Correlation between Courses and Program Outcomes (Krishna University Syllabus)

Course Number and Course Name	CO No.	Course Outcome (CO)
C101A **BPH101A12** Mathematics Theory	**Upon completion of this course the graduate is able to**	
	C101A.1	Implement the algebric calculations for interpreting the pharmaceutical problems. (c, d)
	C101A.2.	Assess the principles of co-ordinate geometry in the calculations of angles between lines and point of intersection. (c, d)
	C101A.3.	Interpret the calculations using differential calculus. (c, d)
	C101A.4.	Calculate the neighborhood values of given variables. (c, d)
	C101A.5.	Integrate the calculus and differential equations. (c, d)
BPH101B12 C101B Biology (Theory)	**Upon completion of this course the graduate is able to**	
	C101B.1.	Differentiate animal and plant cells and cell division.(a, d, e)
	C101B.2.	Classify plant kingdom and structure of bacteria and yeast. (a, d, e)
	C101B.3.	Describe the taxonomic families. (a, d, e)
	C101B.4.	Distinguish the anatomical structures of plant parts. (a, d, e)
	C101B.5.	Understand the animal kingdom. (a, d, e)
BPH101C12 C101C Biology (Practicals)	**Upon completion of this course the graduate is able to**	
	C101C.1.	Perform experiments using microscope. (a, d, e)
	C101C.2.	Identify angiosperm families. (a, d, e)
	C101C.3.	Classify tissues and anatomical structures of root, stem and leaf. (a, d, e)
	C101C.4.	Differentiate microscopic and macroscopic features of plants. (a, d, e)
	C101C.5.	Explain anatomical features and physiology of digestive & nervous systems in earthworm as animal model. (a, d, e)
BPH10212 Pharmaceutical Chemistry-I (Theory)	**Upon completion of this course the graduate is able to**	
	C102.1.	Describe the structural arrangements and chemical properties of compounds. (a, b, c, d)
	C102.2.	Understand the synthetic methods and reactions involved with the alcohols and ethers. (a, b, c, d)
	C102.3.	Determine the reactivity of alkyl halides. (a, b, c, d)
	C102.4.	Design synthetic methods involved with the carbonyl compounds. (a, b, c, d)
	C102.5.	Analyze the interconversion reactions of carboxylic acids and their derivatives. (a, b, c, d)
BPH10312 Pharmaceutical Chemistry-I (Practicals)	**Upon completion of this course the graduate is able to**	
	C103.1.	Assess the physical properties and extra elements in the organic compounds. (a, c, d)
	C103.2.	Identify alcohol and ether functional groups. (a, c, d)

	C103.3.	Distinguish between nitro and amine functional groups. (a, c, d)
	C103.4.	Evaluate the presence of carbonyl groups in organic compounds. (a, c, d)
	C103.5.	Detect the carboxylic acids and their functional derivatives. (a, c, d)
BPH10412 Physical Pharmacy – I (Theory)	**Upon completion of this course the graduate is able to**	
	C104.1.	Understand the concepts of intermolecular forces and different states of matter. (c)
	C102.2.	Describe thermodynamics and physical properties of drug molecules. (a)
	C102.3.	Discuss the colligative properties and the theories related to solutions of electrolytes. (c)
	C102.4.	Explain various buffer systems in pharmaceutical processes. (a)
	C102.5.	Identify electrochemical cells and electrodes. (c)
BPH10512 Physical Pharmacy – I (Practical)	**Upon completion of this course the graduate is able to**	
	C105.1.	Estimate the physicochemical properties of molecules. (a)
	C105.2.	Evaluate the effect of viscosity of given liquid and the effect of temperature on viscosity. (c)
	C105.3.	Assess the effect of temperature on co existence of phases by calculating the upper consolute/critical solution temperatures. (a)
	C105.4.	Prepare and maintain aqueous buffers. (a)
	C105.5.	Determine the optical activity of the molecules using Polarimeter. (a)
BPH10612 Computer Applications and Statistical Methods. (Theory)	**Upon completion of this course the graduate is able to**	
	C106.1.	Understand the BASIC languages to operate computers in the field of pharmaceutical sciences. (c, d, k)
	C106.2.	Interpret the scientific graphs and design diagrams using BASIC programmes. (c, d, k)
	C106.3.	Apply the C language in computer programs. (c, d, k)
	C106.4.	Demonstrate the graphical and pictorial representation of data. (c, d, k)
	C106.5.	Perform statistical analysis of the data. (c, d, k)
BPH20112 Pharmaceutics - I (Theory)	**Upon completion of this course the graduate is able to**	
	C201.1.	Understand the history of pharmacy profession, meteorological calculations, packaging of pharmaceuticals and various pharmacopoeias. (a)
	C201.2.	Formulate various dosage forms. (a)
	C201.3.	Prepare monophasic liquid dosage forms and galenicals. (a)
	C201.4.	Dispense biphasic liquid dosage forms and suppositories. (a)
	C201.5.	Identify and rectify pharmaceutical incompatibilities in prescriptions. (a, f)

BPH20212 Pharmaceutics - I (Practicals)	**Upon completion of this course the graduate is able to manufacture, label and dispense the following classes of dosage forms**	
	C202.1.	Aromatic waters and solutions. (a, e, f)
	C202.2.	Ear drops, lotions and liniments. (a, e, f)
	C202.3.	Gargles, mouthwashes, throat paints, douches and syrups. (a, e, f)
	C202.4.	Glycerites and suspensions. (a, e, f)
	C202.5.	Elixirs, emulsions and suppositories. (a, e, f)
BPH20312 Pharmaceutical Analysis-I (Theory)	**Upon completion of this course the graduate is able to**	
	C203.1.	Explain the concepts in pharmaceutical analysis including good laboratory practices. (a, b, c, d)
	C203.2.	Identify the elemental impurities in pharmaceutical products using limit tests as per IP. (a, b, c, d)
	C203.3.	Estimate the drugs based on volumetric analysis. (a, b, c, d)
	C203.4.	Perform gravimetric analysis of drugs. (a, b, c, d)
	C203.5.	Analyze the compounds based on the principles of complexometric and non aqueous titrations. (a, b, c, d)
BPH20412 Pharmaceutical Analysis-I (Practicals)	**Upon completion of this course the graduate is able to perform and report the amount of drug/impurities present in the given samples by**	
	C204.1.	Acid base titrations. (a, b, c, d)
	C204.2.	Oxidation and reduction methods. (a, b, c, d)
	C204.3.	Complexometric titrations. (a, b, c, d)
	C204.4.	Volumetric analysis. (a, b, c, d)
	C204.5.	Limit tests (Chlorides, Sulphates, Iron, Arsenic, Heavy metals) as per IP. (a, b, c, d)
BPH20512 Environmental Studies (Theory)	**Upon completion of this course the graduate is able to**	
	C205.1.	Classify natural resources, degradation methods and their management. (a, b, i, j)
	C205.2.	Evaluate different aspects of biodiversity. (a, b, i, j)
	C205.3.	Solve the problems related to environmental pollution. (a, b, i, j)
	C205.4.	Analyze the interlinked issues related to economy and environment. (a, b, i, j)
	C205.5.	Assess various social issues and acts associated with the environment. (a, b, i, j)
BPH30112 Pharmaceutical Chemistry-II (Theory)	**Upon completion of this course the graduate is able to**	
	C301.1.	Understand the concepts of stereochemistry. (a, c, d, k)
	C301.2.	Discuss the mechanisms, orientation and order of reactivity in aromatic compounds. (a, c, d, k)
	C301.3.	Explain the importance of polynuclear compounds in drug synthesis. (a, c, d, k)
	C301.4.	Analyze heterocyclic compounds. (a, c, d, k)
	C301.5.	Describe the mechanisms and applications of named reactions and reagents. (a, c, d, k)

BPH30212 Pharmaceutical Chemistry-II (Practicals)	**Upon completion of this course the graduate is able to**	
	C302.1.	Analyze functional groups in water insoluble organic binary mixtures by systematic procedure. (a, c, d, k)
	C302.2.	Understand the mechanism of nitration in aromatic compounds. (a, c, d, k)
	C302.3.	Perform bromination reactions with various aromatic compounds. (a, c, d, k)
	C302.4.	Carry out simple condensation reactions for synthesis of organic compounds. (a, c, d, k)
	C302.5.	Synthesize compounds using diazotization and coupling reactions. (a, c, d, k)
BPH30312 Pharmaceutical Engineering-I (Theory)	**Upon completion of this course the graduate is able to**	
	C303.1.	Explain different aspects of pharmaceutical processing and units used in expressing properties of compounds and mixing concepts of matter. (a, b, c, d, j)
	C303.2.	Discuss the flow of fluids and solids and their transportation in pharmaceutical processing. (a, b, c, d, j)
	C303.3.	Design pharmaceutical plants as per regulatory requirements and various health hazard issues. (a, b, c, d, j)
	C303.4.	Describe the concept of humidity in maintaining refreeze ration and air conditioning systems for the purpose of pharmaceutical processing. (a, b, c, d, j)
	C303.5.	Understand the size reduction and size separation in pharmaceutical operations. (a, b, c, d, j)
BPH30412 Pharmaceutical Microbiology (Theory)	**Upon completion of this course the graduate is able to**	
	C304.1.	Differentiate microorganisms based on their morphology. (a, d)
	C304.2.	Cultivate, preserve and estimate the microorganisms from various sources. (a, c, j)
	C304.3.	Explain antimicrobial drug action and maintain the aseptic environment. (a, c)
	C304.4.	Understand the principles of immune system, immunization, serology and different methods of disease transmission. (a, e)
	C304.5.	Identify and immunize various communicable and non communicable diseases (a, f)
BPH30512 Pharmaceutical Microbiology (Practicals)	**Upon completion of this course the graduate is able to**	
	C305.1.	Design and conduct experiments on microorganisms. (a, k)
	C305.2.	Differentiate bacteria by staining techniques. (a, c)
	C305.3.	Estimate microorganisms present in the given sample. (a, c, j)
	C305.4.	Classify bacterial species. (a, c, j)
	C305.5.	Evaluate the factors affecting bacterial growth. (a, c, j)
BPH30612 Anatomy & Physiology	**Upon completion of this course the graduate is able to**	
	C306.1.	Understand the anatomical aspects, tissues and membrane permeability of compounds/drugs. (a, e, f, i, j)
	C306.2.	Explain the functions of nervous system and special sensory

(Theory)		organs. (a, e, f, i, j)
	C306.3.	Describe the anatomy and physiology of cardiovascular system. (a, e, f, i, j)
	C306.4.	Discuss the structure and functions of digestive and respiratory systems. (a, e, f, i, j)
	C306.5.	Explain the endocrine and urinogenital systems. (a, e, f, i, j)
BPH30712 Anatomy & Physiology (Practicals)	**Upon completion of this course the graduate is able to**	
	C307.1.	Distinguish tissues and organs of the human body from histological slides. (a, e, f, i, j)
	C307.2.	Determine the bleeding time, clotting time, erythrocyte sedimentation rate (ESR) and blood groups. (a, e, f, i, j)
	C307.3.	Estimate the hemoglobin content and blood cell count. (a, e, f, i, j)
	C307.4.	Estimate the blood pressure, normal cardiogram and the effect of temperature on normal cardiogram. (a, e, f, i, j)
	C307.5.	Identify the parts of human body from specimens. (a, e, f, i, j)
BPH40112 Pharmaceutical Chemistry-III (Theory)	**Upon completion of this course the graduate is able to understand the chemistry and mechanism of action of**	
	C401.1.	Sulphonamides and different anti-infective agents. (a, c, d, f, k)
	C401.2.	Different classes of antibiotics. (a, c, d, f, k)
	C401.3.	Antiamoebics, antimalarials and anthelmintics. (a, c, d, f, k)
	C401.4.	Antimycobacterial and antifungal drugs. (a, c, d, f, k)
	C401.5.	Anti viral and anticancer drugs. (a, c, d, f, k)
BPH40212 Physical Pharmacy-II (Theory)	**Upon completion of this course the graduate is able to**	
	C402.1.	Understand the concepts of distribution, diffusion patterns of molecules and the effect of complexation phenomena on drug action. (a, b, c, d, j)
	C402.2.	Interpret the reaction rates involving stability and decomposition of medicinal agents. (a, b, c, d, j)
	C402.3.	Discuss the theories of surface and electrical properties. (a, b, c, d, j)
	C402.4.	Formulate the homo and heterogeneous systems like colloids, powders, emulsions and suspensions. (a, b, c, d, j)
	C402.5.	Explain the rheological (flow) properties of different dosage forms (a, b, c, d, j)
BPH40312 Physical Pharmacy-II (Practicals)	**Upon completion of this course the graduate is able to**	
	C403.1.	Assess the solubility, partition coefficient and the effect of surface active agents on solubility of drugs. (a, b, c, d, j)
	C403.2.	Determine the shelf life of drugs in various formulations. (a, b, c, d, j)
	C403.3.	Understand the adsorption phenomena of drug molecules. (a, b, c, d, j)
	C403.4.	Demonstrate the physical and chemical properties of biphasic dosage forms with respect to stability. (a, b, c, d, j)
	C403.5.	Estimate the derived properties of powders for successful tablet

		compression. (a, b, c, d, j)
BPH40412 Applied Biochemistry and clinical pathology (Theory)	**Upon completion of this course the graduate is able to**	
	C404.1.	Explain the functions, metabolism and metabolic disorders of lipids. (a, e)
	C404.2.	Discuss the synthesis, physiological importance, metabolism and disorders of carbohydrates. (f, e)
	C404.3.	Describe the synthesis, functions, metabolism and metabolic disorders of proteins and amino acids. (a, e)
	C404.4.	Understand the importance of enzymes and biochemical role of minerals, vitamins and hormones. (e, f)
	C404.5.	Evaluate the pathology of blood and urine components by quantitative and qualitative methods. (a, b, c, d)
BPH40512 Applied Biochemistry and Clinical Pathology (Practicals)	**Upon completion of this course the graduate is able to**	
	C405.1.	Analyze carbohydrates in the given test samples. (c, e)
	C405.2.	Perform urine analysis. (e, f, h)
	C405.3.	Identify proteins and amino acids in the given samples. (a, c)
	C405.4.	Assess the activity of enzymes. (e)
	C405.5.	Estimate the blood glucose and serum creatinine levels. (d, e, f)
BPH40612 Forensic Pharmacy (Theory)	**Upon completion of this course the graduate is able to**	
	C406.1.	Understand the evolution, ethics, legislation and regulations in pharmacy profession. (a, e, f, g, i, j)
	C406.2.	Interpret the regulations of drugs and cosmetic act 1940 and 1945 in India. (a, e, f, g, i, j)
	C406.3.	Explain the legislations and acts to control the advertisements, excise duties and price of drugs. (a, e, f, g, i, j)
	C406.4.	Practice the legislations, acts and laws to control the dangerous drugs, poisons and opium. (a, e, f, g, i, j)
	C406.5.	Describe the patent system, medical termination of pregnancy, prevention of cruelty of animals and shops & establishments act. (a, e, f, g, i, j)
BPH40712 English & Communication Skills (Practicals)	**Upon completion of this course the graduate is able to**	
	C407.1.	Differentiate verbal and non verbal aspects in communication skills. (b, e, h)
	C407.2.	Improve personality development. (b, e, h)
	C407.3.	Explain the importance of fluency in language for professional development. (b, e, h)
	C407.4.	Solve Practice tests for GRE, IELTS and TOEFL. (b, e, h)
	C407.5.	Conceive, arrange and articulate ideas logically and clearly. (b, e, h)
BPH50112 Pharmaceutical Chemistry-IV (Theory)	**Upon completion of this course the graduate is able to understand the classification, mechanism of action, SAR, synthesis and therapeutic uses of drugs related to**	
	C501.1.	Central nervous system. (a, c, d, f)
	C501.2.	Autonomic nervous system. (a, c, d, f)

	C501.3.	Cardiovascular system. (a, c, d, f)
	C501.4.	Opioid analgesics and NSAIDs. (a, c, d, f)
	C501.5.	Antihistamine drugs. (a, c, d, f)
BPH50212 Pharmaceutical Chemistry-IV (Practicals)	**Upon completion of this course the graduate is able to perform the following as per pharmacopoeial specifications**	
	C502.1.	Assay of different classes of drugs in products/formulations by acid base titrations. (a, c, d, f)
	C502.2.	Assay of drugs in products/formulations by red-ox titrations. (a, c, d, f)
	C502.3.	Assay of drugs in products/formulations by non-aqueous titrations. (a, c, d, f)
	C502.4.	Synthesize and identify drugs acting on the central nervous system. (a, c, d, f)
	C502.5.	Synthesize and identify cardiovascular and non-steroidal anti-inflammatory drugs. (a, c, d, f)
BPH50310 Pharmaceutics-II (Theory)	**Upon completion of this course the graduate is able to understand the formulation and evaluation aspects of**	
	C503.1.	Formulation and cosmetics. (a, f, j, k)
	C503.2.	Oral liquids and semi solid dosage forms. (a, f, j, k)
	C503.3.	Oral solid dosage forms. (a, f, j, k)
	C503.4.	Parenteral dosage forms and ophthalmic preparations (a, f, j, k)
	C503.5.	Aerosols and radio pharmaceuticals. (a, f, j, k)
BPH50412 Pharmaceutics-II (Practicals)	**Upon completion of this course the graduate is able to prepare, label and evaluate the preparations of**	
	C504.1.	Oral liquids. (a, f, j, k)
	C504.2.	Oral tablets and capsules. (a, f, j, k)
	C504.3.	External semisolids. (a, f, j, k)
	C504.4.	Parenterals. (a, f, j, k)
	C504.5.	Cosmetics like shampoos and creams. (a, f, j, k)
BPH50512 Pharmacognosy-I (Theory)	**Upon completion of this course the graduate is able to**	
	C505.1.	Distinguish the organized and unorganized drugs. (a, f, j)
	C505.2.	Describe the methods of cultivation, collection, processing and storage of crude drugs. (a, f, j)
	C505.3.	Explain the importance of plant growth regulators and quality control tests of crude drugs. (a, f, j)
	C505.4.	Understand the importance of various classes of natural drugs. (a, f, j)
	C505.5.	Discuss various sources of fibres and the biogenetic pathways of primary & secondary metabolites of pharmaceutical importance. (a, f, j)
BPH50612 Pharmacognosy-I	**Upon completion of this course the graduate is able to**	
	C506.1.	Perform qualitative chemical tests to identify chemical constituents of medicinal plants. (a, b, c, f, j)
	C506.2.	Evaluate the purity of powdered crude drugs based on microscopic measurements. (a, b, c, f, j)

(Practicals)	**C506.3.**	Identify the leaf drugs by analyzing leaf surface data. (a, b, c, f, j)
	C506.4.	Assess the quality and purity of crude drugs based on organoleptic and physico-chemical properties. (a, b, c, f, j)
	C506.5.	Analyze crude drugs by morphological characteristics. (a, b, c, f, j)
BPH50712 Pharmacology-I (Theory)	**Upon completion of this course the graduate is able to**	
	C507.1.	Explain the principles of pharmacodynamics and pharmacokinetics. (a, f, k)
	C507.2.	Understand the actions of various drugs on autonomic nervous system. (a, f, k)
	C507.3.	Describe the pharmacology of drugs acting on the central nervous system and analgesics. (a, f, k)
	C507.4.	Classify psychoactive drugs with their mechanism of action and therapeutic uses. (a, f, k)
	C507.5.	Discuss the mechanism of action and pharmacological actions of drugs acting on the gastrointestinal tract and kidney. (a, f, k)
BPH60112 Pharmaceutical Engineering -II (Theory)	**Upon completion of this course the graduate is able to**	
	C601.1.	Explain the mechanisms of heat flow in different pharmaceutical equipments. (c, d)
	C601.2.	Demonstrate evaporators used in pharmaceutical industry. (c, d)
	C601.3.	Describe the principles and equipments used for the drying in pharmaceutical industries. (c, d)
	C601.4.	Discuss various distillation methods used in the separation of liquids and filtration of fluids. (c, d)
	C601.5.	Understand the principles and equipments used for the crystallization and extraction of compounds. (c, d)
BPH60212 Pharmaceutical Engineering-II (Practicals)	**Upon completion of this course the graduate is able to**	
	C602.1.	Reduce the size and separate solid materials used in pharmaceutical operations. (c, d)
	C602.2.	Assess the factors that influence the rate of filtration (c, d)
	C602.3.	Estimate the moisture content in samples and the humidity levels in the environment. (c, d)
	C602.4.	Assess the flow of heat in various pharmaceutical plant construction materials. (c, d)
	C602.5.	Estimate the drying properties of substances under various conditions. (c, d)
BPH60312 Pharmaceutical Biotechnology (Theory)	**Upon completion of this course the graduate is able to**	
	C603.1.	Design fermentor(s) for the production of secondary metabolites. (a, d, j)
	C603.2.	Understand the importance of sterility testing of pharmaceutical products. (a, c, k)
	C603.3.	Describe the animal and immunological products of pharmaceutical importance. (a, j)

	C603.4.	Estimate the vitamins and antibiotics by bioassays & insulin by radio immune assay. (a, c)
	C603.5.	Explain the microbial conversion of steroids, enzyme immobilisation and recombinant DNA technology. (a, d, k)
BPH60412 Pharmaceutical Biotechnology (Practicals)	**Upon completion of this course the graduate is able to**	
	C604.1.	Estimate the potency of antibiotics and vitamins. (c, j)
	C604.2.	Analyze the sterility of the sterile products. (c)
	C604.3.	Evaluate the effect of production variables on biotechnology based intermediates and drug products. (c, d)
	C604.4.	Isolate the DNA from various sources and by different methods. (d, k)
	C604.5.	Identify (and isolate) the microorganisms that produce bioactive molecules from soil samples. (j, d)
BPH60512 Hospital and Clinical Pharmacy (Theory)	**Upon completion of this course the graduate is able to**	
	C605.1.	Understand the professional practice and management skills in pharmacy unit. (a, f, g, i, j)
	C605.2.	Dispense and distribute various categories of drugs to in and out patients. (a, f, g, i, j)
	C605.3.	Design manufacturing unit for sterile and non sterile supplies. (a, f, g, i, j)
	C605.4.	Detect, assess and monitor adverse drug reactions in hospital. (a, f, g, i, j)
	C605.5.	Understand the clinical pharmacy aspects of various diseases and disorders. (a, f, g, i, j)
BPH60612 Hospital and Clinical Pharmacy (Practicals)	**Upon completion of this course the graduate is able to**	
	C606.1.	Understand the general dispensing procedures. (a, f, g, i, j, k)
	C606.2.	Dispense prescriptions with different types of mixtures. (a, f, g, i, j, k)
	C606.3.	Compound, label and pack the prescriptions containing powders. (a, f, g, i, j, k)
	C606.4.	Prepare and dispense ointments by various methods. (a, f, g, i, j, k)
	C606.5.	Manufacture large volume parenterals. (a, f, g, i, j, k)
BPH70112 Pharmaceutics –III (Biopharmaceutics, Pharmacokinetics & New Drug Delivery Systems) (Theory)	**Upon completion of this course the graduate is able to**	
	C701.1.	Understand the mechanisms of drug absorption in the biological systems. (a, c)
	C701.2.	Evaluate the influence of various factors on bioavailability and elimination of drugs. (a, c)
	C701.3.	Assess pharmacokinetic models and their parameters. (a, c)
	C701.4.	Explain the principles and concepts involved in the development of sustained release dosage forms. (a, c)
	C701.5.	Design and develop novel drug delivery systems. (a, c)
BPH70212 Pharmaceutics –III	**Upon completion of this course the graduate is able to**	
	C702.1.	Assess the pH, solubility profiles and stability aspects of drugs. (a, c)

(Biopharmaceutics, Pharmacokinetics & New Drug Delivery Systems) (Practicals)	**C702.2.**	Compare different marketed brands of drugs in terms of dissolution parameters. (a, c)
	C702.3.	Construct the plasma concentration-time profiles data for calculating pharmacokinetic parameters. (a, c)
	C702.4.	Explain the methods to increase solubility and dissolution rate of poorly soluble drugs. (a, c)
	C702.5.	Design and evaluate various sustained release dosage forms. (a, c)
BPH70312 Pharmacology-II (Theory)	**Upon completion of this course the graduate is able to**	
	C703.1.	Understand the mechanisms of drug action on cardiovascular disorders. (a, f, j, k)
	C703.2.	Describe the pharmacology of drugs acting on respiratory system. (a, f, j, k)
	C703.3.	Explain the treatment of infectious and neoplastic diseases. (a, f, j, k)
	C703.4.	Understand the drug action on various endocrine disorders. (a, f, j, k)
	C703.5.	Discuss the principles and procedures of bioassays and toxicology. (a, f, j, k)
BPH70412 Pharmacology-II (Practicals)	**Upon completion of this course the graduate is able to**	
	C704.1.	Understand different animal models and basic equipments used in experimental pharmacology. (a, c, d, f, j, k)
	C704.2.	Perform the experiments to explain the effects of drugs on both *in vivo* and *ex vivo* models. (a, c, d, f, j, k)
	C704.3.	Determine the potency of a substance on isolated tissues. (a, c, d, f, j, k)
	C704.4.	Explain the effect of drugs either alone or in combination on isolated frog's rectus abdominus muscle (a, c, d, f, j, k)
	C704.5.	Demonstrate the effect of drugs either alone or in combination on isolated frog's heart (a, c, d, f, j, k)
BPH70512 Pharmaceutical Analysis-II (Theory)	**Upon completion of this course the graduate is able to understand the theory and principles of**	
	C705.1.	Photometric analytical techniques. (a, c, d)
	C705.2.	Titrimetric analytical techniques. (a, c, d)
	C705.3.	Chromatographic techniques. (a, c, d)
	C705.4.	High pressure liquid and high performance thin layer chromatographic techniques. (a, c, d)
	C705.5.	Thermal analytical techniques, radio immune assays and NMR techniques. (a, c, d)
BPH70612 Pharmaceutical Analysis-II (Practicals)	**Upon completion of this course the graduate is able to analyze the drugs by**	
	C706.1.	UV spectrophotometry. (b, c, d)
	C706.2.	Visible spectrophotometry. (b, c, d)
	C706.3.	Nephalometry, turbidimetry, fluorimetry and flame photometry. (b, c, d)

	C706.4.	Potentiometric and complexometric titrations. (b, c, d)
	C706.5.	Chromatographic techniques. (b, c, d)
BPH70712 Industrial Management and Pharmaceutical Marketing (Theory)	**Upon completion of this course the graduate is able to**	
	C707.1.	Manage and organize different pharmaceutical industry operations. (a)
	C707.2.	Design a layout for the construction of pharmaceutical industry. (b)
	C707.3.	Understand various aspects of production planning, control and personnel management. (e)
	C707.4.	Explain sales principles and distribution policies.(f)
	C707.5.	Analyze accounting policies in pharmaceutical industries (a)
BPH70812 Project	**Upon completion of this course the graduate is able to**	
	C708.1.	Understand the scientific problems.(a, b, c, d, h, i, j, k)
	C708.2.	Develop and propose a scientific hypothesis. (a, b, c, d, h, i, j, k)
	C708.3.	Conduct experiments both *in vitro* and *in vivo.* (a, b, c, d, h, i, j, k)
	C708.4.	Draw technical conclusions from the experimental results with statistical analysis. (a, b, c, d, h, i, j, k)
	C708.5.	Prepare and present research findings as scientific papers. (a, b, c, d, h, i, j, k)
BPH80112 Pharmaceutical Chemistry-V (Natural Products) (Theory)	**Upon completion of this course the graduate is able to**	
	C801.1.	Describe the structural elucidation and stereochemistry of carbohydrates & glycosides. (a, f, j)
	C801.2.	Explain the chemistry and biological significance of proteins, hormones and nucleic acids. (a, f, j)
	C801.3.	Understand the chemistry and qualitative analysis of fats, oils and waxes and structural elucidations of terpenes and vitamins. (a, f, j)
	C801.4.	Determine the chemical structure of alkaloids and their isolation. (a, f, j)
	C801.5.	Discuss interrelationship between steroidal hormones. (a, f, j)
BPH80212 Pharmaceutical Chemistry-V (Natural Products) (Practical)	**Upon completion of this course the graduate is able to**	
	C802.1.	Assess the quality and purity of fixed oils. (a, c, d, f, j)
	C802.2.	Estimate the quality and purity of waxes. (a, c, d, f, j)
	C802.3.	Extract compounds from plant sources of pharmaceutical importance. (a, c, d, f, j)
	C802.4.	Perform the quality and purity tests for volatile oils.
	C802.5.	Characterize compounds from plant sources by chemical tests/reactions. (a, c, d, f, j)
BPH80312 Pharmacognosy-II	**Upon completion of this course the graduate is able to**	
	C803.1.	Understand the pharmacognostical scheme of crude drugs containing volatile oils. (a, c, j, k)
	C803.2.	Discuss the importance of alkaloidal crude drugs. (a, c, j, k)

(Theory)	**C803.3.**	Distinguish glycosidal crude drugs and their extraction procedures. (a, c, j, k)
	C803.4.	Describe plant tissue cultures and their applications in the production of secondary metabolites. (a, c, j, k)
	C803.5.	Explain the importance of ayurvedic drugs. (a, c, j, k)
BPH80412 Pharmacognosy-II (Practicals)	**Upon completion of this course the graduate is able to**	
	C804.1.	Identify and characterize volatile oil crude drugs by macroscopic and microscopic observations. (c, j, k)
	C804.2.	Evaluate the crude drugs by organoleptic, anatomical, powder microscopical and macroscopical characters.(c, j, k)
	C804.3.	Distinguish crude drugs containing glycosides by morphological, histological and powder studies. (c, j, k)
	C804.4.	Analyze powdered crude drug mixtures. (c, j, k)
	C804.5.	Differentiate ginger, arjuna and amla by microscopical and macroscopical characteristics. (c, j, k)
BPH80512 Good Manufacturing Practices & Validation (Theory)	**Upon completion of this course the graduate is able to**	
	C805.1.	Understand the GMP, cGMP and validation procedures for different equipments in pharmaceutical industry. (a, d)
	C805.2.	Explain the sources of water. (a, d)
	C805.3.	Calibrate analytical instruments like HPLC and Spectrophotometer as per ICH guidelines. (c, d)
	C805.4.	Evaluate and analyze the data in pharmaceutical industry. (c, d)
	C805.5.	Describe QA procedures like GLP, SOP, ICH and ISO 900 etc. (c, d)

Correlation between Courses and Program Outcomes (PCI Syllabus)

Course Number and Course Name	CO No	Course Outcome (CO)
BP101T Human Anatomy and Physiology-I (Theory)	**Upon completion of this course the graduate is able to**	
	C101T.1	Explain the structural (both cellular and tissue) organization and various homeostatic mechanisms. (a, e, f, i, j)
	C101T.2	Understand the structure and functions of joints, integumentary system and skeletal system. (a, e, f, i, j)
	C101T.3	Differentiate the functions of blood, body fluids and lymph. (a, e, f, i, j)
	C101T.4	Discuss the structure and functions of peripheral nervous system and special sensory organs. (a, e, f, i, j)
	C101T.5	Describe the anatomy and physiology of heart and its disorders. (a, e, f, i, j)
BP102T Pharmaceutical	**Upon completion of this course the graduate is able to**	
	C102T.1	Identify the elemental impurities in pharmaceutical products

Analysis-I (Theory)		using limit tests as per Indian Pharmacopoeia. (a, c, d)
	C102T.2	Understand the concepts of acid-base and Non aqueous titrations. (a, c, d)
	C102T.3	Discuss the principles and steps involved in gravimetric analysis, precipitation and complexometric titrations. (a, c, d)
	C102T.4	Perform the different types of redox titrations. (a, c, d)
	C102T.5	Analyze the compounds based on the principles of electrochemical methods like Conductometry, potentiometry and polarography. (a, c, d)
BP103T Pharmaceutics-I (Theory)	**Upon completion of this course the graduate is able to**	
	C103T.1	Understand the historical background of pharmacy profession and handling of prescription and pediatric dose calculations (a, c, f).
	C103T.2	Perform various pharmaceutical calculations and understand the powder and liquid dosage forms. (a, c, f).
	C103T.3	Formulate and evaluate different kinds of monophasic and biphasic liquid dosage forms. (a, c, f)
	C103T.4	Identify and solve pharmaceutical incompatibilities in prescriptions and to prepare suppositories. (a, c, f)
	C103T.5	Prepare and evaluate different types of semisolid dosage forms (a, c, f)
BP104T Pharmaceutical Inorganic Chemistry (Theory)	**Upon completion of this course the graduate is able to understand the importance of**	
	C104T.1	Limit tests in the field of pharmacy. (a, c, d, k)
	C104T.2	Buffers, electrolytes and dental products. (a, c, d, k)
	C104T.3	Gastrointestinal agents. (a, c, d, k)
	C104T.4	Miscellaneous inorganic compounds. (a, c, d, k)
	C104T.5	Radiopharmaceuticals. (a, c, d, k)
BP105T Communication skills (Theory)	**Upon completion of this course the graduate is able to**	
	C105T.1	Understand the importance, barriers and perspectives of communication. (b, e, h)
	C105T.2	Communicate effectively (Verbal and Non Verbal) (b, e, h)
	C105T.3	Acquire writing skills and listening skills (b, e, h)
	C105T.4	Develop presentation skills (b, e, h)
	C105T.5	Participate effectively in group discussion (b, e, h)
BP106RBT Remedial Biology (Theory)	**Upon completion of this course the graduate is able to**	
	C106RBT.1	Classify Monera, Protista, Fungi, Animalia and Plantae (a, d, e).
	C106RBT.2	Understand the cardiovascular, digestive and respiratory systems in the human body (a, d, e).
	C106RBT.3	Describe the human excretory, nervous, endocrine and reproductive systems (a, d, e).
	C106RBT.4	Explain the photosynthesis, essential nutrients and nitrogen metabolism in plants. (a, d, e)

	C106RBT.5	Differentiate cells, tissues, cell division and explain the plant respiration and growth (a, d, e)
BP106RMT Remedial Mathematics (Theory)	**Upon completion of this course the graduate is able to**	
	C106RMT. 1	Apply the knowledge of partial fractions, logarithms, functions and limits for interpreting the pharmaceutical problems. (c, d)
	C106RMT. 2	Understand the theory and applications of matrices and determinant in solving pharmacokinetic equations. (c, d)
	C106RMT. 3	Interpret the calculations using differential calculus. (c, d)
	C106RMT. 4	Calculate the slope and other parameters using integrations. (c, d)
	C106RMT. 5	Integrate the differential equations and laplace transform. (c, d)
BP107P Human Anatomy and Physiology (Practical)	**Upon completion of this course the graduate is able to**	
	C107P.1	Distinguish tissues and organs of the human body from histological slides. (a, e, f, i, j)
	C107P.2	Identify axial and appendicular bones. (a, e, f, i, j)
	C107P.3	Estimate the hemoglobin content and blood cell count. (a, e, f, i, j)
	C107P.4	Determine the bleeding time, clotting time, erythrocyte sedimentation rate (ESR) and blood groups. (a, e, f, i, j)
	C107P.5	Record blood pressure, heart rate and pulse rate. (a, e, f, i, j)
BP108P Pharmaceutical Analysis I (Practical)	**Upon completion of this course the graduate is able to**	
	C108P.1	Conduct limit tests for chlorides, sulphates, Iron, Arsenic, Heavy metals as per IP. (a, b, c, d)
	C108P.2	Perform acid base titrations. (a, b, c, d)
	C108P.3	Understand oxidation and reduction methods. (a, b, c, d)
	C108P.4	Demonstrate complexometric titrations. (a, b, c, d)
	C108P.5	Carry out precipitation Titrations. (a, b, c, d)
BP109P Pharmaceutics I (Practical)	**Upon completion of this course the graduate is able to**	
	C109P.1	Prepare syrups and elixirs (a, c)
	C109P.2	Formulate and dispense throat paints, medicated and non-medicated soap solutions. (a, c)
	C109P.3	Develop various dosage forms like lotions, mixtures, gels, liniments and emulsions (a, c)
	C109P.4	Compound medicated powders and effervescent granules (a, c)
	C109P.5	Design the manufacturing process of suppositories and ointments (a, c).
BP110P Pharmaceutical Inorganic Chemistry	**Upon completion of this course the graduate is able to**	
	C110P.1	Perform the limit tests. (a, c, d, k)
	C110P.2	Understand the principles of modified limit tests. (a, c, d, k)
	C110P.3	Identify the chemical compounds by performing schematic analysis. (a, c, d, k)

(Practical)	C110P.4	Test the purity of compounds. (a, c, d, k)
	C110P.5	Prepare inorganic pharmaceutical compounds. (a, c, d, k)
BP111P Communication skills (Practical)	**Upon completion of this course the graduate is able to**	
	C111P.1	Develop communication skills. (b, e, h)
	C111P.2	Improve pronunciations. (b, e, h)
	C111P.3	Differentiate direct and indirect speech (b, e, h)
	C111P.4	Acquire writing skills (b, e, h)
	C111P.5	Prepare scientific presentations and develop interview handling skills (b, e, h)
BP112RBP Remedial Biology (Practical)	**Upon completion of this course the graduate is able to**	
	C112P.1	Handle microscope for scientific examinations (a, d, e)
	C112P.2	Describe the anatomy and physiology of frog by using computer models. (a, d, e)
	C112P.3	Identify bones. (a, d, e)
	C112P.4	Determine blood groups and blood pressure. (a, d, e)
	C112P.5	Estimate the tidal volume. (a, d, e)
BP201T Human Anatomy and Physiology II (Theory)	**Upon completion of this course the graduate is able to**	
	C201T.1	Describe the organization of central nervous system. (a, e, f, i, j)
	C201T.2	Explain the anatomy and physiology of gastrointestinal tract. (a, e, f, i, j)
	C201T.3	Understand the respiratory and urinary systems. (a, e, f, i, j)
	C201T.4	Discuss the structure and functions of endocrine glands. (a, e, f, i, j)
	C201T.5	Recognize the importance of reproductive system and genetics. (a, e, f, i, j)
BP202T Pharmaceutical Organic Chemistry I (Theory)	**Upon completion of this course the graduate is able to understand the chemistry of**	
	C202T.1	Organic compounds. (a, d, i, j)
	C202T.2	Alkanes, alkenes and conjugated dienes. (a, i, j)
	C202T.3	Alkyl halides and alcohols. (a, i, j)
	C202T.4	Carbonyl compounds. (a, i, j)
	C202T.5	Aliphatic amines, carboxylic acids/amides/ esters. (a, i, j)
BP203T Biochemistry (Theory)	**Upon completion of this course the graduate is able to understand the**	
	C203T.1	Chemistry of biomolecules and bioenergetics. (a, k)
	C203T.2	Metabolism of carbohydrates in physiological and pathological conditions. (a, e, k)
	C203T.3	Lipid and amino acid metabolic pathways in normal and diseased conditions. (a, e, k)
	C203T.4	Genetic organization of mammalian genome. (a, e, k)
	C203T.5	Importance of enzymes and their inhibitors in diagnostic and therapeutic applications. (a, e, k)
BP204T Pathophysiology	**Upon completion of this course the graduate is able to understand the pathogenesis of**	

(Theory)	C204T.1	Inflammation restoration. (a, c, i, k)
	C204T.2	Cardiovascular, respiratory and excretory systems. (a, c, i, k)
	C204T.3	Endocrine, nervous, gastrointestinal and blood. (a, c, i, k)
	C204T.4	Cancer and skeletal system. (a, c, i, k)
	C204T.5	Infectious diseases. (a, c, i, k)
BP205T Computer Applications in Pharmacy (Theory)	**Upon completion of this course the graduate is able to**	
	C205T.1	Understand the importance of Software's in the field of Pharmaceutical Sciences. (c, d, k)
	C205T.2	Explain the databases and Web technologies in Pharmacy. (c, d, k)
	C205T.3	Implement the knowledge of computers in Pharmacy. (c, d, k)
	C205T.4	Discuss the concepts of bioinformatics and their impact in vaccine discovery. (c, d, k)
	C205T.5	Execute data in preclinical development. (c, d, k)
BP206T Environmental sciences (Theory)	**Upon completion of this course the graduate is able to**	
	C206T.1	Understand the multidisciplinary nature of environmental studies. (h, j)
	C206T.2	Recognize renewable and non-renewable resources. (h, j)
	C206T.3	Explain natural resources and their associated problems. (h, j)
	C206T.4	Identify different ecosystems. (h, j)
	C206T.5	Solve environmental problems. (h, j)
BP207P Human Anatomy and Physiology II (Practical)	**Upon completion of this course the graduate is able to**	
	C207P.1	Identify various organs of the human body using models, charts, specimens and slides. (a, e, f, i, j)
	C207P.2	Demonstrate the general neurological examination, positive and negative feedback mechanisms. (a, e, f, i, j)
	C207P.3	Recognize different tastes. (a, e, f, i, j)
	C207P.4	Record the body temperature and basal mass index. (a, e, f, i, j)
	C207P.5	Determine the tidal volume and vital capacity of the lungs and perform the pregnancy diagnosis test. (a, e, f, i, j)
BP208P Pharmaceutical Organic Chemistry I (Practical)	**Upon completion of this course the graduate is able to**	
	C208P.1	Determine the physical properties of organic compounds. (a, b, c, g, i, j)
	C208P.2	Categorize the functional groups. (a, b, c, g, i, j)
	C208P.3	Identify extra elements and determine the solubility of organic compounds. (a, b, c, g, i, j)
	C208P.4	Evaluate organic compounds. (a, b, c, g, i, j)
	C208P.5	Synthesize derivatives of organic compounds. (a, b, c, g, i, j)
BP209P Biochemistry (Practical)	**Upon completion of this course the graduate is able to**	
	C209P.1	Analyze carbohydrates (a, c, e, f)
	C209P.2	Identify proteins and amino acids. (a, c, e, f)
	C209P.3	Perform urine analysis. (a, c, e, f)
	C209P.4	Assess the activity of enzymes. (a, c, e, f)

	C209P.5	Estimate the blood glucose and serum creatinine levels. (a, c, e, f)
BP210P Computer Applications in Pharmacy (Practical)	**Upon completion of this course the graduate is able to**	
	C210P.1	Design a questionnaire for a particular disease. (c, d, k)
	C210P.2	Create a HTML web page, mailing labels, databases, invoice tables and queries in MS access. (c, d, k)
	C210P.3	Store and retrieve the information of a drug and its adverse effects using online tools. (c, d, k)
	C210P.4	Generate and print the reports from patient database. (c, d, k)
	C210P.5	Export the tables, queries, forms and reports to web and XML pages. (c, d, k)
BP301T Pharmaceutical Organic Chemistry II (Theory)	**Upon completion of this course the graduate is able to understand the structure, preparation and reactions of**	
	C301T.1	Benzene and its derivatives. (a, c, j, k)
	C301T.2	Phenols, aromatic amines and aromatic acids. (a, c, j, k)
	C301T.3	Fats and oils. (a, c, j, k)
	C301T.4	Polynuclear hydrocarbons. (a, c, j, k)
	C301T.5	Cyclo alkanes. (a, c, j, k)
BP302T Physical Pharmaceutics-I (Theory)	**Upon completion of this course the graduate is able to understand the**	
	C302T.1	Solubility of drugs. (a, c, d)
	C302T.2	Physicochemical properties of drug molecules. (a, c, d)
	C302T.3	Surface and interfacial phenomenon. (a, c, d)
	C302T.4	Complexation and protein binding. (a, c, d)
	C302T.5	Importance of buffers in pharmaceutical and biological systems. (a, c, d)
BP303T Pharmaceutical Microbiology (Theory)	**Upon completion of this course the graduate is able to**	
	C303T.1	Understand the basics of microorganisms and their identification, cultivation and preservation. (a, j)
	C303T.2	Apply the concepts of sterilization process in different fields of science. (a, c)
	C303T.3	Perform sterility testing of various pharmaceutical products and microbiological assays (a, d, f)
	C303T.4	Design aseptic areas and their maintenance for different pharmaceutical procedures. (a, c, k)
	C303T.5	Culture different animal cells and apply them in various fields of pharmaceutical industries. (a, d, g, j)
BP304T Pharmaceutical Engineering (Theory)	**Upon completion of this course the graduate is able to**	
	C304T.1	Explain the mechanisms of fluid flow, size reduction and size separation in different pharmaceutical equipments. (a, b, c, d, j)
	C304T.2	Demonstrate heat exchangers, evaporators and distillators used in pharmaceutical industry. (a, b, c, d, j)
	C304T.3	Describe the principles and equipments used for the drying and mixing in pharmaceutical industries. (a, b, c, d, j)
	C304T.4	Discuss various filtration and centrifugation techniques used

		in the filtration of fluids and separation of liquids.(a, b, c, d, j)
	C304T.5	Design pharmaceutical plants as per regulatory requirements and material handling systems. (a, b, c, d, j)
BP305P Pharmaceutical Organic Chemistry II (Practical)	**Upon completion of this course the graduate is able to**	
	C305P1	Understand different purification methods. (a, d, j, k)
	C305P.2	Analyze fats and oils by various methods. (a, d, j, k)
	C305P.3	Prepare pharmaceutical intermediates by electrophilic aromatic substitution reactions. (a, d, j, k)
	C305P.4	Synthesize organic intermediates by oxidation and hydrolysis reactions. (a, d, j, k)
	C305P.5	Prepare organic intermediates by condensation and diazotization reactions. (a, d, j, k)
BP306P Physical Pharmaceutics-I (Practical)	**Upon completion of this course the graduate is able to**	
	C306P1	Differentiate the solubility, distribution, diffusion patterns of solids, liquids and gases. (a, c, d, j)
	C306P.2	Evaluate the physicochemical properties of drug molecules and matter. (a, c, d, j)
	C306P.3	Determine the interfacial tension and its properties. (a, c, d, j)
	C306P.4	Estimate the stability constant and donor acceptor ratio for drug effect. (a, c, d, j)
	C306P.5	Understand the importance of buffers, isotonic solutions and pH in pharmaceutical processes. (a, c, d, j)
BP307P Pharmaceutical Microbiology (Practical)	**Upon completion of this course the graduate is able to**	
	C307P1	Design and conduct experiments involved with microorganisms. (a, d, k)
	C307P.2	Classify microorganisms (a, c, j)
	C307P.3	Assess the sterility of pharmaceutical products. (a, c, d, f)
	C307P.4	Estimate the potency of antibiotics. (a, c, d)
	C307P.5	Identify the microorganisms present in the samples. (a, c, e)
BP308P Pharmaceutical Engineering (Practical)	**Upon completion of this course the graduate is able to**	
	C308P1	Reduce the size and separate the materials. (c, d)
	C308P.2	Identify the factors that influence the rate of filtration, evaporation and crystallization. (c, d)
	C308P.3	Estimate the moisture content in samples and humidity levels in the environment. (c, d)
	C308P.4	Demonstrate the flow of heat in various pharmaceutical plant construction materials. (c, d)
	C308P.5	Investigate the drying properties of substances under various conditions. (c, d)