

NARGUND
GROUP OF INSTITUTIONS



NARGUND COLLEGE OF PHARMACY

2nd Main, Dattatreya Nagar, 100 FEET Ring Road, Banashankari 3rd Stage, Bangalore-85, Karnataka.

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**Programme Outcomes, Programme Specific Outcomes
and Course Outcomes
(POs-PSOs-COs)**

B. Pharm Programme



NARGUND COLLEGE OF PHARMACY

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Phone: 080-26720604

Programme Outcomes (POs)

PO.1	Pharmacy Knowledge Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
PO.2	Planning Abilities Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO.3	Problem Analysis 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.
PO.4	Modern Tool Usage Learn, selects, and applies appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO.5	Leadership Skills 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 wellbeing.
PO.6	Professional Identity Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



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PO.7	Pharmaceutical Ethics: 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.
PO.8	Communication: 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.
PO.9	The Pharmacist and Society 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.
PO.10	Environment and Sustainability Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO.11	Life-Long Learning 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.

Program Specific Outcomes (PSOs)

PSO.1	Leverage expertise in the successful product development for both large scale & commercial production and analytical techniques ensuring adherence to regulatory standards, product safety and efficacy
PSO.2	Acquire adequate knowledge & necessary skills to practice effectively the profession of pharmacy, patient counseling and professional information exchange with physician & other paramedicos and strive for better healthcare.



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Course Outcomes (COs)

On successful completion of the course, students should be able to:

B. Pharm I Semester	
BP101T	Course Title: Human Anatomy & Physiology I -Theory
CO.1	Understand about the structure human body from a fundamental level
CO.2	Understand the various homeostatic mechanisms and their imbalances
CO.3	Analyze the importance of Blood, Lymphatic system, and Immunity in the human body.
CO.4	Remember the gross morphology, structure, and functions of cell, skeletal, muscular, and cardiovascular systems of the human body
CO.5	Gain knowledge about a few common diseases that occur in the human body
BP102T	Course Title: Pharmaceutical Analysis I- Theory
CO.1	Understand methods of expressing concentration and various types of errors
CO.2	Apply basic principle of analysis in preparation and standardization of some compounds
CO.3	Acquire Knowledge on principle involved in different volumetric and gravimetric analytical methods
CO.4	Explain the principles of electroanalytical methods
BP103T	Course Title: Pharmaceutics- Theory
CO.1	Understand the history of pharmacy profession and its scope.
CO.2	Learn the prescription in a professional manner.
CO.3	Evaluate the dose for a drug.
CO.4	Analyze pharmaceutical incompatibility in a formulation / prescription.
CO.5	Remember formulation, evaluation, merits and demerits of conventional dosage forms.
BP104T	Course Title: Pharmaceutical Inorganic Chemistry- Theory
CO.1	Understand the different kinds of impurities and state their effects.
CO.2	Learn variety of sources of impurities and the methods to control for proficient processing and therapeutic efficiency.
CO.3	Recognize the principle and procedure for various limit tests and their possible modifications. They can execute their achieved knowledge experimentally.



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CO.4	Accomplish with various official inorganic drugs belong to different categories for their methods of preparation, properties, tests for purity, storage conditions and uses.
CO.5	Classify and distinguish the various assay methods for inorganic drugs, their principle, methodology and possible amendments.
CO.6	Gain sufficient knowledge on radio pharmaceuticals, their measurements, effects and applications.
BP105T	Course Title: Communication skills -Theory
CO.1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
CO.2	Communicate effectively (Verbal and Non Verbal)
CO.3	Manage the team as a team player.
CO.4	Develop interview skills
CO.5	Acquire Leadership qualities and essentials.
BP106RBT	Course Title: Remedial Biology -Theory
CO.1	Gain Knowledge of the classification and salient features of five kingdoms of life
CO.2	Understand the basic components of anatomy & physiology of plant
CO.3	Learn the basic components of anatomy and physiology animal with special reference to human
BP106RMT	Course Title: Remedial Mathematics -Theory
CO.1	Know the theory of mathematics operations and their application in Pharmacy
CO.2	Solve the different types of problems by applying theory
CO.3	Appreciate the important application of mathematics in Pharmacy
BP107P	Course Title: Human Anatomy and Physiology I – Practical
CO.1	Perform microscopic study of various tissues.
CO.2	Identify axial and appendicular bones of the human skeleton.
CO.3	Analyze the various tissues of different systems of the human body.
CO.4	Learn various techniques like blood group determination, blood pressure measurement, and blood cell counting.
CO.5	Perform hematological test like blood cell count, hemoglobin estimation, bleeding/clotting time, etc.



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BP108P	Course Title: Pharmaceutical Analysis I – Practical
CO.1	Prepare and evaluate different strength of standard solutions using different types of titration.
CO.2	Estimate the amount of substance present using different types of volumetric titration.
CO.3	Evaluate strength of different samples using electroanalytical techniques.
BP109P	Course Title: Pharmaceutics I – Practical
CO.1	Calculate the working formula for the given official formula.
CO.2	Analyze the role of ingredients in a formulation.
CO.3	Formulate different conventional formulations.
CO.4	Select the suitable container for packing the dosage forms.
CO.5	Make an appropriate label for the preparation.
BP110P	Course Title: Pharmaceutical Inorganic Chemistry – Practical
CO.1	Understand thoroughly on various limit tests, their principle, procedures and list out their applications.
CO.2	Perform experiments for modifications in the existing methodologies on limit test experiments.
CO.3	Distinguish between limit tests and tests for purity and can carry out any related experiments.
CO.4	Perform qualitative chemical tests for some essential anions and cations.
CO.5	Prepare some official inorganic drugs by following simple procedures.
BP111P	Course Title: Communication Skills – Practical
CO.1	Articulate the concept of basic greeting and communication etiquettes
CO.2	Learn good pronunciation and presentation techniques
CO.3	Gain strong grammatical skills and written communication skills
CO.4	Create and compose ideas for effective communication with Socioethical values for successful career.
BP112RBP	Course Title: Remedial Biology – Practical
CO.1	Understand the parts of microscope and use of it in experimental biology
CO.2	Utilize computer models for the study of frog
CO.3	Identify stem, root, leaf, seed, fruit, flower and their modifications



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CO.4	Acquire knowledge about types of bones and determine the tidal volume
CO.5	Determine the blood group and blood pressure.
B. Pharm II Semester	
BP201T	Course Title: Human Anatomy and Physiology II – Theory
CO.1	Explain the anatomy and physiology of Central nervous system, nerve tracts, reflex action
CO.2	Understand the Lung functions, mechanism of respiration, resuscitation techniques and methods
CO.3	Gain knowledge the Gastrointestinal tract functions, secretions, digestion and absorption of nutrients and its disorders, role of ATP, creatinine and BMR
CO.4	Remember morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body.
CO.5	Understand the reproductive system of male and female, formation sperm and ovum, menstrual cycle, pregnancy, chromosomes, DNA and protein synthesis, pattern of inheritance
BP202T	Course Title: Pharmaceutical Organic Chemistry I – Theory
CO.1	Understand IUPAC name from structure of a compound and write structure from IUPAC name.
CO.2	Classify organic compounds with example.
CO.3	Define the importance of reaction intermediates.
CO.4	Explain reaction, mechanism, reactivity and orientation of elimination reaction, nucleophile substitution reaction and addition reaction.
CO.5	Describe preparation and reactions of various classes of aliphatic compounds and aromatic compounds.
BP203T	Course Title: Biochemistry – Theory
CO.1	To understand the importance of biomolecules and bioenergetics
CO.2	To acquire the knowledge on carbohydrate metabolism and biological oxidation
CO.3	Learn the concepts of β oxidation of saturated Fatty acid, amino acid metabolism and its disorders
CO.4	Understand the concepts of Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and disorders
CO.5	To know the IUB classification of enzymes Enzyme kinetics, Therapeutic and



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	diagnostic applications of enzymes and isoenzymes Coenzymes
BP204T	Course Title: Pathophysiology – Theory
CO.1	To study of causes of diseases and reactions of the body to such disease producing causes.
CO.2	To impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms.
CO.3	To study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.
CO.4	To describe the etiology and pathogenesis of the selected disease states
CO.5	To name the signs and symptoms of the diseases
BP205T	Course Title: Computer Applications in Pharmacy – Theory
CO.1	Understand various types of application of computers in pharmacy
CO.2	Gain knowledge various types of databases using proper web technology
CO.3	Apply knowledge of databases for effective working in pharmacy
CO.4	Learn the technique of bioinformatics
CO.5	Explain computing tools for data analysis in preclinical development
BP206T	Course Title: Environmental sciences – Theory
CO.1	Develop attitude towards environmental problems and their solutions
CO.2	Impart basic knowledge about the environment, eco system and its allied problems
CO.3	To participate in environment protection and environment improvement
CO.4	Help community in identifying and solving environmental problems
CO.5	Establish mechanism and help people to maintain harmony with Nature
BP207P	Course Title: Human Anatomy and Physiology II –Practical
CO.1	Explain the gross morphology, structure and functions of various organs of the human body
CO.2	Describe the various homeostatic mechanisms and their imbalances..
CO.3	Analyze the various tissues of different systems of the human body.
CO.4	Identify the various tissues and organs of different systems of human body.
CO.5	Appreciate coordinated working pattern of different organs of each system



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BP208P	Course Title: Pharmaceutical Organic Chemistry I– Practical
CO.1	Recall the preliminary tests used for the qualitative analysis of unknown organic compounds, including color, odor, and detection of elements (Nitrogen, Sulphur, and Halogen) by Lassaigne’s test and functional group tests.
CO.2	Demonstrate the principles and procedures involved in systematic qualitative analysis of organic compounds, including solubility tests, functional group tests, and the significance of melting point/boiling point determination.
CO.3	Identify the unknown organic compounds, including detecting functional groups, solubility characteristics, and determining melting point/boiling point.
CO.4	Analyze the results obtained from qualitative tests, functional group identification, and melting point/boiling point determination to confirm the unknown organic compounds accurately.
CO.5	Evaluate the reliability and validity of their qualitative analysis of results, purity of the unknown compounds, and make informed decisions based on their observations and data.
BP209P	Course Title: Biochemistry – Practical
CO.1	Perform Qualitative analysis of carbohydrates, proteins and urine
CO.2	Analyse quantitatively reducing sugars and proteins
CO.3	Estimate blood creatinine, blood sugar and serum total cholesterol
CO.4	Measure pH of the prepared buffer solution.
CO.5	Determine salivary amylase activity and the effect of temperature and substrate concentration.
BP210P	Course Title: Computer Applications in Pharmacy – Practical
CO.1	Understand fundamentals of computer and its uses in pharmaceutical sciences.
CO.2	Design a questionnaire using a word processing package to gather information about a particular disease
CO.3	Retrieve the information of a drug and its adverse effects using online tools
CO.4	Generating report and printing the report from patient database
B. Pharm III Semester	
BP301T	Course Title: Pharmaceutical Organic Chemistry II– Theory
CO.1	Understand the general concepts of aromatic compounds, distinguish the aromatic and aliphatic compounds, their reactions, and predict the reactivity and



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	orientation based on substituent groups.
CO.2	Distinguish the aromatic acids and bases, effect of substituents on acidity and basicity of aromatic compounds, their synthesis and reactions.
CO.3	Describe the chemistry of fats and oils, evaluate quality of fats and oils based on various analytical constants and their application.
CO.4	Discuss the polynuclear organic compounds with respect to their chemistry and synthesis.
CO.5	Explain the stability of various cycloalkanes and their synthesis and reactions.
BP302T	Course Title: Physical Pharmaceutics I – Theory
CO.1	Acquire detailed knowledge of different types of solubility and their application on development of drug delivery system.
CO.2	Understand various physicochemical properties of drug molecules and different state of matters in designing the dosage forms.
CO.3	Demonstrate the underlying principles of interfacial phenomena, adsorption and different interfaces and learn to evaluate them.
CO.4	Describe, analyze and distinguish the types of complexes and co-relate the drug action and protein binding.
CO.5	Gain knowledge of pH, buffers and isotonic solutions and their uses in pharmaceutical dosage form along with various methods to determine the pH.
BP303T	Course Title: Pharmaceutical Microbiology – Theory
CO.1	Discuss the branches, historical development and scope of microbiology,
CO.2	Understand Nutritional requirements, growth, isolation and preservation of bacteria and principle and application of different types of microscopes.
CO.3	Demonstrate the staining techniques and sterilization process.
CO.4	Describe the Morphology, classification, reproduction/replication, cultivation of Fungi and Viruses.
CO.5	Acquire the knowledge on mode of action, factors influencing, evaluation of efficiency bacteriostatic and bactericidal disinfectants
CO.6	Explain about the microbial spoilage, importance of preservatives in pharmaceutical products and Procedure, applications of animal cell culture in pharmaceutical industry and research
BP304T	Course Title: Pharmaceutical Engineering – Theory



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CO.1	Understand and control corrosion by proper selection of materials.
CO.2	Gain Knowledge about the relationship between pressure and fluid flow and of relationship between particle size and solubility, mechanism of size separation based on size, shape and density.
CO.3	Apply the mechanism of heat transfer and various operations of evaporation and distillation.
CO.4	Understand the significances of operation and principles of drying. Learn different ways of mixing solid liquid dosage form.
CO.5	Understand the operation and principles of centrifugation and filtration
BP305P	Course Title: Pharmaceutical Organic Chemistry II – Practical
CO.1	Synthesize various organic compounds by different chemical reactions.
CO.2	Purify organic compounds using various procedures like recrystallization and steam distillation.
CO.3	Calculate the theoretical yield, practical yield and percentage yields of the products obtained by synthesis.
CO.4	Understand the synthesis and reaction mechanism for the synthesized organic compounds.
CO.5	Determine the quality of fats and oils by acid value, saponification value and iodine value.
BP306P	Course Title: Physical Pharmaceutics I – Practical
CO.1	Perform, determine and analyze the solubility, partition-co-efficient of various drug molecules under various conditions.
CO.2	Determine the critical micellar concentration and critical solution temperature of two component system, dissociation constant of different drugs and to determine their application.
CO.3	Determine the HLB, adsorption and surface tension of different drug molecules.
CO.4	Analyze the drug complexes by various methods and interpret their data.
CO.5	Demonstrate the preparation of buffers and isotonic solutions and determination of pH.
BP307P	Course Title: Pharmaceutical Microbiology – Practical
CO.1	Carried out the preparation of nutrient broth and nutrient agar media and sterilization of glassware's and media using suitable instrument



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CO.2	Perform sub culturing of bacteria by agar slab and slant of bacteria and fungus- slants and isolate pure culture by streak plate method and pour method
CO.3	Differentiate the organisms by Simple, Gram, Acid staining techniques
CO.4	Carry out the sensitivity test, minimum inhibitory concentration of an antibiotic and sterility test for water for injection
CO.5	Demonstrate bacteriological analysis of water and Biochemical tests
BP 308P	Course Title: Pharmaceutical Engineering –Practical
CO.1	Evaluate the particle size of powder by using sieve analysis. Understand the concept of size reduction using various size reduction techniques.
CO.2	Examine the end point of drying, loss of drying and moisture content of wet sample by constructing drying rate curve.
CO.3	Understand the significance of various factors affecting filtration, evaporation and crystallization.
CO.4	Demonstrate the construction, working and application of various equipment.
CO.5	Perform various experiment related to heat transfer.
B. Pharm IV Semester	
BP401T	Course Title: Pharmaceutical Organic Chemistry III– Theory
CO.1	Describe the method of preparation and properties of organic compounds.
CO.2	Explain the stereochemical aspects of organic compounds and stereochemical reactions.
CO.3	Understand the medicinal uses and other applications of organic compounds.
BP402T	Course Title: Medicinal Chemistry I – Theory
CO.1	Discuss the chemistry of drugs with respect to their pharmacological activity.
CO.2	Explain the drug metabolic pathway, adverse effect and therapeutic value of drugs.
CO.3	Understand the structural activity relationship (SAR) of different class of drugs.
CO.4	Write the chemical synthesis of drug.
BP403T	Course Title: Physical Pharmaceutics II – Theory
CO.1	Understand physiochemical properties that contribute in designing as table colloidal system.
CO.2	Describe the pharmaceutical significance of different states of flow to drug-



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	delivery system.
CO.3	Formulate and evaluate various dispersion system for effective clinical management.
CO.4	Describe, analyze and distinguish the fundamental properties of particles and develop analytical skills to optimism the flow of powders.
CO.5	Gain knowledge of chemical kinetics and use them for stability testing and determination of expire date of formulations according to ICH guidelines.
BP404T	Course Title: Pharmacology I – Theory
CO.1	Understand what drug does to the living organisms and how their effects can be applied to therapeutics.
CO.2	Learn mechanism of action, pharmacodynamics and pharmacokinetics along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.
CO.3	Understand the pharmacological actions of different categories of drugs.
CO.4	Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
CO.5	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
CO.6	Observe the effect of drugs on animals by simulated experiment.
BP405T	Course Title: Pharmacognosy and Phytochemistry I– Theory
CO.1	Discuss the definition, history, scope and development of Pharmacognosy, classification and quality control of crude drugs
CO.2	Describe the techniques in the cultivation, processing, storage of crude drugs and conservation of medicinal plants
CO.3	Acquire the knowledge on history and requirement, procedure and application of plant tissue culture
CO.4	Explain various traditional system of medicines and different types of secondary metabolites, their general properties, classification, and their test for identification
CO.5	Describe the sources, chemical constituents and uses of plants products such as plant fibers, hallucinogens teratogens, natural allergens, primary metabolites (carbohydrates, lipids, proteins, novel medicinal agents from marine sources



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BP406P	Course Title: Medicinal Chemistry I – Practical
CO.1	Execute preparation of medicinal compounds.
CO.2	Interpret assay of drugs.
CO.3	Examine the partition coefficient of drugs.
BP407P	Course Title: Physical Pharmaceutics II – Practical
CO.1	Acquire knowledge on basic mathematical calculations to formulate and evaluate the physiochemical properties of different stable system.
CO.2	Analyze flow behavior of the fluid via evaluating the deformation of the liquids under different stress condition.
CO.3	Formulating and evaluating different liquid to assess their quality.
CO.4	Optimize the particle behavior by assessing their physical properties to suit the stable solid dosage form.
CO.5	Examine the quality of pharmaceutical products by assessing the stability parameters under different stress conditions.
BP408P	Course Title: Pharmacology I – Practical
CO.1	Gain knowledge of instruments and laboratory animals used in experimental pharmacology.
CO.2	Utilize different routes of drug administration in animals.
CO.3	Examine various pharmacological laboratory techniques.
CO.4	Estimate the effect of drugs on animals by simulated experiment.
BP409P	Course Title: Pharmacognosy and Phytochemistry I – Practical
CO.1	Analyze unorganized crude drugs by chemical tests
CO.2	Determine the leaf constants, stomatal number and index, Vein islet number, Vein islet termination, Palisade ratio, size of starch grains, Calcium oxalate crystals, Fiber length and width, Lycopodium spore method
CO.3	Determine physicochemical parameters like Ash value, Extractive values, Moisture content of crude drugs
CO.4	Find out swelling index and foaming of crude drugs
B. Pharm V Semester	
BP501T	Course Title: Medicinal Chemistry II – Theory
CO.1	Define and Classify different class of drugs based on chemical aspects.
CO.2	Describe and correlate the chemistry of drugs with respect to their



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	pharmacological activity
CO.3	Understand the mechanism of metabolic pathways, therapeutic significance and adverse effect of different category of medicinal compounds.
CO.4	Understand the Structural Activity Relationship of different class of medicinal compounds.
CO.5	Explain synthesis of various medicinal compounds.
BP502T	Course Title: Industrial Pharmacy I– Theory
CO.1	Identify the physical and chemical properties of drug to carry out preformulation studies and apply them in formulating the solid, liquid, parenteral dosage forms and in stability studies.
CO.2	Classify tablet, describe various excipients, granulation methods, large scale production equipments, defects coating process and quality control parameters of inprocess and compressed tablets; Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions.
CO.3	Explain the production of gelatin and hard gelatin shell, filling of hard and soft gelatin shell, final product quality control tests, packaging, storage and stability testing of capsules; Pelletization process and equipments for manufacturing.
CO.4	Recognise the essential requirements, production facilities, aseptic processing and formulation, containers and closures selection, and quality control tests of parenteral products including ophthalmic Preparations.
CO.5	Discuss formulation, preparation and quality control tests of various cosmetics viz lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens, and pharmaceutical Aerosols. Report the materials used for packaging of pharmaceutical products, factors influencing choice of containers, quality control tests.
BP503T	Course Title: Pharmacology II – Theory
CO.1	Understand about the structure, functions, electro-physiology of human heart and pharmacological features of drugs used in cardiovascular diseases.
CO.2	Remember agonist and antagonist drugs used in urinary tract disorders.
CO.3	Explain the role, classification and functions of various types of (agonist and antagonist) autocoids.
CO.4	Describe the role, mechanism of action and functions of different class of



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	hormones in endocrine system.
CO.5	Discuss about the Principle, classification, applications and merits of various types of bioassay. Screening methodology and pharmacological features of different class of drugs with their selective agonist and antagonist used in different types of bioassay.
BP504T	Course Title: Pharmacognosy and Phytochemistry II– Theory
CO.1	Explain basic metabolic pathways of plants and formation of different secondary metabolites through various biosynthetic pathways in plants
CO.2	Describe utilization of radioactive isotopes in the investigation of biosynthetic pathways
CO.3	Explain source, chemistry, therapeutic uses and commercial application of various secondary metabolites containing drugs.
CO.4	Carry out the methods of extraction, identification and analysis various phytoconstituents present in crude drugs
CO.5	Discuss methods for industrial production, estimation and utilization of some therapeutically important phytoconstituents
CO.6	Describe various modern methods for extraction, isolation, purification and identification of crude drugs
BP505T	Course Title: Pharmaceutical Jurisprudence – Theory
CO.1	Understand the basic knowledge of legislations related to the profession of pharmacy in India.
CO.2	Learn D&C act 1940 and its rules and their implication to the development and marketing of pharmaceuticals.
CO.3	Know working of regulatory authorities and agencies governing the manufacture, analysis, tests, sales and licensee required for the drugs
CO.4	Acquire Knowledge about administration of various act and rules, study about various parameters of different schedules and labeling and packaging guidelines.
CO.5	Gain information about NDPS, DPCO, NLEM, their committees and its functions.
CO.6	Understand the code of ethics during pharmaceutical practice. Learn details of Patents, IPR, MTP and RTI act.



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BP506P	Course Title: Industrial Pharmacy I – Practical
CO.1	Execute Preformulation studies on paracetamol/ aspirin/ any other drug.
CO.2	Experiment on preparation of Paracetamol/Aspirin tablets and evaluation of prepared and marketed tablets. Implement the theoretical knowledge of film coating of tablets.
CO.3	Preparation and evaluation of Tetracycline capsules and comparison with marketed capsules
CO.4	Demonstrate the preparation of Calcium Gluconate injection/Ascorbic Acid injection and ophthalmic preparation viz Eye drops/ and Eye ointments.
CO.5	Apply theoretical knowledge in preparation of Creams (cold / vanishing cream) and evaluation of Glass containers (as per IP).
BP507P	Course Title: Pharmacology II – Practical
CO.1	Analyze the effect of drugs on blood pressure and heart rate by using isolated frog heart and dog heart.
CO.2	Perform bioassay of Histamine, Oxytocin, Serotonine and Acetylcholine.
CO.3	Report the analgesic activity by central and peripheral methods (Eddy's hot plate method and tail flick method) by using rats and mice.
CO.4	Demonstrate an anti-inflammatory activity by carrageen induced paw model using rats and mice.
CO.5	Summarize actions of selective agonist and antagonist used in spasmogens and spasmolytics rabbit jejunum.
BP508P	Course Title: Pharmacognosy and Phytochemistry II – Practical
CO.1	Identify the crude drugs by morphological study and carryout the T S and Powder microscopy of important crude drugs
CO.2	Isolate & detect of active principles such as Caffeine, Diosgenin, Atropine, Sennosides
CO.3	Separate sugar and components from herbal extract using chromatography
CO.4	Extract volatile oil from distillation and identify the same by chromatography
CO.5	Analyze unorganized crude drugs by chemical tests
B. Pharm VI Semester	
BP601T	Course Title: Medicinal Chemistry III – Theory



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CO.1	Define and explain the drugs used for various infectious diseases caused by pathogens.
CO.2	Distinguish the medicinal compounds based on their chemistry, mechanism of action and biological activity with examples and structures.
CO.3	Explain the recent developments in design of different class of drugs based on structure activity relationship.
CO.4	Identify different pathways of synthesis, metabolism of drugs and also finding therapeutic values and adverse effects of various class of drugs.
CO.5	Discuss the importance and design of drugs by various approaches like QSAR, docking, combinatorial chemistry and prodrug design.
BP602T	Course Title: Pharmacology III – Theory
CO.1	Identify Drugs for treating various Respiratory and Gastrointestinal Complications.
CO.2	Explain the principles of Chemotherapy and illustrate the mechanism of action of Antibiotics.
CO.3	Analyze the Chemotherapy of UTI's, STD's, and anti-cancer drugs and to categorize the immuno-pharmacology.
CO.4	Asses the Various types of toxicity studies, principles of treatment of poisoning and management of various poisoned condition.
CO.5	Compile the biological clock and its significance leading to chrono-therapy.
BP603T	Course Title: Herbal Drug Technology – Theory
CO.1	Know selection of herbs, authentication, processing, development of herbal medicinal product, cultivation and its agriculture practice, Indian system of medicine, formulation and its standardization.
CO.2	Understand benefits of various plants as nutraceuticals, know herb-food interaction of various plant drugs.
CO.3	Remember the Sources and description of raw materials from herbs used in personal care products, formulations and novel dosage form.
CO.4	Understand benefits of various plants as nutraceuticals in ailments and remember the herb-food interaction of various plant drugs
CO.5	Know the WHO and ICH guidelines for evaluation of herbal drugs.
CO.6	Remember the plant based industries and institutions of India, Good



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	Manufacturing Practices of India system of medicine.
BP604T	Course Title: Biopharmaceutics and Pharmacokinetics – Theory
CO.1	Understand and the importance of absorption and distributions of drugs
CO.2	Knowledge of bioavailability, bioequivalent and elimination of drugs.
CO.3	Understand the pharmacokinetics, various compartment models of drugs, pharmacokinetics parameters, elimination and their significance with application.
CO.4	Gain knowledge on multi-compartment models and their significances.
CO.5	Understand aboutn on-linear pharmacokinetics.
BP605T	Course Title: Pharmaceutical Biotechnology – Theory
CO.1	Understand the importance of Immobilized enzymes and biosensors and protein engineering in Pharmaceutical Industry
CO.2	Understand basic principles of genetic engineering, enzyme technology and steps involved in rDNA technology and its applications.
CO.3	Describe the concept of immunity, production of vaccine, hybridoma technology
CO.4	Discuss Immuno blotting techniques and Microbial genetics and biotransformation
CO.5	Explain the principles of fermentation its design and production of pharmaceutical products, various blood products, plasma collection and processing of it.
BP606T	Course Title: Quality Assurance –Theory
CO.1	Gain the knowledge of cGMP aspects in a pharmaceutical industry
CO.2	Understand the responsibilities of QA & QC departments
CO.3	Acquire the skill for preparation process of various documentation like SOP, BMR, MFR etc.,
CO.4	Explain principle of calibration of instruments and validation and its types
CO.5	Learn ways to perform analytical method validation and concept of good warehouse practices.
BP607P	Course Title: Medicinal chemistry III – Practical
CO.1	Synthesize various medicinal compounds and intermediates by different chemical reactions.



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CO.2	Propose reaction mechanism for the synthesized organic compounds. Calculate the theoretical yield, practical yield and percentage yields of the products obtained by synthesis.
CO.3	Estimate and find out purity of some medicinal drugs by various assay methods.
CO.4	Draw chemical structures and reactions using chem draw software.
CO.5	Determine the physico-chemical properties of drugs using drug design software Drug likeness screening.
BP608P	Course Title: Pharmacology III – Practical
CO.1	Recall the dose calculations in pharmacological experiments and relate the anti-allergic activity/anti-ulcer activity in rats modules.
CO.2	Demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum.
CO.3	Construct serum biochemical parameters by using semi auto analyzer.
CO.4	Analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method
CO.5	Evaluate acute oral toxicity (LD50), acute skin irritation/corrosion and acute eye irritation/corrosion. Predict the pharmaco-kinetic parameters and adapt the bio-statistics methods in experimental pharmacology.
BP609P	Course Title: Herbal Drug Technology – Practical
CO.1	Perform monograph analysis, preliminary Phytochemical screening for crude drugs.
CO.2	Determine the alcohol content in Asava and Arista.
CO.3	Preparation and standardization of herbal cosmetics and herbal formulations.
CO.4	Determine the aldehyde content, phenol content and total alkaloids.
B. Pharm VII Semester	
BP701T	Course Title: Instrumental Methods of Analysis – Theory
CO.1	Understand the interaction of matter with electromagnetic radiation and its application in qualitative and quantitative analysis.
CO.2	Apply the principles of spectroscopic techniques in the estimation of pharmaceuticals.
CO.3	Distinguish the principles and implement procedures of various types of



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	analytical technique, chromatographic separation and analysis of drugs.
CO.4	Compare the principles and implement procedure of various types of chromatographic and spectroscopic identification and analysis of drugs.
CO.5	Identify the applications of modern analytical techniques other than drug analysis.
BP702T	Course Title: Industrial Pharmacy II – Theory
CO.1	Know the process of pilot plant and scale up of pharmaceutical dosage form.
CO.2	Understand the process of technology transfer from lab scale to commercial batch.
CO.3	Know different Laws and Acts that regulate pharmaceutical industry.
CO.4	Understand the approval process and regulatory requirements for drug products.
BP703T	Course Title: Pharmacy Practice – Theory
CO.1	Gain knowledge about Hospital, its Classifications, Organizational structure and Medical staffs involved
CO.2	Learn about Hospital pharmacy, Location, Layout, Organizational structure, Staff requirement, Responsibilities and Functions of hospital pharmacist
CO.3	Understand and recall Adverse drug reaction, its Classification, Genetically determined toxicity, Drug interaction, Methods for Detection and Reporting ADR
CO.4	Know about Community Pharmacy, Organization and structure of wholesale and retail drug store, Types and design, Legal requirement for establishing
CO.5	Learn the skills for maintenance of drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store
BP704T	Course Title: Novel Drug Delivery System – Theory
CO.1	Understand the basics of selection of drugs candidates, various approaches, formulation, physiochemical, biological properties of drug and applications of polymer relevant to controlled drug delivery system.
CO.2	Design various method involved in microencapsulation, mucosal drug delivery system and concepts of implants and osmotic pumps
CO.3	Learn the formulation and applications of transdermal drug delivery system, gastro- retentive drug delivery system and nasopulmonary drug delivery system.
CO.4	Acquire knowledge on the various concepts and application of liposomes,



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	niosomes, nanoparticles and monoclonal antibodies
CO.5	Describe the formulations and applications of ocular drug delivery system and intrauterine drug delivery system
BP705P	Course Title: Instrumental Methods of Analysis – Practical
CO.1	Understand the chromatographic separation and analysis of drugs.
CO.2	Apply the basics to calculate λ_{max} of drugs.
CO.3	Determine the drug content by different analytical methods.
CO.4	Estimate the compounds by chromatographic method of separation.
CO.5	Develop the practical skills in handling modern analytical instruments.
BP706PS	Course Title: Practice School
CO.1	Acquire knowledge and hands on experience on the latest technologies and research domains beyond the syllabus
CO.2	Practically apply the knowledge and skills previously learned through conventional classroom teaching and laboratory experiment
CO.3	Develop the ability to adapt rapidly changing requirement and challenges of a professional workplace in the real world.
CO.4	Improve their employability and establish a professional network before graduation.
B. Pharm VIII Semester	
BP801T	Course Title: Biostatistics and Research Methodology
CO.1	Know the operation of Excel, SPSS, Minitab, DoE.
CO.2	Apply various statistical techniques to analyse data.
CO.3	Select various statistical software in designing the experiments and in treatment of clinical study data.
BP802T	Course Title: Social and Preventive Pharmacy
CO.1	Acquire awareness of current issues related to health in the country and worldwide.
CO.2	Derive strategies for health care development for community.
CO.3	Learn different health programme their objectives and way of working.
CO.4	Recommend alternative ways for solving health related problems
BP803ET	Course Title: Pharma Marketing Management
CO.1	Understand marketing concepts and techniques and their applications in



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	pharmaceutical industry.
CO.2	Explain quantitative and qualitative aspects of market.
CO.3	Apply knowledge of product for deciding product branding, packaging and labelling, Product mix and product life cycle.
CO.4	Learn different ways to do promotion.
CO.5	Gain knowledge for pharmaceutical marketing channels and learn duties of professional sales representative.
	Analyse determinants of price and pricing methods, DPCO, NPPA.
BP805ET	Course Title: Pharmacovigilance
CO.1	Understand the concept of drug safety monitoring, history and development of pharmacovigilance
CO.2	Create awareness in establishment of pharmacovigilance centres in hospitals.
CO.3	Apply the knowledge to use dictionaries used in pharmacovigilance and ICD classification of disease.
CO.4	Appreciate drug evaluation, ICH guidelines CIOMS requirements for ADR reporting.
BP809ET	Course Title: Cosmetic Science
CO.1	Understand about cosmetics and cosmeceuticals products
CO.2	Gain knowledge and gain analytical skills associated with sunscreen and sun protection cosmetics
CO.3	Understand formulation and analytical skill to design and develop various cosmetic products.
CO.4	Understand basic problems associated with skin, hair and oral care.
BP810ET	Course Title: Experimental Pharmacology
CO.1	Gain knowledge about the CPCSA and OECD guidelines.
CO.2	Appreciate the application of various commonly used laboratory animals.
CO.3	Demonstrate the various screening methods used in preclinical research.
CO.4	Understand the importance of biostatistics and research methodology.
BP813ET	Course Title: Experimental Pharmacology
CO.1	Understand various pharmaceutical product development, regulations related to preformulation, stability assessment, Quality control testing of different dosage form.



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CO.2	Gain the detail knowledge about the excipients used in pharmaceutical products like solvents, solublizers, surfactants, emulsifying agents, etc
CO.3	Learn the skills for selection and application of excipients in various pharmaceutical formulation.
CO.4	Acquire knowledge about various optimization techniques used in pharmaceutical product development like DoE, QbD.
CO.5	Learn various quality control test for Packaging material used for pharmaceutical products and their related regulatory guidelines.
BP814PW	Course Title: Project Work
CO.1	Find the research gap and path to overcome it.
CO.2	Explain the aim, objective and plan of work for the investigation.
CO.3	Perform detailed literature review to support the data for project study
CO.4	Decide the methodology and material required for the present research work
CO.5	Execute the task according to set goals. Articulate the results with proper justification.