Kharvel Subharti College of Pharmacy

Name of the Program with program code: Bachelor of Pharmacy (PH-01)

Course Outcomes (Old Syllabus)

Programme Name	Programme Objectives	Course Name	Course Code	Course Outcomes
Bachelor of Pharmacy	• PO1 **Pharmacy Knowledge:** Graduates will acquire strong fundamental concepts and adequate scientific information regarding basic principles of pharmaceutical, biomedical; behavioural, social, administrative and manufacturing practices by which they will able to handle drugs safely and ensure the rationale use of drugs. • **PO2**	Mathematics	BPH 101 M	**Upon the completion of this course, the student will able to-** • Understand about measure, mean, mode and median. • Know about separable homogenous & linear differential equations • Understand linear differential equations, complimentary function and particular integral, simultaneous, pharmaceuticals applications. • Calculate significant digits and rounding off numbers, data collection, random and non random sampling methods, sample size, data organization diagrammatic representation of data. • Application of probability and events, Bayes theorem, probability theorems, probability distributions, elements of binomial and poison distribution.
		Biology	BPH 101 B	**Upon the completion of this course, the student will able to-** • Know about kingdoms of life. • Inquire about general structure and life history of insects

	Drug development: Graduates will acquire the ability to develop and/or evaluate various pharmaceuticals and their formulations including cosmeceuticals and quality assurance of various pharmaceutical dosage forms including those of herbal origin as per standards of official monographs, WHO, and other regulatory agencies. • **PO3** **Social Awareness:** Graduates will demonstrate the impact of pharmacy knowledge on the society and also will be aware of modern issues. They will create awareness of			• Discuss about morphology and histology of root, stem, leaf, flower, fruit and seed, modification of stems and roots. • Understand about plant cell structure and non living inclusions, mitosis and meiosis, different types of plant tissues and their functions. • Basic concept of molecular biology (DNA and RNA). • Discuss about methods of classification of plants.
		Pharmaceutical Analysis -I	BPH 102	**Upon completion of the course the student shall be able to-** • Description of Heterocyclic Compounds. • Describe acid Base Titrations along with basic concepts. • Explain Oxidation reduction Titrations along with basic concepts. • Explain Precipitation Titrations along with basic concepts. • Discuss Gravimetric Analysis along with its technique.
		Pharmaceutics-I (General Pharmacy)	BPH 103	**Upon completion of this course the student shall be able to:** • Know the history and profession of pharmacy. • Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations. • Understand the professional way of handling the prescription • Understand the preparations of various conventional dosage forms.

	healthcare issues through interactions with others and will gain a sense of self-respect towards community and citizenship. • **PO4** **Pharmaceutical Ethics:** Graduates will demonstrate knowledge of professional and ethical responsibilities as per pharmaceutical jurisprudence. They will be able to demonstrate knowledge and skills in all disciplines of Pharmaceutical sciences and develop a sound pharmaceutical care plan to manage medication-related problems. They will retrieve, evaluate, and apply current drug information	Anatomy & Physiology-I	BPH 104	**Upon completion of this course the student should be able to:** • Explain the gross morphology, structure and functions of various organs of the human body. • Classify Joints and types of joint movements with proper knowledge of physiology of skeletal muscle contraction. • Identify the various tissues and organs of different systems of human body. • Describe composition and function of blood, significance and various disorders • Explain the concepts of health and disease, balanced diet and nutritional deficiency disorders. • Perform the haematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
		Pharmaceutical Chemistry-I (Organic Chemistry- I)	BPH 105	**Upon completion of the course the student shall be able to-** • Discuss structure and properties of atom, nomenclature of organic compounds. • Explain Organic reactions & their mechanism. • Explain Stereochemistry of organic compounds and isomerism. • Considering of preparation, Properties and reactions of alkyl

	in the delivery of pharmaceutical care and assure safe and accurate preparation and dispensing of medications. • **PO5** **Professional Identification:** The graduates will swear by a code of ethics of Pharmacy Council of India in relation to community and shall act as integral part of a health care system. They will understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).			halides, Alcohols, aliphatic amine. • Discussion on alkanes, cycloalkanes, alkenes, alkynes & dienes, free radical substitution reaction.
		Pharmaceutical Chemistry-II (Inorganic Pharmaceutical Chemistry)	BPH 201	**Upon completion of course student shall be able to-** • To describe about sources of impurities & their control limit. • To explain different limit tests in pharmacy. • To illustrate the medicinal and pharmaceutical importance of inorganic compounds. • To define and classify Radio-Pharmaceuticals including its applications and hazards. • To describe major intra and extra- cellular electrolytes.
		Pharmaceutical Chemistry-III (Organic Chemistry- II)	BPH 202	**Upon completion of the course the student shall be able to-** • Discuss Nomenclature, preparation, properties and reactions of aromatic compounds. • Discuss Nomenclature, preparation, properties and reactions of aromatic compounds aliphatic aldehydes, aliphatic ketones, aromatic aldehydes and aromatic ketones. • Explain Aliphatic & aromatic carboxylic acids and Di & tri-carboxylic acids, hydroxyl acids, ß-keto ester derivatives. • Explain Nomenclature, preparation, Properties and reactions of Organometallic compounds.

	• **PO6** **Analytical Skills:** Graduates will develop skills in qualitative and quantitative analysis of various pharmaceuticals. They will demonstrate their skills to use modern pharmaceutical tools, software, and equipments to analyze & solve problems. Develop skills in qualitative and quantitative analysis of various pharmaceuticals. • **PO7** **Leadership Skills:** Graduates will develop interpersonal skills such as influencing others, negotiating and working with others, conflict management and leading			• Classification, structure, reactions, structure elucidation of carbohydrate.
		Anatomy & Physiology –II	BPH 203	**Upon completion of this course the student should be able to:** • Explain the gross morphology, structure and functions of various organs of the human body. • Describe the hypo and hyper secretion of endocrine glands and their disorders. • Identify the various tissues and organs of different systems of human body. • Describe the digestive system and their functions and path physiology of digestive disorders. • Discuss the structure and functions of different parts of brain and spinal cord and understanding of autonomic nervous system. • Explain the spermatogenesis and oogenesis and path physiology of sexually transmitted disease.

	others through the problem-solving process. They will be able to lead and function both individually and as a member of a team. • **PO8** **Communication:** The graduates will acquire excellent interpersonal oral communication and writing skills. Demonstrate the ability of verbal communication and writing reports and to lead the team effectively. • **PO9** **Drugs and diseases**: Graduates will be able to understand different classes of drugs, their mechanism of	Computer Fundamentals & Programming	BPH 204	**Upon the completion of this course, the student will able to-** • Know about basic computer organization functionality computer codes computer classification. • Understand, planning the computer program, algorithm, flowcharts, and decision tables. • Know, writing simple programs in 'C', numeric constants, variable and arithmetic expressions. • Apply Fortran 77, writing simple programme in Fortran 77. • Understand basic database concept and classification, operations performed on database.
		Professional Communication	BPH 205	**Upon the completion of this course, the student will able to-** • Know about English grammar, parts of speech, Articles, Preposition, Tenses, Active-Passive voice, direct and indirect speech. • Know about various type of letter writing. • To know about interview tips and interview exit. • Know about presentation techniques, corporate behaviour, corporate expectation, office etiquettes and Extempore. • Know about personality types, decision making, motivation, attitude, thinking and group discussions.
		Pharmaceutics-II	BPH 301	**Upon completion of the course student shall be able to:**

	action, dynamics, kinetics, structure activity relationships, pathophysiology and pharmacotherapeutics of various diseases. • **PO10** **Problem analysis and Planning:** Graduates will utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Demonstrate effective planning abilities including time management, resource management,	(Unit Operations-I)		• Know various unit operations used in Pharmaceutical industries. • Understand the material handling techniques. • Know about various industrial hazards and safety precautions. • Know about flow of fluids and various methods to determine them. • Understand various filtration and centrifugation techniques. • Understand various preventive methods used for corrosion control in Pharmaceutical industries. • Understand the principles used in air conditioning, humidification and de-humidification systems.
		Anatomy Physiology and Path physiology - III	BPH 302	**Upon completion of this course the student should be able to:** • Describe various path physiological mechanism of disease and their management. • Explain basic mechanism of inflammation, repairing and concepts of wound healing. • Describe anatomy and functions of respiratory system and their disorders. • Discuss basic anatomy and physiology of sense organs. • Describe anatomy and functions of cardiovascular system, conducting system, ECG and their disorders.

	delegation skills and organizational skills. • **PO11** **Life-long learning**: Graduates will 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.	Pharmacognosy -I	BPH 303	**Upon the completion of this course, the student will able to-** • Know about history, scope & development of pharmacognosy, sources and classification of drugs. • Illustrate about Plant taxonomy (floral formula and floral diagram of some families). • Understand, Cultivation, Collection, Processing & Storage of crude drugs. • Understand adulteration and method of evaluation as per W.H.O. guidelines. • Recall quality control and standardization of crude drugs. • Understand systematic pharmacognostic studies of drugs containing carbohydrates (derived products) and Lipids.
		Pharmaceutical Chemistry - IV (Organic Chemistry -III)	BPH 304	**Upon completion of course student shall be able to-** • Describe Nomenclature, Chemistry, Preparation, Properties and importance of organic compound (ά, β- Unsaturated carbonyl compounds, Acetoacetic ester and malonic ester). • Explain Nomenclature, Chemistry, Preparation, Properties and their Pharmaceutical/synthetic importance – Heterocyclic compounds. • Describe Explain Nomenclature, Chemistry, Preparation, Properties and their Pharmaceutical/synthetic importance of

				Polynuclear hydrocarbons: Naphthalene, Anthracene and Phenantherene. • Discussing mechanism and synthetic application of name reactions. • Classification, identification, general methods of preparation of amino acid, Nucleic acid, polymerization, oils.
		Pharmaceutics – III (Community Pharmacy)	BPH 305	**Upon completion of the course student shall be able to:** • Describe determinant of health. • Explain the concept and scope, of epidemiology. • Apply approaches of epidemiology in nursing management of communicable diseases. • Apply approaches of epidemiology in nursing management of non-communicable diseases. • Know the sources to collect demographic information from the community. • Understand impact of population explosion in India.
		Pharmaceutics – IV (Unit Operations – II)	BPH 401	**Upon completion of the course student shall be able to:** • Understand various stoichiometric equations used in unit operations. • Understand principles of distillation and various instrumental techniques of distillation.

				• Understand theories of evaporation and various instrumental techniques of evaporation. • Know about moisture content and EMC of materials and theories & machinery used in drying techniques. • Understand about automated process control systems. • Know about elements of computer aided manufacturing (CAM). • Understand various reactors and fundamentals of reactor design for chemical reactions.
		Pharmaceutical Microbiology	BPH 402	**Upon completion of the course, student shall be able to:** • Understand methods of identification, cultivation and preservation of various microorganisms. • Understand the importance and implementation of sterilization in pharmaceutical processing and industry. • Know about sterility testing's of pharmaceutical products. • Carry out microbiological standardization of Pharmaceuticals. • Understand the cell culture technology and its applications in pharmaceutical industries.
		Pharmacognosy - II	BPH 403	**Upon the completion of this course, the student will able to-** • Discuss about resin, study of drugs containing resins and their combination. • Describe different methods of obtaining volatile oils from plants

				and systematic pharmacognosy. • Know about phytochemical screening of plant metabolites (chemical identification), isolation and classification along with qualitative chemical tests. • Able to apply the use of fibres and pharmaceutical aids in pharmacy. • Describe about tannins & tannin containing drugs and utilization and worldwide trade of volatile oil.
		Pharmaceutical Analysis- II	BPH 404	**Upon completion of the course the student shall be able to-** • Explain Theoretical considerations and application in drug analysis. • Describe quality control by the various analytical techniques. • Discuss assays included in the Indian Pharmacopeia 2008. • Point out various chromatographic techniques. • Restructure quantitative & qualitative application of analytical techniques.
		Pharmaceutical Jurisprudence & Ethics	BPH 405	**Upon completion of the course, the student shall be able to:** • Understand pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. • Know about various Indian pharmaceutical acts and laws.

				• Know about regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. • Understand code of ethics during the pharmaceutical practice.
		Pharmaceutical Chemistry – V (Biochemistry)	BPH 501	**Upon completion of the course the student shall be able to-** • Discuss Lipid metabolism and biological oxidation. • Describe Carbohydrate metabolism, TCA cycle. • Explain Enzymes and coenzyme. • Considering Biosynthesis, catabolism and conversion of amino acids to specialized products, considering biosynthesis of RNA. • Explain Genetic Code and Protein synthesis and Regulation of gene expression.
		Pharmaceutics – V (Pharmaceutical Technology -I)	BPH 502	**Upon completion of the course, the student shall be able to:** • Know different causes of drug degradation and will know the stable storage conditions for drug products. • Understand different cosmetic products and their general method of formulation and evaluation of different cosmetic formulations. • Know different dental and their general method of formulation and evaluation of dentifrices. • Know about the formulation and evaluation of semisolid dosage forms. • Know various bases used for different types of semisolid

				products. • Know about formulation, method of preparation and evaluation of various types of suppositories. • Understand several of components of pharmaceutical aerosols and their formulation and quality control tests. • Know about various liquid formulations and methods of preparation and evaluation of liquid orals. • Know about formulation, method of preparation and evaluation of various types of liquid external preparations. • Know the role of preformulation and formulation in the development of a drug into dosage form.
		Pharmacology – I	BPH 503	**Upon completion of this course the student should be able to:** • Explain the concepts of receptors, absorption and distribution of drugs. • Describe metabolism and excretion of drugs, adverse drug reactions and drug interactions. • Discuss various routes of drugs administration and bioassay of drugs. • Knowledge of mechanism of action of drugs and get the idea which medicines are used for the treatment of a particular disease.

				• Describe drug discovery and development.
		Pharmaceutical Chemistry -VI (Medicinal Chemistry –I)	BPH 504	**Upon completion of the course the student shall be able to-** • Description about medicinal chemistry and their importance. • Discuss chemistry of drugs in respect to their pharmacological activity. • Explain Synthetic procedure of the drug with pharmacokinetic profile of drugs. • Describe Structural Activity Relationship (SAR) of different class of drugs with relate their biological activity. • Illustrate mode of action of drug.
		Pharmaceutics – VI (Physical Pharmacy)	BPH 505	**Upon the completion of the course student shall be able to:** • Understand various physicochemical properties of drug molecules in the designing the dosage forms. • Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations. • Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. • Understand various physicochemical properties of drug molecules in the designing the dosage forms. • Know the principles of chemical kinetics & to use them for stability testing and

				determination of expiry date of formulations. • Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
		Pharmaceutical Chemistry-VII (Medicinal Chemistry - II)	BPH 601	**Upon completion of the course the student shall be able to-** • Discuss chemistry of drugs with classification. • Explain Synthetic procedure of the drug with their pharmacokinetic profile. • Describe Structural Activity Relationship (SAR) of different class of drugs with relate their biological activity. • Illustrate mode of action of drug. • Considering drug dose, adverse effect, t1/2 , Self life of drug.
		Pharmaceutics-VII (Pharmaceutical Technology - II)	BPH 602	**Upon the completion of the course student shall be able to:** • Understand various microencapsulation techniques and their application. • Know about various techniques of granulation and compression of tablets. • Know about various tablet coating processes and equipments. • Understand the various routes of parenteral administration & parenteral products. • Understand the concept of formulation and evaluation of parenteral products.

				• Know the various techniques involved in formulation and evaluation of sustained and controlled release products. • Know the basic concepts of Quality assurance, production planning and material control in pharmaceutical industry. • Understand various types of surgical dressings including official surgical dressings. • Know about various packaging materials used in pharmaceutical industry along with their testing as per pharmacopoeial standards. • Know about techniques used in capsule formation.
		Pharmacology-II	BPH 603	**Upon the completion of this course, the student will able to-** • Understand occurence, distribution and classification of glycosides. • Systemic study of drugs containing glycosides (saponins, cardioactive sterols and anthraquinone cathartics) including biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests. • Know about utilization and production of various phytoconstituents.

				• Discuss about pharmacognostic studies of some traditional drugs and their importance. • Understand the principals of Ayurvedic, Unani , Siddha and Homeopathic systems of medicines.
		Environment & Ecology	BPH 605	**Upon the completion of this course, the student will able to-** • Know about definition, scope & importance of Natural Resources – renewable & non renewable, use, utilization, exploitation and associated problems of forests and different resources. • Discuss about environmental pollution, causes and control measures. • Understand the laws related to environmental protection. • Discuss about ecosystems which includes introduction, types features & functions of difference ecosystems, biodiversity & its conservation with special reference to India. • Understand the Environmental Protection Act -1986.
		Pharmaceutical Analysis -III	BPH 701	**Upon completion of the course the student shall be able to-** • Illustrate different type of Spectrophotometry's. • Describe Principal, Instrumentation and Pharmaceutical application of various Spectroscopy. • Analyze spectra and their calculations.

				• Sub-divide assay of official formulation. • Distinguish quantitative & qualitative analysis of drugs using various analytical instruments.
		Pharmaceutics - VIII (Biopharmaceutics & Pharmacokinetics)	BPH 702	**Upon completion of the course student shall be able to:** • Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. • Know the use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. • Understand the concepts of bioavailability and bioequivalence of drug products and their significance. • Understand various pharmacokinetic parameters, their significance & application.
		Pharmacology - III	BPH 703	**Upon completion of this course the student should be able to:** • Knowledge of mechanism of action of drugs and get the idea which medicines are used for the treatment of an infectious disease. • Describe the chemotherapy of parasitic infections and Cancer. • Discuss the contraceptives and sex hormones. • Principles of toxicology and treatment of various poisonings.

				• Describe Pharmacology of endocrine system and drugs acting on them.
		Pharmaceutical Chemistry –VIII (Medicinal Chemistry -III)	BPH 704	**Upon completion of the course the student shall be able to-** • Description about drug design and their importance. • Establish relation between physiochemical properties with their biological activity (QSAR). • Explain chemistry of drugs in respect to their pharmacological activity • Discuss Synthetic procedure of drug with pharmacokinetic profile of drugs. • Illustrate mode of action of drug.
		Pharmacognosy-IV	BPH 705	**Upon the completion of this course, the student will able to-** • Understand occurence, distribution and classification of alkaloids along with systemic pharmacognostic studies. • Discuss chemistry, systemic pharmacognostic studies and importance of drugs containing alkaloidal moieties like imidazole, steroidal, alkaloidal amine, glycoalkaloid, purines and quinazoline. • Know about world wide trade in medicinal plants & derived product. • Know about biological sources, preparation, identification tests

				and uses of various enzymes. • Know about application of chromatographic techniques in evaluation of herbal drugs. • Understand the historical development, types, nutritional requirements and importance of plant tissue culture.
		Pharmaceutical Biotechnology	BPH 801	**Upon completion of the subject student shall be able to:** • Understand the importance of Immobilized enzymes in Pharmaceutical industries. • Know about genetic engineering applications in relation to production of pharmaceuticals. • Understand the importance of monoclonal antibodies in industries. • Understand the use of microorganisms in fermentation technology.
		Natural Products	BPH 802	**Upon completion of this course it is expected that students will be able to understand-** • Enlist natural compounds and their chemistry and medicinal importance. • Discuss importance of natural compounds as lead molecules for new drug discovery. • Description of DNA technology tool for new drug discovery.

				• Generalized methods of structural elucidation of compounds of natural origin. • Associated Isolation, purification and characterization of simple chemical constituents from natural source.
		Hospital Pharmacy	BPH 803	**Upon completion of the subject student shall be able to:** • Know various drug distribution methods in a hospital. • Appreciate the pharmacy stores management and inventory control. • Know about drug monitoring of patient through medication chart review and clinical review. • Know about medication history interview and counsel the patients. • Understand and identify drug related problems. • Know and assess adverse drug reactions • Understand and interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states. • Know pharmaceutical care services. • Know about patient counselling in community pharmacy. • Understand the concept of rational drug therapy.
		Pharmaceutical Industrial	BPH 804	**Upon completion of the subject student shall be able to:** • Understand the basic concept of Management ie Administrative

		Management		Management, Entrepreneurship development, Operative Managemen Record Keeping and Identification of key points to give maximum thrust for development and perfection. • Understand various pharmaceutical Marketing concepts: channels of distribution, Salesmanship, Principle of sales promotion, advertising, ethics of sales, merchandising, literature, detailing, Recruitment, training, evaluation, compensation to the pharmacist. • Understand various principles of economics with special reference to the Laws of demand and supply, demand schedule, demand curves labor welfare, general principles of insurance and inland and foreign trade and procedures of exporting and importing goods. • Understand various principles of Accountancy, Ledger posting and book entries preparation of trial balance, columns of a cash book, Bank reconciliation statement, rectification of errors, profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques bills of exchange, promissory notes and bundles documentary bills. • Understand various Market Forecasting, Market Demand Estimating, Geo-demo-graphic analysis and Estimating industry sales.

				• Understand various aspects of Materials Management: and Production Management.
		Novel drug delivery system	BPH-805-A	**Upon completion of the course student shall be able to:** • Understand various approaches for development of novel drug delivery systems. • Understand the criteria for selection of drugs and polymers for the development of Novel drug delivery system • Formulation and evaluation of novel drug delivery systems.
		GMP, Quality Assurance & Validation	BPH-805-B	**Upon completion of the subject student shall be able to:** • Know about Requirements of GMP, CGMP1, GLP. • Know the basic concept of quality assurance and quality control. • Know various concepts in validation and process validation in manufacturing dosage formulations, applications of process validation. • Understand various documentation- Protocols, Forms and maintenance of records in Pharmaceutical industry. • Know about various sampling protocols and IPQC problems related to dosage forms.
		Standardization of herbal drugs	BPH-805-C	**Upon the completion of this course, the student will able to-** • Illustrate the commerce and quality control of natural medicinal plants products, organoleptic, microscopical, physical &

				chemical evaluation of crude drugs. • Practise standardisation of plant material as per WHO guidelines. • Demonstrate methods of extraction and modern techniques for the isolation, purification, separation, estimation and characterization of active plant constituents. • Understand the analysis of official formulations derived from crude drugs including some ayurveda preparations. • Know about general methods of screening of natural products for hypoglycemic, anti-inflammatory, anti-bacterial, psychopharmacological and anti-fertility activity.
		Drug design	BPH-805-D	**Upon completion of this course it is expected that students will be able to:** • Considering skills of design of new drug molecules using molecular modelling software • Describe concepts of QSAR • Computational chemistry • Explain molecular docking. • Consideration of CADD.
		Clinical Pharmacy & Drug	BPH-805-E	**Upon completion of this course the student should be able to:** • Knowledge of mechanism of action of drugs and get the idea

		interaction		which medicines are used for the treatment of an infectious disease. • Explain the safe use of drugs in elderly, pregnancy and paediatrics. • Discuss concepts of Therapeutic drug monitoring. • Describe basic concepts of Pharmacotherapy and individualization of drug therapy. • Explain concepts of essential drugs and rationale use of drugs.
		Pharmaceutical Marketing	BPH-805-F	**Upon completion of the subject student shall be able to:** • Understand various principles of marketing management, and Market analysis. • Know about Drug development and the marketing research interface • Understand about basic needs of advertisement and product detailing • Understand various distribution channels in pharmaceutical marketing like-Manufacturer, Wholesaler, Retailer, Hospital & Government agencies and Selection of stockists and distributors. • Know about inventory control in various pharmaceutical organizations. Internal control and external control.

		Pharmaceutical Packaging	BPH-805-G	**Upon completion of the subject student shall be able to:** • Understand various new concepts in pharmaceutical packaging systems and design of packages. • Understand various Packaging materials with special reference to polymers, metals, glass and plastics and control of Packaging materials. • Describe various methods of testing of containers & closures as per Pharmacopoeial tests and specifications, Defects in Packages. • Illustrate methods of Stability testing of package and packaging material. • Know various Ancillary materials used in packaging. 6. Demonstrate various techniques of Sterilization of packaging materials.

Course Outcomes (New Syllabus)

Programme Name	Programme Objectives	Course Name	Course Code	Course Outcomes
Bachelor of Pharmacy	• PO1 **Pharmacy Knowledge:** Graduates will acquire strong fundamental concepts and adequate scientific information regarding basic principles of pharmaceutical, biomedical; behavioural, social, administrative and manufacturing practices by which they will able to handle drugs safely and ensure the rationale use of drugs. • **PO2** **Drug development:** Graduates will acquire the ability to develop and/or evaluate various pharmaceuticals and their	Human Anatomy and Physiology -1	BP 101 T	**Upon completion of this course the student should be able to-** • Explain the gross morphology, structure and functions of various organs of the human body. • Describe the various homeostatic mechanisms and their imbalances. • Identify the various tissues and organs of different systems of human body. • Perform the various experiments related to special senses and nervous system. • Appreciate coordinated working pattern of different organs of each system.
		Pharmaceutical Analysis -1	BP 102 T	**Upon completion of the course student shall be able to-** • Understand the principles of volumetric and electro chemical analysis. • Carryout various volumetric and electrochemical

	formulations including cosmeceuticals and quality assurance of various pharmaceutical dosage forms including those of herbal origin as per standards of official monographs, WHO, and other regulatory agencies. • **PO3** **Social Awareness:** Graduates will demonstrate the impact of pharmacy knowledge on the society and also will be aware of modern issues. They will create awareness of healthcare issues through interactions with others and will gain a sense of self-respect towards community and citizenship.			titrations. • Develop analytical skills.
		Pharmaceutics -I	BP 103 T	**Upon completion of this course the student should be able to:** • Know the history of profession of pharmacy. • Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations. • Understand the professional way of handling the prescription. • Preparation of various conventional dosage forms.
		Pharmaceutical Inorganic Chemistry	BP 104 T	**Upon completion of course student should be able to-** • Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals. • Understand the medicinal and pharmaceutical importance of inorganic compounds.
		Communication Skills	BP 105 T	**Upon completion of the course the student should be able to-** • Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation.

	• **PO4** **Pharmaceutical Ethics:** Graduates will demonstrate knowledge of professional and ethical responsibilities as per pharmaceutical jurisprudence. They will be able to demonstrate knowledge and skills in all disciplines of Pharmaceutical sciences and develop a sound pharmaceutical care plan to manage medication-related problems. They will retrieve, evaluate, and apply current drug information in the delivery of pharmaceutical care and assure safe and accurate preparation and dispensing of medications. • **PO5** **Professional Identification:** The graduates will swear by a code of ethics of Pharmacy Council of			• Communicate effectively (Verbal and Non Verbal) • Effectively manage the team as a team player. • Develop interview skills. • Develop Leadership qualities and essentials.
		Remedial Biology	BP 106 RBT	**Upon completion of the course, the student should be able to-** • Know the classification and salient features of five kingdoms of life. • Understand the basic components of anatomy & physiology of plant. • Know understand the basic components of anatomy & physiology animal with special reference to human.
		Remedial Mathematics	BP 106 RMT	**Upon completion of the course the student should be able to:-** • Know the theory and their application in Pharmacy. • Solve the different types of problems by applying theory. • Appreciate the important application of mathematics in Pharmacy.
		Human Anatomy and Physiology -II	BP 201 T	**Upon completion of this course the student should be able to:** • Explain the gross morphology, structure and functions of

	India in relation to community and shall act as integral part of a health care system. They will understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees). • **PO6** **Analytical Skills:** Graduates will develop skills in qualitative and quantitative analysis of various pharmaceuticals. They will demonstrate their skills to use modern pharmaceutical tools, software, and equipments to analyze & solve problems. Develop skills in qualitative and quantitative analysis of various			various organs of the human body. • Describe the various homeostatic mechanisms and their imbalances. • Identify the various tissues and organs of different systems of human body. • Perform the haematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. • Appreciate coordinated working pattern of different organs of each system. • Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
		Pharmaceutical Organic Chemistry -I	BP 202 T	**Upon completion of the course the student should be able to-** • Write the structure, name and the type of isomerism of the organic compound. • Write the reaction, name the reaction and orientation of reactions. • Understand reactivity/stability of compounds. • Identify and confirm the identification of organic

	pharmaceuticals. • **PO7** **Leadership Skills:** Graduates will develop interpersonal skills such as influencing others, negotiating and working with others, conflict management and leading others through the problem-solving process. They will be able to lead and function both individually and as a member of a team. • **PO8** **Communication:** The graduates will acquire excellent interpersonal oral communication and writing skills. Demonstrate the ability of verbal communication and writing reports and to lead the team effectively.			compound.
		Biochemistry	BP 203 T	**Upon completion of course student should able to** • Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. • Understand the metabolism of nutrient molecules in physiological and pathological conditions. • Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
		Pathophysiology	BP 204 T	**Upon completion of the subject student should be able to –** • Describe the etiology and pathogenesis of the selected disease states. • Name the signs and symptoms of the diseases. • Mention the complications of the diseases.
		Computer Applications in Pharmacy	BP 205 T	**Upon completion of the course the student should be able to-** • Know the various types of application of computers in pharmacy. • Understand the various types of databases. • Know the various applications of databases in pharmacy.

	• **PO9** **Drugs and diseases**: Graduates will be able to understand different classes of drugs, their mechanism of action, dynamics, kinetics, structure activity relationships, pathophysiology and pharmacotherapeutics of various diseases. • **PO10** **Problem analysis and Planning:** Graduates will utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Demonstrate effective planning abilities including time management, resource	Environmental Sciences	BP 206 T	**Upon completion of the course the student should be able to-** • Create the awareness about environmental problems among learners. • Impart basic knowledge about the environment and its allied problems. • Develop an attitude of concern for the environment. • Motivate learner to participate in environment protection and environment improvement. • Acquire skills to help the concerned individuals in identifying and solving environmental problems. • Strive to attain harmony with nature.
		Pharmaceutical Organic Chemistry -II	BP 301 T	**Upon completion of the course the student shall be able to-** • Write the structure, name and the type of isomerism of the organic compound. • Write the reaction, name the reaction and orientation of reactions. • Understand account for reactivity/stability of compounds. • Prepare organic compounds.
		Physical Pharmaceutics - I	BP 302 T	**Upon the completion of the course student shall be able to-** • Understand various physicochemical properties of drug

	management, delegation skills and organizational skills. • **PO11** **Life-long learning**: Graduates will 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.			molecules in the designing the dosage forms. • Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations. • Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
		Pharmaceutical Microbiology	BP 303 T	**Upon completion of the subject student shall be able to-** • Understand methods of identification, cultivation and preservation of various microorganisms. • Understand the importance and implementation of sterilization in pharmaceutical processing and industry. • Learn sterility testing of pharmaceutical products. • Carry out microbiological standardization of Pharmaceuticals. • Understand the cell culture technology and its applications in pharmaceutical industries.
		Pharmaceutical Engineering	BP 304 T	**Upon completion of the course student shall be able to:** • Know various unit operations used in Pharmaceutical industries. • Understand the material handling techniques. • Perform various processes involved in pharmaceutical

				manufacturing process. • Carry out various test to prevent environmental pollution. • Appreciate and comprehend significance of plant lay out design for optimum use of resources. • Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
		Pharmaceutical Organic Chemistry - II	BP 401 T	**At the end of the course, the student shall be able to-** • Understand the methods of preparation and properties of organic compounds. • Explain the stereo chemical aspects of organic compounds and stereo chemical reactions. • Know the medicinal uses and other applications of organic compounds.
		Medicinal Chemistry - I	BP 402 T	**Upon completion of the course the student shall be able to-** • Understand the chemistry of drugs with respect to their pharmacological activity. • Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. • Know the Structural Activity Relationship (SAR) of different class of drugs. • Write the chemical synthesis of some drugs.

		Physical Pharmaceutics - II	BP 403 T	**Upon the completion of the course student shall be able to-** • Understand various physicochemical properties of drug molecules in the designing the dosage forms. • Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations. • Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
		Pharmacology - I	BP 404 T	**Upon completion of this course the student should be able to-** • Understand the pharmacological actions of different categories of drugs. • Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels. • Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. • Observe the effect of drugs on animals by simulated experiments. • Appreciate correlation of pharmacology with other bio medical sciences.

		Pharmacognosy and Phytochemistry - I	BP 405 T	**Upon completion of the course, the student shall be able** to- • Know the techniques in the cultivation and production of crude drugs. • Know the crude drugs, their uses and chemical nature. • Know the evaluation techniques for the herbal drugs. • Carry out the microscopic and morphological evaluation of crude drugs.
		Medicinal Chemistry - II	BP 501 T	**Upon completion of the course the student shall be able to-** • Understand the chemistry of drugs with respect to their pharmacological activity. • Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. • Know the Structural Activity Relationship of different class of drugs. • Study the chemical synthesis of selected drugs.
		Industrial Pharmacy-I	BP 502 T	**Upon completion of the course the student shall be able to-** • Know the various pharmaceutical dosage forms and their manufacturing techniques. • Know various considerations in development of pharmaceutical dosage forms.

				• Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.
		Pharmacology - II	BP 503 T	**Upon completion of this course the student should be able to-** • Understand the mechanism of drug action and its relevance in the treatment of different diseases. • Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments. • Demonstrate the various receptor actions using isolated tissue preparation. • Appreciate correlation of pharmacology with related medical sciences.
		Pharmacognosy and Phytochemistry - II	BP 504 T	**Upon completion of the course, the student shall be able-** • Know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. • Understand the preparation and development of herbal formulation. • Understand the herbal drug interactions. • Carryout isolation and identification of phytoconstituents.
		Pharmaceutical	BP 505 T	**Upon completion of the course, the student shall be able to**

		Jurisprudence		**understand:** • The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. • Various Indian pharmaceutical Acts and Laws. • The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. • The code of ethics during the pharmaceutical practice.
		Medicinal Chemistry-III	BP 601 T	**Upon completion of the course student shall be able to-** • Understand the importance of drug design and different techniques of drug design. • Understand the chemistry of drugs with respect to their biological activity. • Know the metabolism, adverse effects and therapeutic value of drugs. • Know the importance of SAR of drugs.
		Pharmacology-III	BP 602 T	**Upon completion of this course the student should be able to:** • Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases. • Comprehend the principles of toxicology and treatment of various poisonings.

				• Appreciate correlation of pharmacology with related medical sciences.
		Herbal Drug Technology	BP 603 T	**Upon completion of this course the student should be able to:** • Understand raw material as source of herbal drugs from cultivation to herbal drug product. • Know the WHO and ICH guidelines for evaluation of herbal drugs. • Know the herbal cosmetics, natural sweeteners, and nutraceuticals. • Appreciate patenting of herbal drugs, GMP.
		Biopharmaceutics and Pharmacokinetics	BP 604 T	**Upon completion of the course student shall be able to:** • Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. • Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. • To understand the concepts of bioavailability and bioequivalence of drug products and their significance. • Understand various pharmacokinetic parameters, their

				significance & applications.
		Pharmaceutical Biotechnology	BP 605 T	**Upon completion of the subject student shall be able to-** • Understanding the importance of Immobilized enzymes in Pharmaceutical industries. • Genetic engineering applications in relation to production of pharmaceuticals. • Importance of Monoclonal antibodies in industries. • Appreciate the use of microorganisms in fermentation technology.
		Quality Assurance	BP 606 T	**Upon completion of the course student shall be able to:** • Understand the cGMP aspects in a pharmaceutical industry • Appreciate the importance of documentation • Understand the scope of quality certifications applicable to pharmaceutical industries • Understand the responsibilities of QA & QC departments.
		Instrumental methods of Analysis	BP 701 T	**Upon completion of the course the student shall be able to-** • Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis. • Understand the chromatographic separation and analysis of drugs.

				• Perform quantitative & qualitative analysis of drugs using various analytical instruments.
		Industrial Pharmacy-II	BP 702 T	**Upon completion of the course, the student shall be able to:** • Know the process of pilot plant and scale up of pharmaceutical dosage forms. • Understand the process of technology transfer from lab scale to commercial batch. • Know different Laws and Acts that regulate pharmaceutical industry. • Understand the approval process and regulatory requirements for drug products.
		Pharmacy Practice	BP 703 T	**Upon completion of the course, the student shall be able to-** • Know various drug distribution methods in a hospital. • Appreciate the pharmacy stores management and inventory control. • Monitor drug therapy of patient through medication chart review and clinical review. • Obtain medication history interview and counsel the patients.

				• Identify drug related problems. • Detect and assess adverse drug reactions. • Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states. • Know pharmaceutical care services. • Do patient counselling in community pharmacy.
		Novel Drug Delivery System	BP 704 T	**Upon completion of the course student shall be able-** • Understand various approaches for development of novel drug delivery systems. • Understand the criteria for selection of drugs and polymers for the development of NDDS, their formulation and evaluation.
		Biostatistics and Research Methodology	BP 801 T	**Upon completion of the course the student shall be able to-** • Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment). • Know the various statistical techniques to solve statistical problems • Appreciate statistical techniques in solving the problems.
		Social and preventive Pharmacy	BP 802 T	**After the successful completion of this course, the student shall be able to:** • Acquire high consciousness/realization of current issues

				related to health and pharmaceutical problems within the country and worldwide. • Have a critical way of thinking based on current healthcare development. • Evaluate alternative ways of solving problems related to health and pharmaceutical issues.
		Pharma Marketing Management	BP 803 ET	• The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.
		Pharmaceutical Regulatory Science	BP 804 ET	**Upon completion of the subject student shall be able to-** • Know about the process of drug discovery and development. • Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. • Know the regulatory approval process and their registration in Indian and international markets.
		Pharmacovigilance	BP 805 ET	**At completion of this course, the students will be able to (know, do, and appreciate):** • Why drug safety monitoring is important? • History and development of pharmacovigilance. • National and international scenario of

				pharmacovigilance. • Dictionaries, coding and terminologies used in pharmacovigilance. • Detection of new adverse drug reactions and their assessment. • International standards for classification of diseases and drugs. • Adverse drug reaction reporting systems and communication in pharmacovigilance. • Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle. • Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation. • Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India. • ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning. • CIOMS requirements for ADR reporting. • Writing case narratives of adverse events and their quality.
		Quality Control	BP 806 ET	**Upon completion of the subject student shall be able to-**

		and standardization of Herbals		• Know WHO guidelines for quality control of herbal drugs. • Know Quality assurance in herbal drug industry. • Know the regulatory approval process and their registration in Indian and international markets. • Appreciate EU and ICH guidelines for quality control of herbal drugs.
		Computer Aided Drug Design	BP 807 ET	**Upon completion of the course, the student shall be able to understand-** • Design and discovery of lead molecules. • The role of drug design in drug discovery process. • The concept of QSAR and docking. • Various strategies to develop new drug like molecules. • The design of new drug molecules using molecular modelling software.
		Cell and Molecular Biology	BP 808 ET	**Upon completion of the subject student shall be able to-** • Summarize cell and molecular biology history. • Summarize cellular functioning and composition. • Describe the chemical foundations of cell biology. • Summarize the DNA properties of cell biology. • Describe protein structure and function.

				• Describe cellular membrane structure and function. • Describe basic molecular genetic mechanisms. • Summarize the Cell Cycle.
		Cell and Molecular Biology	BP 808 ET	**Upon completion of the subject student shall be able to-** • Summarize cell and molecular biology history. • Summarize cellular functioning and composition. • Describe the chemical foundations of cell biology. • Summarize the DNA properties of cell biology. • Describe protein structure and function. • Describe cellular membrane structure and function. • Describe basic molecular genetic mechanisms. • Summarize the Cell Cycle.
		Cosmetic Science	BP 809 ET	**Upon completion of the course, the students shall be able to understand-** • Key ingredients used in cosmetics and cosmeceuticals. • Key building blocks for various formulations. • Current technologies in the market. • Various key ingredients and basic science to develop cosmetics and cosmeceuticals. • Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and

				efficacy.
		Pharmacological Screening Methods	BP 810 ET	**Upon completion of the course the student shall be able to-** • Appreciate the applications of various commonly used laboratory animals. • Appreciate and demonstrate the various screening methods used in preclinical research. • Appreciate and demonstrate the importance of biostatistics and research methodology. • Design and execute a research hypothesis independently.
		Advanced Instrumentation Techniques	BP 811 ET	**Upon completion of the course the student shall be able to-** • Understand the advanced instruments used and its applications in drug analysis. • Understand the chromatographic separation and analysis of drugs. • Understand the calibration of various analytical instruments. • Know analysis of drugs using various analytical instruments.
		Dietary Supplements and Neutraceuticals	BP 812 ET	**At the end of the course, students should be able to-** • Understand the need of supplements by the different group of people to maintain healthy life.

				• Understand the outcome of deficiencies in dietary supplements. • Appreciate the components in dietary supplements and the application. • Appreciate the regulatory and commercial aspects of dietary supplements including health claims.