Apply Analytical Geometry and calculus
			106MT.5	Use of mathematics in solving Chemical kinetics and Pharmacokinetics equations
		<b>Human Anatomy and Physiology – Practical</b>	107.1	Determine formed elements of blood and correlate the results with clinical conditions
			107.2	Identify locations of bone in human skeleton with their importance
			107.3	Describe body tissue and organs based on structure and organization of cells
			107.4	Compare the common diagnostic and biochemical test performed in clinical conditions and its Use in diagnosis and prognosis of diseases.
		<b>Pharmaceutical Analysis Lab- I</b>	108.1	Apply the concept of volumetric analysis by assay & standardization.
			108.2	Experiment with given samples for volumetric, gravimetric and solvent extraction methods.
			108.3	Utilize Pharmacopoeial monographs to evaluate pharmaceutical samples.
			108.4	Demonstrate electroanalytical methods.
		<b>Pharmaceutics-I Practical</b>	109.1	Relate prescription and commonly used Latin terms in pharmacy practice
			109.2	Outline roles of active and inactive ingredient required for formulation.
			109.3	Describe compounding, labeling and dispensing of extemporaneous preparations.
			109.4	Summarize patient counseling and patient education methods
		<b>Pharmaceutical Inorganic Chemistry – Practical</b>	110.1	Identify impurities by limit tests for inorganic ions.
			110.2	Relate identification test for inorganic substances
			110.3	Perform test for purity
			110.4	Illustrate Preparation of inorganic pharmaceuticals
		<b>Communication skills –Practical</b>	111.1	Understand basic communication skills.
			111.2	Relate pronunciation consonants, nouns and vowel sounds
			111.3	Illustrate advanced learning
			111.4	Summarize Interview handling and e-communication Skills
		<b>Remedial Biology – Practical</b>	112.1	Understand techniques of experimental biology.
			112.2	Explain structure of cell and its components.
			112.3	Determine blood group, blood pressure and tidal volume.
			112.4	Study structure and function of parts of plants and frog using suitable techniques.



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<b>FIRST YEAR B. PHARMACY</b>	<b>Semester- II</b>	<b>Human Anatomy and Physiology II (Theory)</b>	201.1	Explain the gross morphology, structure and functions of various organs of the human body.
			201.2	Summarize processes and part of organs in digestive system and their function.
			201.3	Relate the anatomy and physiology of urinary system.
			201.4	Outline role of hormones in the human body.
			201.5	Illustrate the different components of reproductive and nervous system.
			201.6	Explain physiological processes and mechanism for respiration.
		<b>Pharmaceutical Organic Chemistry I – Theory</b>	202.1	Identify type of isomerism and IUPAC nomenclature of the organic compounds.
			202.2	Explain the name reactions and its orientations.
			202.3	Predict reactivity and stability of organic compounds.
			202.4	Illustrate the uses of organic compounds.
			202.5	Outline identification or confirmatory tests of organic compounds.
		<b>Biochemistry – Theory</b>	203.1	Define basics of biochemistry.
			203.2	Explain the metabolism of nutrient molecules.
			203.3	Outline the concept of biological oxidation.
			203.4	Summarize the nucleic acid metabolism and genetic information transfer.
			203.5	Understand the biochemical role of enzymes in drugs and therapeutics.
		<b>Pathophysiology – Theory</b>	204.1	Outline basic concepts and mechanisms of cell injury and adaptation; inflammation and tissue repair.
			204.2	Illustrate pathophysiology's of different organ systems of the body.
			204.3	Analyse complications associated with pathologies of different organ systems.
			204.4	Enlist different diagnostic tests used for diagnosis of pathologies.
			204.5	Appraise role of drugs in alleviation of various pathologies.
			204.6	Explain generation of neoplasm and the etiologic factors responsible for it.
		<b>Computer Applications in Pharmacy</b>	205.1	Outline basic concepts and application of computers in pharmacy
			205.2	Explain role of databases
			205.3	Discuss use of computers in Hospital and Clinical Pharmacy
205.4	Summarize data analysis in Preclinical development			
205.5	Extend role of databases in Bioinformatics			



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<b>SECOND YEAR B. PHARMACY</b>	<b>Semester- II</b>	<b>Environmental sciences</b>	206.1	Describe basics of the environment and its allied problems
			206.2	Show the awareness about environmental problems among learners
			206.3	Outline skills to help the concerned individuals in identifying and solving environmental problems.
			206.4	Demonstrate an attitude of concern for the environment.
			206.5	Plan to attain harmony with Nature.
		<b>Human Anatomy and Physiology II (Practical)</b>	207.1	Illustrate the anatomy of systems of the human body using specimen, models, charts, etc.
			207.2	Demonstrate the function of nervous system and total blood count by cell analyzer.
			207.3	Perform recording of body temperature and BMI.
			207.4	Outline different types of taste, permanent slides of vital organs, tidal volume and vital capacity.
		<b>Pharmaceutical Organic Chemistry I – (Practical)</b>	208.1	Explain systematic qualitative analysis of unknown organic compounds.
			208.2	Illustrate physical constant determinations of organic compounds.
			208.3	Summarize solid derivative preparation of organic compounds.
			208.4	Demonstrate the construction of molecular models.
		<b>Biochemistry – (Practical)</b>	209.1	Outline the various qualitative tests of biomolecules.
			209.2	Summarize the various quantitative analyses of biomolecules.
			209.3	Demonstrate the preparation of buffer solution and measurement of pH
			209.4	Relate the effect of temperature and substrate salivary amylase activity.
		<b>Computer Applications in Pharmacy (Practical)</b>	210.1	Summarize MS Access.
			210.2	Explain HTML web page.
			210.3	Outline MS WORD.
210.4	Illustrate Web and XML pages.			



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<b>SECOND YEAR B. PHARMACY</b>	<b>Semester- III</b>	<b>Pharmaceutical Organic Chemistry-II</b>	301.1	Summarize the organic chemistry aspects of some important organic compounds in pharmaceuticals.
			301.2	Illustrate the reactivity, orientation and stability of organic reactions.
			301.3	Describe the chemistry of fats, oils and cycloalkanes.
			301.4	Summarize the chemistry and uses of polynuclear organic compounds.
			301.5	Cite structure and uses of important organic compound
		<b>Physical Pharmaceutics-I</b>	302.1	Predict solubility of drug and factors affecting the solubility.
			302.2	Describe the various state of matter and their properties along with the physicochemical properties of drug molecules.
			302.3	Express surface and interfacial phenomenon.
			302.4	Discuss pharmaceutical complexation and protein binding.
			302.5	Outline pH and buffers with concepts related to it.
		<b>Pharmaceutical Microbiology</b>	303.1	Understand methods of identification, cultivation and preservation of various microorganisms.
			303.2	Summarize importance and implementation of sterilization in pharmaceutical processing and industry
			303.3	Illustrate sterility testing of pharmaceutical products.
			303.4	Appraise microbiological standardization of Pharmaceuticals.
			303.5	Explain the cell culture technology and its applications in pharmaceutical industries.
		<b>Pharmaceutical Engineering</b>	304.1	Explain basics of unit operations in pharmaceutical industries.
			304.2	Elaborate fluid flow and its measurement along with size reduction and separation.
			304.3	Illustrate heat transfer, evaporation and distillation as unit operations.
			304.4	Summarize process of drying, mixing, filtration and centrifugation.
			304.5	Identify the materials of construction and corrosion.
		<b>Pharmaceutical Organic Chemistry-II (Practical)</b>	305.1	Summarize the preparation, purification and quantification of important organic compounds
			305.2	Finding the Acid value, saponification value and Iodine value
			305.3	Infer the theoretical and percentage yields of the products obtained by synthesis.
			305.4	Complete the synthesis of various organic compounds by different chemical reactions.



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<b>SECOND YEAR B. PHARMACY</b>	<b>Semester- III</b>	<b>Physical Pharmaceutics-I (Practical)</b>	306.1	Predict physical parameters of drug as well as excipients like solubility, Pka, partition coefficient, HLB, surface tension and critical micelle concentration.
			306.2	Understand complex and adsorption isotherm
			306.3	Determination of stability constants using different methods.
			306.4	Predict solubility of partially miscible solvents by using CST method.
		<b>Pharmaceutical Microbiology (Practical)</b>	307.1	Carry out sterilization glassware's, equipment's and isolation and preservation of microorganisms.
			307.2	Interpret microorganisms on the basis of morphology and staining techniques.
			307.3	Plan and evaluate potability or drinking water along with determination of coliforms.
			307.4	Summarize sterility testing of pharmaceuticals.
		<b>Pharmaceutical Engineering (Practical)</b>	308.1	Illustrate energy requirements for optimizing the pharmaceutical unit processes.
			308.2	Discuss equipment's used in the manufacturing of pharmaceuticals.
			308.3	Determine moisture content, drying curves, humidity and crystallization with suitable method.
			308.4	Perform experiments related to unit operations



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<b>SECOND YEAR B. PHARMACY</b>	<b>Semester- IV</b>	<b>Pharmaceutical Organic Chemistry III</b>	401.1	Summarize the organic chemistry of stereoisomers and heterocyclic compounds.
			401.2	Find the appropriate nomenclature to heterocyclic and stereoisomers.
			401.3	Illustrate synthesis and reactions of optical and geometrical isomers.
			401.4	Outline the preparation and reactions of heterocyclic compounds
			401.5	Demonstrate reactions of synthetic importance
		<b>Medicinal Chemistry-I</b>	402.1	Explain the medicinal chemistry of important classes of various drugs.
			402.2	Outline the drug metabolism and physicochemical properties of drugs.
			402.3	Summarize the medicinal chemistry of ANS and cholinergic neurotransmitter drugs.
			402.4	Demonstrate the medicinal chemistry of drugs acting on CNS
			402.5	Relate the structural features of drugs with their biological action.
		<b>Physical Pharmaceutics-II</b>	403.1	Understand concept, preparation and properties of colloidal dispersion.
			403.2	Explain flow behaviors of dispersion and deformation of solids.
			403.3	Discuss concept and properties of coarse dispersion as well as pharmaceutical powders.
			403.4	Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms
			403.5	Know the stability of drug by its physicochemical kinetic study.
		<b>Pharmacology I</b>	404.1	Understand the fundamental concepts of pharmacodynamics and pharmacokinetics
			404.2	Describe the mechanism of actions of different categories of drugs and their pharmacological effects on various organ systems.
			404.3	Apply the basic pharmacological knowledge in understanding the adverse effects and drug interactions
			404.4	Outline the process of drug discovery and clinical development
			404.5	Explain the pharmacology of drugs acting of peripheral and central nervous system.
		<b>Pharmacognosy and Phytochemistry-I</b>	405.1	Recite and classify drugs of natural origin with quality control aspects.
			405.2	Summarize the techniques in the cultivation and production of crude drugs.
			405.3	Illustrate plant tissue culture techniques with modern applications.
			405.4	Contrast various systems of medicines with respect to pharmacognosy.
			405.5	Memorize all primary metabolites with their pharmaceutical importance





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<b>SECOND YEAR B. PHARMACY</b>	<b>Semester- IV</b>	<b>Medicinal Chemistry-I (Practical)</b>	406.1	Plan synthesis and an assay of important drugs and intermediates.
			406.2	Select facile synthetic routes and synthesize drugs and intermediates.
			406.3	Analyze concentration of drugs in the given sample.
			406.4	Make use of the physicochemical properties and find partition coefficient drugs.
		<b>Physical Pharmaceutics-II (Practical)</b>	407.1	Explain measurement of micromeritic properties of drugs, excipients and dosage forms.
			407.2	Understand viscosity and sedimentation behavior.
			407.3	Judge kinetics of chemical reactions.
			407.4	Perform accelerated stability study for drug and formulation.
		<b>Pharmacology-I (Practical)</b>	408.1	Understand basic experimental pharmacology with animal handling.
			408.2	Outline commonly used instruments, animals and laboratory techniques used in experimental pharmacology along with the regulatory requirements.
			408.3	Describe the pharmacology of various drugs using simulated experiments acting on hepatic enzymes, ciliary motility and eye of animals.
			408.4	Demonstrate activity of drugs using simulated experiments acting on the peripheral and central nervous system of animals.
		<b>Pharmacognosy and Phytochemistry-I (Practical)</b>	409.1	Identify and evaluate crude drugs by chemical tests and leaf constant methods.
			409.2	Use various methods for standardization of herbal drugs.
			409.3	Relate important extraction techniques for extraction of herbal drugs.
			409.4	Memorize various index and tests for evaluation of crude drugs.



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<b>THIRD YEAR B. PHARMACY</b>	<b>Semester- V</b>	<b>Medicinal Chemistry II – Theory</b>	501.1	Explain the importance of medicinal chemistry of various drugs.
			501.2	Examine the medicinal chemistry of antihistaminics, antineoplastics and drugs acting on CVS.
			501.3	Analyze medicinal chemistry of antidiabetic, local ansthetics and drugs acting on Endocrine system.
			501.4	Conclude the therapeutic uses, metabolism, adverse effect and synthesis of drugs.
			501.5	Describe synthesis of some important drugs.
		<b>Industrial Pharmacy I– Theory</b>	502.1	Describe pharmaceutical dosage forms and their manufacturing techniques.
			502.2	Explain Preformulation and formulation aspects of various dosage forms
			502.3	Elaborate formulation aspects of solid and liquid dosage forms
			502.4	Understand the formulation and manufacturing of parenterals and aerosols
			502.5	Express the importance of Cosmetics and packaging in pharmaceuticals
		<b>Pharmacology II – Theory</b>	503.1	Understand the mechanism of drug action and its relevance in the treatment of different diseases.
			503.2	Illustrate the pharmacology of drugs acting on cardiovascular, endocrine and urinary system.
			503.3	Outline the physiological role of autacoids and the receptors on which they act.
			503.4	Describe the role of autacoids and related drugs in treatment of inflammation, gout and rheumatoid arthritis.
			503.5	Explain the basics of bioassay and its methods of various drugs.
		<b>Pharmacognosy and Phytochemistry II– Theory</b>	504.1	Appraise isolation, identification and analysis of Phytoconstituents.
			504.2	Discuss industrial production, estimation and utilization aspects Phytoconstituents.
			504.3	Recall the modern extraction techniques, characterization and identification of the herbal drugs and Phytoconstituents.
			504.4	Describe plant metabolic pathways with investigation techniques of pathways.
			504.5	Summarize Pharmacognosy of various classes of herbals drugs.
		<b>Pharmaceutical Jurisprudence – Theory</b>	505.1	Understand Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
			505.2	Highlight various Indian pharmaceutical Acts and Laws
			505.3	Summarize various regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
			505.4	Comment on various code of ethics to be followed during the pharmaceutical practice.
			505.5	Annotate various drug abuse and penalties thereof.



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<b>THIRD YEAR B. PHARMACY</b>	<b>Semester- V</b>	<b>Industrial Pharmacy I – Practical</b>	506.1	Make use of preformulation parameters for dosage form.
			506.2	Carryout preparation and evaluation of solid dosage forms.
			506.3	Formulate parenterals and cosmetics.
			506.4	Evaluate glass container as packaging material.
		<b>Pharmacology II – Practical</b>	507.1	Understand basics of <i>in-vitro</i> pharmacology and various drug-receptor actions.
			507.2	Demonstrate effect of drugs on cardiovascular, urinary, gastrointestinal system using simulated experiments.
			507.3	Determine pD <sub>2</sub> , pA <sub>2</sub> and concentration of given sample.
			507.4	Evaluate anti-inflammatory and analgesic activity of drugs using simulated experiments.
		<b>Pharmacognosy and Phytochemistry II – Practical</b>	508.1	Demonstrate Pharmacognosy of certain crude drugs.
			508.2	Appraise certain herbal drugs for isolation and detection.
			508.3	Construct various chromatographic techniques for evaluation and separation.
			508.4	Experiment on isolation and evaluation of volatile oils.



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<b>THIRD YEAR B. PHARMACY</b>	<b>Semester- VI</b>	<b>Medicinal Chemistry III – Theory</b>	601.1	Explain the medicinal chemistry of various classes of drugs.
			601.2	Examine the medicinal chemistry of antibiotics, antitubercular, Antiviral, Antifungal and Anti-protozoal agents.
			601.3	Assess the medicinal chemistry of Anti-infective agents, Anthelmintics and Sulpha drugs.
			601.4	Conclude the therapeutic uses, metabolism, adverse effect and synthesis of drugs.
			601.5	Appraise various approaches used in drug design including QSAR and combinatorial chemistry.
		<b>Pharmacology III – Theory</b>	602.1	Attain the knowledge about pharmacological aspects pertaining to digestive system.
			602.2	Adapt knowledge about the pharmacological aspects of treatment of various Respiratory disorders.
			602.3	Explain pharmacology of drugs used in chemotherapy.
			602.4	Outline the concepts of immunopharmacology.
			602.5	Elaborate on the principles of toxicology and chronopharmacology.
		<b>Herbal Drug Technology</b>	603.1	Understand herbal drugs as raw material of ayurveda and scientific study of cultivation of herbal drugs and farming.
			603.2	Contrast over various systems of traditional medicines with formulation aspects.
			603.3	Recognize nutraceutical potential of herbals industry.
			603.4	Explain herbal cosmetics, natural sweeteners, nutraceutical and excipients.
			603.5	Appreciate patenting of herbal drugs, GMP requirements.
		<b>Biopharmaceutics and Pharmacokinetics</b>	604.1	Explain the basics of Biopharmaceutics and Pharmacokinetics.
			604.2	Apply the concept of metabolism, elimination, bioavailability
			604.3	Study bioequivalence in biopharmaceutics.
			604.4	Summarize the various pharmacokinetic parameters and its related calculations along with various models.
			604.5	Understand non- linear pharmacokinetics.
		<b>Pharmaceutical Biotechnology</b>	605.1	Understand the importance of enzymes immobilization in Pharmaceutical Industries
			605.2	Summarize genetic engineering applications in relation to production of pharmaceuticals
			605.3	Integrate immunological aspects in understanding immunology and production of MAbs and vaccines.
			605.4	Importance of immune-blotting and microbial genetics techniques in biopharmaceutics.
			605.5	Appreciate the use of microorganisms in fermentation technology



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<b>THIRD YEAR B. PHARMACY</b>	<b>Semester- VI</b>	<b>Quality Assurance –Theory</b>	606.1	Explain the role and importance of quality assurance in pharmaceuticals.
			606.2	Appraise the importance of documentation in pharmaceuticals.
			606.3	Conclude the quality control, GLP and other quality aspects of pharmaceuticals.
			606.4	Recommend the quality certifications and ICH guidelines in pharmaceuticals.
			606.5	Support the system of calibration, validation of pharmaceuticals in the pharmaceutical industry.
		<b>Medicinal Chemistry III – Practical</b>	607.1	Simplify the computational, synthetic and green chemistry approaches of medicinal compounds.
			607.2	Choose appropriate methods to synthesize intermediates and drugs.
			607.3	Estimate purity of the synthesized or marketed drugs.
			607.4	Hand-on software for drawing structures and ADMET prediction.
		<b>Pharmacology III – Practical</b>	608.1	Outline basics of experimental techniques related to animals and humans.
			608.2	Describe the effect of drugs on gastrointestinal tract, mast cells and blood glucose level.
			608.3	Comprehend toxicological evaluation of drugs.
			608.4	Analyze the biostatistical methods used for parametric data and non-parametric data.
		<b>Herbal Drug Technology – Practical</b>	609.1	Evaluate residual contents of certain chemicals in crude drugs.
			609.2	Appraise certain herbal constituent's cosmetic formulations.
			609.3	Choose appropriate formulations methods for herbal drugs with evolution parameters..
			609.4	Summarize monograph analysis of herbal drugs.



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<b>FOURTH YEAR B. PHARMACY</b>	<b>Semester- VII</b>	<b>Pharmaceutical chemistry II</b>	701.1	Discuss the chemistry of medicinal agents.
			701.2	Compile chemical classification, nomenclature and stereochemistry of medicinal agents.
			701.3	Modify structure of drugs by reviewing SAR and metabolism.
			701.4	Perceive MOA of different classes of medicinal compounds.
			701.5	Design the synthesis of drugs.
		<b>Pharmacognosy III</b>	702.1	Discuss the Pharmacognosy of drugs containing alkaloids, glycosides and glycoproteins
			702.2	Elaborate biosynthetic pathways of alkaloids from various amino acids.
			702.3	Appraise biopharmaceutical considerations and pharmacopeial study of herbal drugs.
			702.4	Develop alternative system of formulations using some natural excipients and their standardization along with regulatory aspects.
			702.5	Interpret some important phytoconstituents by spectroscopic techniques.
		<b>Pharmaceutical Analysis III</b>	703.1	Explain the various methods used for the multicomponent analysis of drugs by UV spectroscopy.
			703.2	Discuss chromatographic and hyphenated techniques for qualitative and quantitative analysis.
			703.3	Elaborate NMR and mass spectrometry.
			703.4	Evaluate the spectral data for structural interpretation of chemical compound.
			703.5	Assess analytical method validation.
		<b>Pharmaceutical Jurisprudence</b>	705.1	Assess the Pharmaceutical legislations in India and rules therein.
			705.2	Describe various regulatory procedures for drugs and cosmetics and other related acts.
			705.3	Explain IPC & CRPC aspects along with provisions of drug price control order.
			705.4	Describe provisions of Indian Patent act.
			705.5	Appraise role of drug regulatory agencies of developed countries guidelines of the same.
		<b>Intellectual Property Rights</b>	709.1	Discuss basics of IPR with respect to pharmaceuticals.
			709.2	Perceive the knowledge of patents with case studies.
			709.3	Adapt various harmonized practices and integrate the knowledge required for various intellectual properties.
			709.4	Explain significance of rules and regulations pertaining to IPR.
			709.5	Justify the role of IPR in pharmaceutical product launch.



Year	Semester	Course with code	Course outcome number	Course Outcome: Upon completion of the course, the learner shall be able to:
<b>FOURTH YEAR B. PHARMACY</b>	<b>Semester- VII</b>	<b>Pharmacognosy Lab II</b>	706.1	Evaluate physicochemical characteristics of powdered crude drugs and monograph analyses.
			706.2	Judge authenticity of powder formulation on the basis of qualitative chemical tests and powder microscopy.
			706.3	Determine the total aldehyde content/phenol content/ total alkaloids in crude drugs.
			706.4	Estimate actives of crude drug using suitable isolation and detection method.
			706.5	Analyze morphological characters of marketed formulation.
		<b>Pharmaceutical analysis lab III</b>	707.1	Evaluate the concentration of analytes by UV Spectroscopic multicomponent analytical methods.
			707.2	Estimate different chromatographic techniques for qualitative and quantitative applications.
			707.3	Assess validation parameters for analytical methods.
			707.4	Predict the amount of drug in marketed formulation
		<b>Pharmacology Lab II</b>	708.1	Estimate the concentration of unknown using bioassay technique.
			708.2	Appraise the role of oxytocin using suitable bioassay method.
			708.3	Demonstrate pharmacology of drugs affecting behavior using suitable simulations.
			708.4	Discuss the guidelines and protocols in toxicity studies.



Year	Semester	Course with code	Course outcome number	Course Outcome: Upon completion of the course, the learner shall be able to:
<b>FOURTH YEAR B. PHARMACY</b>	<b>Semester- VIII</b>	<b>Pharmaceutical Chemistry III</b>	801.1	Discuss the medicinal chemistry of CNS and ANS drugs and there utility in therapeutics.
			801.2	List opioid receptors and chemistry of drugs acting on it.
			801.3	Outline chemistry of NSAIDs
			801.4	Appraise chemistry of drugs used in treatment of gout.
			801.5	Discuss the chemistry of drugs containing steroidal ring.
		<b>Pharmaceutics IV</b>	802.1	Discuss preformulation and formulation aspects of sterile products.
			802.2	Explain oral SR/CR products, principles of design, development and evaluation.
			802.3	Understand concepts of validation and pilot plant scale up for large scale manufacturing operations.
			802.4	Know the importance of Industrial Pharmacy and NDDS.
			802.5	Demonstrate biopharmaceutics and significance of various pharmacokinetic parameters.
		<b>Clinical Pharmacy</b>	807.1	Relate to the role of pharmacist in different setups like clinics, pharmacies and in the community.
			807.2	Appraise the crucial role of pharmacists in patient counseling and eventually in drug adherence and compliance to therapy.
			807.3	Discuss the types, risk factors, classification, and methods of detection, monitoring and reporting of ADRs, drug interactions, pharmacovigilance and TDM in normal as well as special populations.
			807.4	Outline the process of drug discovery and development, Ethical Guidelines/Schedules, Role of Ethics Committee, essential documents in clinical trials/research, BA-BE studies
			807.5	Appreciate the role of GCP in conduct of clinical research
		<b>Novel Drug Delivery Systems</b>	811.1	Explain basic concept of NDDS.
			811.2	Interpret different NDDS for different route- oral, transdermal, ocular, transmucosal and implantable.
			811.3	Understand concepr and need of passive and active targeting.
			811.4	Explain basic concept of targeted drug delivery to colon, brain, lymphatic system and tumor.
			811.5	Discuss nanocarriers for drug targeting in various tissues of human body.





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**INDIRA INSTITUTE OF PHARMACY**  
 Approved by AICTE, PCI, Recognized by D.T.E & Affiliated to UoM.  
 A/P-Sadavali (Devrukhh), Tal-Sangmeshwar, Dist-Ratnagiri, Pin – 415804 (Maharashtra)

Year	Semester	Course with code	Course outcome number	Course Outcome: Upon completion of the course, the learner shall be able to:
<b>FOURTH YEAR B. PHARMACY</b>	<b>Semester- VIII</b>	<b>Pharmaceutical Chemistry Lab II</b>	803.1	Perform various unit operations of organic synthetic reactions
			803.2	Characterize reaction intermediates and final products by using TLC.
			803.3	Know the theoretical concepts behind organic synthesis.
			803.4	Understand the concepts of green chemistry.
		<b>Pharmaceutics Lab IV</b>	804.1	Demonstrate formulation and development of parenterals and ophthalmic products.
			804.2	Understand about quality control and documentation of a manufacturing process.
			804.3	Perform the Pharmacopoeial tests on parenteral products and their packaging materials.
			804.4	Know excipient/API specifications, Validation and SOP's