



**Curriculum:** B. in Pharm 2018-2022

## Program Level Course - PO Matrix Report

### Program Outcomes (POs) & Program Specific Outcomes (PSOs) :

- 1 . Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- 2 . Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- 3 . Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- 4 . Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- 5 . Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- 6 . Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- 7 . Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- 8 . Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions



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9 . The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

10 . Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

11 . Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Course Outcomes (COs) - Program Outcomes (POs) & Program Specific Outcomes (PSOs) matrices:-**

**Course Outcomes (COs):**

Course: Pharmacognosy and Phytochemistry-II - [614BPH_C_604_T] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3										
CO3	3										
CO4	3										
CO5	3										
CO6	3										

CO1: Explain the concept of adulteration and substitution in crude drugs, extraction process for phyto-constituents using different methods and principles.

CO2: Write the source, composition, general methods of extraction, evaluation, chemical tests, therapeutic uses of crude drugs containing volatile oils, resins and tannins

CO3: Write the biosynthesis of monoterpenoids and phenylpropanoid constituents of volatiles

CO4: Understand the chemistry of phytoconstituents belonging to the classes of terpenoids, sulfur containing constituents and quinones and write source composition and structures of phytoconstituents of crude drugs belonging to these classes

CO5: Write the significance of excipients of natural origin, used in pharmaceutical formulations and describe various classes of excipients like binders, colours, sweetners and flavorants along with the examples of their utility.



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CO6: Describe the applications of plant tissue culture techniques with respect to production of secondary metabolites and edible vaccines.

**Course Outcomes (COs):**

Course: General Chemistry - [BPH_C_101_T] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2		1								
CO2	2		2								
CO3	2										
CO4	2										
CO5	2										
CO6	2									1	

CO1: Explain the structures of various molecules or ions based on the concept of ionic and covalent bonding.

CO2: Discuss the rate laws, hammonds postulate, reactivity and selectivity microscopic reversibility for predicting nature of reaction and product formation.

CO3: Differentiate types of catalytic reactions and the role of catalyst.

CO4: Classify and explain mode of action of gastrointestinal agents, topical agents, miscellaneous inorganic pharmaceutical agents, electrolytes/elements and complexing agents.

CO5: Explain the physiological role of electrolytes/elements and use of physiological ions in replacement therapy, acid-base balance and combination therapy.

CO6: Describe the basic concepts of radiochemistry, biological effects of radiation and therapeutic uses of radiopharmaceuticals.

**Course Outcomes (COs):**

Course: Dispensing & Community Pharmacy - [BPH_C_102_T] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	3		1								
CO3	2										
CO4	2										
CO5	2										
CO6	2										
CO7	2								1		



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CO1: Define and classify various dosage forms
CO2: Elist i) different advantages, disadvantages, ideal properties and types of dosage form and raw materials, incompatibility, routes of administration, labelling directions of dosage form
CO3: Solve problems relating to pharmaceutical calculations
CO4: Knowledge on prescription
CO5: Identify and comprehend different steps involved in dispensing of formulations, physical and chemical incompatibilities among different active ingredients and formulations
CO6: Understand principles involved in compounding of different dosage forms
CO7: Understand the organization of community pharmacy, pharmacy ethics, provide optimal patient care under the direct personal interaction/ counseling

**Course Outcomes (COs):**

Course: Anatomy, Physiology & Pathology - [BPH_C_103_T] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2		2								
CO3	2		2								
CO4	2										
CO5	2										
CO6	2										

CO1: Discuss various body structural levels, structure, composition, functions of plasma membrane and method of movement of substances across plasma membrane.
CO2: Explain anatomy, physiology of lymphatic system, interpret the types of hypersensitivity reactions, and demonstrate the knowledge of the pathophysiology of aids and autoimmune diseases.
CO3: Explain the composition, functions of blood, process of hemostasis, blood coagulation and apply the knowledge of pathophysiology in the identification of common hematological disorders.
CO4: Comprehend the mechanisms of inflammation and repair.
CO5: Describe the anatomy of skeletal, cardiac and smooth muscle, transmission at the neuromuscular junction and energy metabolism in the muscle as well as the mechanism of skeletal muscle contraction.



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CO6: Identify various types of skeletal muscle contraction.

**Course Outcomes (COs):**

Course: Biochemistry-I - [BPH_C_104_T] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1	1									
CO2	2	2									
CO3	2	2									
CO4	2	2									
CO5	2	2									

CO1: List and identify the commonly occurring carbohydrate, amino acid and fatty acids.

CO2: Describe higher order structures like oligo- and polysaccharides/peptides and membrane lipidss

CO3: Classify different vitamins in terms of aqueous solubility and biochemical reactions /role they are involved in

CO4: Define the laws of thermodynamics and explain the concepts of gibbs free energy, favorable and unfavorable reactions and role of atp and nadh as energy carriers

CO5: Describe the process of digestion, absorption, storage and retrieval of different cellular nutrients

**Course Outcomes (COs):**

Course: Communication Skills & Ethics - [BPH_C_105_T] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1		1									
CO2						1		1			
CO3					1	1					
CO4		1			1						
CO5						1		1			

CO1: Generate simple sentences containing learned vocabulary by using correct grammatical structures.

CO2: Discuss and analyze scientific document to persuade or articulate one's own point of view.

CO3: Articulate face-to-face communication and enunciate words and sentences clearly through refined pronunciation.



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CO4: Create a scientific report using precise language, suitable vocabulary and apt style.

CO5: Apply the traits of a suitable candidate for a job / higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume. deliver formal presentations effectively implementing the verbal and non-verbal skills.

**Course Outcomes (COs):**

Course: General Chemistry Lab - [BPH_C_106_L] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1		1								
CO2	1		1								
CO3	1		1								
CO4	1							1			

CO1: Analyze inorganic mixtures qualitatively by semi-micro methods.

CO2: Identify different inorganic impurities in inorganic medicinal agents by performing pharmacopeial test.

CO3: Prepare and purify inorganic pharmaceutical compounds.

CO4: Communicate effectively for uses of various inorganic medicinal agents.

**Course Outcomes (COs):**

Course: Dispensing & Community Pharmacy Lab - [BPH_C_107_L] Term: 1 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3		1								
CO3	3										
CO4	3							1	1		

CO1: Read prescriptions, identify commonly used latin terms in pharmacy practice

CO2: Calculate the quantities of active ingredients and excipients required for compounding the required quantity of formulation (expansion and reduction of formula)

CO3: Compound, label and dispense extemporaneous formulations

CO4: Understand patient counseling and patient education methods

**Course Outcomes (COs):**

Course: Anatomy, Physiology & Pathology Lab - [BPH_C_108_L] Term: 1 - Semester											
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CO	1	2	3	4	5	6	7	8	9	10	11
C01	2										
C02	2		1								
C03	2										
C04	2										
C05	2										
C06	2		1								

C01: Carry out or perform rbc count,wbc count,differential leucocyte count,esr,bleeding time,clotting time,blood group,heamoglobin content and blood pressure.

C02: Interpret the results of the performed experiments and correlate with clinical conditions.

C03: Identify and locate the bones in human skeleton.

C04: Identify and describe the various body tissues and organs based on the structure and organization of cells.

C05: List the common diagnostic and biochemical test performed in various clinical conditions.

C06: Make use of common diagnostic and biochemical test mentioned in the syllabus in diagnosis and prognosis of the diseases.

**Course Outcomes (COs):**

**Course: Anatomy, Physiology & Pathophysiology II - [BPH\_C\_201\_T] Term: 2 - Semester**

CO	1	2	3	4	5	6	7	8	9	10	11
C01	2										
C02	2										
C03	2										
C04	2										
C05	2										
C06	2										

C01: Explain the types of and mechanisms of cellular injuries and cellular adaptation.

C02: Compare and contrast between benign and malignant tumors.

C03: Classify malignant tumours and explain the etiology and pathogenesis of cancer.

C04: Discuss the biological effects of radiations.



CO5: Explain the anatomy and physiology of the respiratory system, endocrine system, nervous system and the sensory organs.

CO6: Comprehend the etiology, pathogenesis, signs, and symptoms of common diseases/disorders of respiratory system, endocrine system and nervous system.

**Course Outcomes (COs):**

Course: Biochemistry-II - [BPH_C_202_T] Term: 2 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1										
CO2	1										
CO3	1										

CO1: The learner should be able to discuss carbohydrate metabolism with respect to different pathways, structures of intermediates, enzymes and cofactors involved, energy requirements/yields, regulation and drugs affecting metabolism

CO2: The learner should be able to discuss lipid metabolism with respect to different pathways, structures of intermediates, enzymes and cofactors involved, energy requirements/yields, regulation and drugs affecting metabolism

CO3: The learner should be able to discuss nucleic metabolism with respect to different pathways, structures of intermediates, enzymes and cofactors involved, energy requirements/yields, regulation and drugs affecting metabolism

**Course Outcomes (COs):**

Course: Pharmacognosy-I - [BPH_C_203_T] Term: 2 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2		1								
CO4	2										
CO5	2										
CO6	2										

CO1: 1 student will be able to outline the alternative and complementary systems of medicine, classify drugs of natural origin

CO2: 2 student will able to describe primary and secondary plant metabolites their biosynthesis, evaluation and therapeutic application



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CO3: 3 student will be able to understand the morphological and microscopic features of medicinal plants

CO4: 4 student will be able to elaborate commercial production, collection, preparation, storage and factors affecting cultivation of medicinal plants

CO5: 5 student will be able to describe chemistry, source, preparation, evaluation of carbohydrate containing crude drugs and their commercial utility as pharmaceutical aids and medicines

CO6: 6 student will be able to describe the source, composition, preparation and applications of fibers, minerals, important protein and enzymes of natural origin.

**Course Outcomes (COs):**

Course: Hospital Pharmacy and Drug store Management - [BPH_C_204_T] Term: 2 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2	1									
CO2	2										
CO3	2										
CO4	2										
CO5	2						1				
CO6	2							1			

CO1: Appreciate the difference in the functions, layout, legal requirements, organization, drug procurement, storage and dispensing of medicines in a retail versus hospital pharmacy setting

CO2: Appreciate the importance of documentation in the functioning of a pharmacy

CO3: Understand the importance of a hospital level formulation and compounding of parenterals.

CO4: Understand the importance and functioning of the hospital sterile supply services department.

CO5: Appreciate the dangers/detection/reporting of fraudulent pharmacy practices.

CO6: Appreciate the concept of rational drug therapy.

**Course Outcomes (COs):**

Course: Environment Sciences - [BPH_C_205_T] Term: 2 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1									1	1	1



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C02										1	1	
C03											1	
C04											1	
C05											1	

C01: Describe the basics of environmental sciences like need and purpose of study the subject, ecology, food chain and ecological pyramids, sustainable development

C02: Outline, environmental legislation, role of different ministries and environment control boards

C03: Classify and compare different sources of energies

C04: Relate technology to control pollution and economic benefits thereof, infer, the concept of green building, carbon credit and disaster management.

C05: Realize the environment related moral responsibilities and identify legal (environmental) aspects for becoming entrepreneur in future.

**Course Outcomes (COs):**

Course: Pharmacognosy Lab-I - [BPH\_C\_206\_L] Term: 2 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
C01	2										
C02	2										
C03	2										
C04	2		1								
C05	2										

C01: Students will be able to carry out quantitative microscopy for leaf constants

C02: Students will be able to determine different extractive and ash values as per pharmacopoeial requirements

C03: Students will be able to identify diagnostic features of plants such as calcium-oxalate, starch and trichomes

C04: Student will be able to differentiate between different plant parts based on morphological and microscopic evaluation

C05: 5 students will be able to identify fibers and carbohydrates based on chemical evaluation

**Course Outcomes (COs):**

Course: Biochemistry\_1 Lab - [BPH\_C\_207\_L] Term: 2 - Semester



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CO	1	2	3	4	5	6	7	8	9	10	11
C01	2		1								
C02	2										
C03	2										
C04	2		1								
C05	2		1								
C06	2		1								

C01: The learners should be able to understand the principles and methods for the estimation of carbohydrates

C02: The learners should be able to understand the principles and methods for the estimation of amino acids and proteins

C03: The learners should be able to understand the principles and methods for the estimation of fats and lipids

C04: The learners should be able to understand the principles and methods for the estimation of nucleic acid

C05: The learners should be able to understand the principles and methods for the estimation of enzyme kinetic parameters

C06: The learners should be able to understand the principles and methods for the estimation of enzyme activity as diagnostic markers

### Course Outcomes (COs):

Course: Computer Lab - [BPH\_C\_208\_L] Term: 2 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
C01		2		2							
C02				2							
C03			2	1							
C04				3				2			

C01: Describe the components of a pc

C02: Compare the different operating systems

C03: Record simple programs using basic and c programming languages

C04: Apply knowledge gained for use of computers in pharmacy

### Course Outcomes (COs):

Course: Organic Chemistry I - [BPH\_C\_301\_T] Term: 3 - Semester



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CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2										
CO5	3										

CO1: Assign iupac and stereochemical nomenclature of compounds containing multiple functional groups.

CO2: Predict aromatic character, resonance and tautomerism of compounds

CO3: Explain the various reaction intermediates along with its reactivity of compounds based on physicochemical properties (eg acidity, basicity, ionization etc.)

CO4: Understand the factors affecting equilibria, rates and reaction mechanism

CO5: Explain the influence of structure on physicochemical properties and its application to various aspects of pharmaceuticals

### Course Outcomes (COs):

Course: Physical Pharmacy I - [BPH\_C\_302\_T] Term: 3 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2		1								
CO4	2										

CO1: Understand the various physical phenomena involved in designing of various formulations.

CO2: Determine the various physical parameters of drugs and formulations.

CO3: Predict and anticipate in process problems based on raw materials and manufacturing methods.

CO4: Apply the knowledge of physical phenomena in selecting raw materials, including drug inactive ingredients of appropriate quality leading to stable formulations.

### Course Outcomes (COs):

Course: Anatomy Physiology and Pathophysiology III - [BPH\_C\_303\_T] Term: 3 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										



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C02	2										
C03	2										
C04	2										
C05	2		1								

C01: Explain the anatomy, and physiology of the reproductive system, cardiovascular system, urinary system and digestive system

C02: Comprehend the etiology, pathogenesis, signs and symptoms of common diseases of the reproductive system, cardiovascular system, urinary system and digestive system

C03: State the relevance of various body fluid compartments, electrolyte distribution and acid-base balance.

C04: Know the concept, significance and application of ecg

C05: Correlate sign and symptoms with diseases of the reproductive system, cardiovascular system, urinary system and digestive system

### Course Outcomes (COs):

Course: Pharmaceutical Analysis I - [BPH_C_304_T] Term: 3 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
C01	1	1	2	2			2		2		
C02	2		2	2							
C03	2	2	2	2							

C01: Explain the role of pharmaceutical analysis in the field of pharmacy and industry and delineate between qualitative quantitative, manual, automatic and electrochemical methods of analysis.

C02: Describe volumetric, gravimetric, electrochemical and solvent extraction methods of analysis

C03: Solve numerical problems related to volumetric, gravimetric and solvent extraction methods of analysis and apply simple statistics to numerical data.

### Course Outcomes (COs):

Course: Pharmaceutical Engineering - [BPH_C_305_T] Term: 3 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
C01	2										
C02	2										
C03	2										
C04	2										



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<b>C05</b>	<b>2</b>										
CO1: Understand mechanics of fluid, fluid flow, and its measurements											
CO2: Classify and describe pumps, heat measuring devices and conveyors											
CO3: Understand basic principles involved in unit operations such as crystallization, evaporation, distillation and refrigeration and will able to describe the equipment and accessories involved therein.											
CO4: Summarize construction material, discuss corrosion of equipment from pharmaceutical industry point.											
CO5: Define and categorize the different industrial hazards.											

**Course Outcomes (COs):**

Course: Organic chemistry-I Lab - [BPH_C_306_T] Term: 3 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1		2								
CO2	2										
CO3	2										
CO1: The learner will be able to; practice and follow safety rules and precautionary measures in laboratory.											
CO2: The learner will be able to; explain theoretical aspects of physical constant determination, detection of functional groups and log p											
CO3: The learner will be able to; characterize/identify/spot monofunctional or bifunctional organic compounds by physical constant, elemental analysis and functional group analysis											

**Course Outcomes (COs):**

Course: Physical Pharmacy-I Lab - [BPH_C_307_T] Term: 3 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2		1								
CO3	2										
CO1: To determine the principle and methods for the determination of various physical parameters of drugs and formulations.											
CO2: To carry out various physical tests involved in characterization of drugs.											
CO3: To demonstrate testing of various physical parameters involved in pre-formulation and formulation evaluation.											



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**Course Outcomes (COs):**

Course: Pharmaceutical Analysis Lab-I - [BPH_C_308_T] Term: 3 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1	2									
CO2	1	1	1	2							
CO3		2	2	2							
CO4	2	2	2	2							

CO1: Employ practice of calibration and proper handling of volumetric apparatus, electronic analytical balance and safety measures in the laboratory.

CO2: Demonstrate eye-hand co-ordination required for titrimetric analysis

CO3: Perform and record, calculate and interpret data obtained for experiments related to volumetric, gravimetric and solvent extraction methods of analysis.

CO4: Conduct and evaluate various tests mentioned in a pharmacopoeial monograph

**Course Outcomes (COs):**

Course: Organic Chemistry-II - [BPH_C_401_T] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1		1								
CO2	1		1								
CO3	1		1								
CO4	1		1								

CO1: Outline few methods of preparation for various functional group.

CO2: Understand how and why  $C=O$  group reacts with nucleophiles (using molecular orbitals and curly arrows) to give varied products

CO3: Predict the molecules that can be synthesized by reaction of  $C=C$  groups with electrophiles

CO4: Understand reactivity aromatic system towards electrophiles and nucleophiles.

**Course Outcomes (COs):**

Course: Physical Pharmacy-II - [BPH_C_402_T] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2		1								
CO2	2										
CO3	2										



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<b>C04</b>	<b>2</b>										
<b>C05</b>	<b>2</b>		<b>2</b>								
CO1: Identify order of reactions, pathways of drug degradation and types of drug complexes.											
CO2: Describe fick's laws of diffusion, mechanism of drug dissolution and absorption											
CO3: Acquire understanding of drug complexes, protein binding and their applications											
CO4: Gain knowledge of the basic principles of coarse and colloidal dispersions											
CO5: Apply basic principles of drug characterization to biopharmaceutical aspects of drug delivery											

**Course Outcomes (COs):**

Course: Pharmaceutics-I - [BPH_C_403_T] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
<b>C01</b>	<b>1</b>										
<b>C02</b>	<b>1</b>										
<b>C03</b>	<b>1</b>										
<b>C04</b>	<b>1</b>										
<b>C05</b>	<b>1</b>										
CO1: Describe the status of pharma industry in india and elaborate on the different official compendia, recall the various types of dosage forms, routes of administration and describe the alternate systems of medicine											
CO2: Explain the concepts and need for gmp & qa and preformulation.											
CO3: Summarize the packaging of pharmaceuticals											
CO4: Explain the formulation considerations, unit operations, q.a. aspects of monophasic systems, and powders											
CO5: Classify, describe the various biological products, viz. sutures & ligatures, blood products and plasma volume expanders											

**Course Outcomes (COs):**

Course: Pharmacology-I - [BPH_C_404_T] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
<b>C01</b>	<b>3</b>										
<b>C02</b>	<b>3</b>										
<b>C03</b>	<b>3</b>										



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<b>CO4</b>	<b>3</b>										
<b>CO5</b>	<b>3</b>										
<b>CO6</b>	<b>3</b>										
CO1: Define the scope, general principles and applications of pharmacology.											
CO2: Understand the factors modifying drug action.											
CO3: Comprehend pharmacokinetic and pharmacodynamic principles along with ability to compare and contrast various routes of administration with advantages and disadvantages											
CO4: Classify receptors and elucidate their role in drug/neurotransmitter/hormone action. understand the mechanisms of drug action.											
CO5: Explain autonomic transmission and discuss the pharmacology of drugs acting on ans and rationalize their therapeutic applications.											
CO6: Explain the pharmacology of drugs acting on cardiovascular system and as diuretics and discuss their use in associated diseases											

**Course Outcomes (COs):**

Course: Physical Pharmacy_2 Lab - [BPH_C_407_L] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
<b>CO1</b>	2		1								
<b>CO2</b>	2		1								
<b>CO3</b>	2		1								
CO1: Determine reaction rate constant, order of a reaction for different reactions											
CO2: Predict shelf life by carrying out accelerated stability studies											
CO3: Calculate physical parameters such as stability constants, molecular weight, and critical micellar concentration											

**Course Outcomes (COs):**

Course: Pharmaceutics_1 Lab - [BPH_C_408_L] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
<b>CO1</b>	1										
<b>CO2</b>	1										
<b>CO3</b>	1										
CO1: Prepare monophasic liquid systems and powder systems, justify the components and method of preparation.											



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CO2: Demonstrate the properties of the developed dosage forms and biological products, comment on the quality.

CO3: Perform experiments as per glp and record in the journals

### Course Outcomes (COs):

Course: Pharmacology_Lab-I - [BPH_C_409_L] Term: 4 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3	1									
CO2	3										
CO3	3										
CO4	3										
CO5	3		1								
CO6	3						1				

CO1: Perform in vitro experiment on cock ileum (tissue) to evaluate effect of drug (ach) and its dose on response (contraction) to comprehend and infer drug effects on receptors and its outcomes.

CO2: State the principles behind plotting dose-response of drugs/agonist/antagonist and its applications

CO3: Define  $p_{a2}$  value and calculate  $p_{a2}$  value of antagonist

CO4: Summarize the impact of drugs on eye and gi and discuss their potential therapeutic utility.

CO5: Observe and explain the mechanisms of action of neurotransmitters, drugs and ions on isolated frog heart.

CO6: Knowledge of animal handling techniques and understanding of ethical guidelines governing animal experimentation.

### Course Outcomes (COs):

Course: Organic Chemistry-III - [BPH_C_501_T] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2	1	1								
CO2	2	1	1								
CO3	2	1	1								
CO4	2	1	1								
CO5	2	1	1								



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CO1: Upon successful completion of this course, a learner will be able to identify, nomenclature, and to employ fundamental heterocyclic organic reactions in the synthetic design of biologically active molecules containing heterocyclic nucleus

CO2: Recognize the steroid molecules, synthetic methods, nature and their role in our body.

CO3: Outline the synthesis, chemical reactions of steroids, conversion of cholesterol to progesterone, estrone and testosterone and elucidation of structure of cholesterol.

CO4: State basic terminologies in polymers, different mechanisms involved in the polymer preparation, different polymerization techniques, details about the glass transition temperature and the factors affecting it and the types of polymers with some specific examples of each

CO5: Students will able to learn assigned synthetic and chemical reactions related to few member and bridge hetero cyclic system.

### Course Outcomes (COs):

Course: **Pharmaceutics-II - [BPH\_C\_502\_T]** Term: 5 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3										
CO3	3										
CO4	3										

CO1: Understand the formulation of liquid biphasic, semisolid, suppository and aerosol dosage forms

CO2: Describe the evaluation of such dosage forms

CO3: Summarize the packaging of liquid biphasic, semisolid, suppository and aerosol dosage forms

CO4: Explain the basic concepts of cosmetic science

### Course Outcomes (COs):

Course: **Pharmaceutical Biotechnology - [BPH\_C\_503\_T]** Term: 5 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2										



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CO1: Discuss the tools, techniques, ethics and environmental safety involved in gene cloning, and the applications of recombinant dna technology & also the concept of bioinformatics, its history & applications relevant to pharma industry

CO2: Discuss basics of immunology and explain the antigen-antibody interactions and defense mechanism and explain technique of monoclonal antibodies production for treating the human diseases

CO3: To study fermentation technology and understanding the basic concepts for production of safer vaccines and antibiotics

CO4: To study different techniques and applications of microbiological assay, enzyme immobilization and cell culture

**Course Outcomes (COs):**

Course: Pharmacology_II - [BPH_C_504_T] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2		1								

CO1: Discuss pharmacology of drugs used in chemotherapy and justify the need for rational use of antimicrobials

CO2: Explain pharmacology of drugs used as immunomodulators

CO3: Explain pharmacology of drugs used in endocrine disorders & haematological disorders

CO4: Apply pharmacotherapy principles in microbial/parasite infections, endocrine and hematological disorders

**Course Outcomes (COs):**

Course: Organic Chemistry_II Lab - [BPH_C_505_L] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										

CO1: Understand the theory behind the crystallization technique

CO2: Understand the process of purification of organic compounds



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CO3: Understand the quantification and identification of unknown binary mixtures

**Course Outcomes (COs):**

Course: Pharmaceutics-Lab II - [BPH_C_506_L] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										

CO1: Understand the formulation aspects of biphasic and semisolid dosage forms

CO2: Explain calculations involved in formulations

CO3: Describe the importance of quality evaluation of biphasics, semisolids, suppositories, aerosols

**Course Outcomes (COs):**

Course: Pharmaceutical Biotechnology Lab - [BPH_C_507_L] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2		1								
CO2	2		1								
CO3	2		1								

CO1: Characterization and identification of bacteria using various staining techniques (morphological study), colony characterization, serological and biochemical characteristics

CO2: Analyze quality of raw material, food and water and assessment of extent of microbial contamination using counting technique and evaluate sterility of products

CO3: The knowledge of bioassay of antibiotic and test antibiotic sensitivity of few antibiotics

**Course Outcomes (COs):**

Course: Pharmaceutical chemistry-I - [BPH_C_601_T] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3		1								
CO2	3		1	1							
CO3	3										
CO4	3										

CO1: Identify and study the suitable drug targets for treatment of disorders



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CO2: Identify the relationship between the physico-chemical properties of the chemical entity and biological response

CO3: Identify the sar of all the classes of anti-malarial, anti-tubercular, anti-infective, antibiotic, anti-parasitic disorders

CO4: Analyze:- draw a schematic metabolic pathway for any given drug.

**Course Outcomes (COs):**

Course: Pharmaceutics-III - [BPH_C_602_T] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3										
CO3	2										
CO4	2										
CO5	2										

CO1: Know the various solid oral dosage forms and their manufacturing techniques

CO2: Know various considerations in development of pharmaceutical dosage forms including stability.

CO3: Formulate solid dosage forms and evaluate them for their quality

CO4: Understand the responsibilities of quality assurance & quality control departments

CO5: Appreciate the importance of documentation

**Course Outcomes (COs):**

Course: Pharmaceutical Analysis-II - [BPH_C_603_T] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	1			2				1			1
CO2	2			2							2
CO3	1										
CO4			2	2				1			

CO1: Comprehend underlying principle, instrumentation, application and limitations in instrumental techniques involving molecular as well as atomic absorption and emission techniques such as uv-visible, fluorescence, infra-red, raman, atomic absorption spectroscopy and atomic emission spectroscopy.

CO2: Explain fundamentals, working principle and applications of x-ray diffraction technique, potentiometric titrations and thermal methods of analysis like tg, dsc and dta.



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CO3: Generalize the concepts and quality control aspects related to radiopharmaceuticals.

CO4: Calculate and interpret the results for spectral analysis and statistical data analysis.

**Course Outcomes (COs):**

Course: Pharmaceutical Chemistry Lab-I - [BPH_C_605_L] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3										
CO3	3										
CO4	3										
CO5	3										
CO6	3		1								

CO1: To synthesize the drug molecules

CO2: To identify the reaction type with the help of different catalyst used.

CO3: To demonstrate the reaction mechanism of particular reactions during practical

CO4: To explain and perform the reaction procedure

CO5: Demonstrate the use of apparatus used for the synthesizing the compounds

CO6: Demonstrate the analysis of the compound and calculation of theoretical yield and % practical yield

**Course Outcomes (COs):**

Course: Pharmaceutical Analysis Lab-II - [BPH_C_607_L] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1			1	2				1			1
CO2			1	2				1			
CO3			2	2				1			
CO4	2		2								
CO5			2								1

CO1: Record the absorbance and calculate concentration of analyte in formulation or as an api by use of a(1%, 1cm), single point and double point standardisation by uv spectrophotometer.

CO2: Relate and construct linear regression analysis data for colorimetric assays and operate a colorimeter instrument.



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CO3: Record and calculate the concentration of an analyte by measure of fluorescence of an analyte in absence and presence of quenching agent.

CO4: Operate a ph meter, measure equivalence point by potentiometric titration, calculate pka and normality for a given acid or mixture of acids.

CO5: Understand the sample preparation technique for ftir spectroscopy, interpret the ir spectra to identify the functional groups of an analyte, and understand the working of a flame photometer.

### Course Outcomes (COs):

Course: Pharmaceutical Chemistry II - [BPH_C_701_T] Term: 7 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2		1								
CO3	2										
CO4	2										
CO5	2										

CO1: Identify chemotherapies for cancer, viral infections, cvs diseases, gastric ulcers and diabetes.

CO2: Categorize different drugs with respect to chemical name, structures, mechanism etc.along with stereochemistry, synthesis of drugs.

CO3: Predict the effects of structural modifications on different drugs activity (sar).

CO4: Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.).

CO5: Explain active/inactive metabolites of the drugs with respects to pharmacological action, adr etc.

### Course Outcomes (COs):

Course: Pharmacognosy-III - [BPH_C_702_T] Term: 7 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2								1		
CO4	2										
CO5	2										
CO6	2										



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<b>C07</b>	<b>2</b>										
CO1: Discuss the source, composition, general methods of extraction, evaluation, chemical tests and therapeutic uses of crude drugs containing phytoconstituents of different phytochemical classes.											
CO2: Illustrate the biosynthesis of alkaloids obtained from different amino acids.											
CO3: Explain regulatory requirements for manufacture and sale of ayurvedic, siddha and unani (asu) medicines and phytopharmaceuticals, monographs of herbal drugs.											
CO4: Describe the excipients from natural origin, herbal formulation and challenges in herbal formulation											
CO5: Discuss concept of herbal drug standardization and its application to herbal formulation											
CO6: Apply the principles of pharmacology to understand interactions of herbal drugs with food and discuss few examples.											
CO7: Discuss analytical spectroscopic specifications of given natural compounds											

**Course Outcomes (COs):**

Course: Pharmaceutical Analysis III - [BPH_C_703_T] Term: 7 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
<b>C01</b>	<b>2</b>										
<b>C02</b>			<b>1</b>								
<b>C03</b>			<b>1</b>								
<b>C04</b>				<b>2</b>							
<b>C05</b>	<b>1</b>		<b>2</b>								
CO1: Explain various methods used for multicomponent analysis of drugs by uv spectroscopy.											
CO2: Summarize chromatographic and hyphenated techniques used for the separation, identification and quantification of analytes.											
CO3: Describe the working of proton 1h nmr spectroscopy and mass spectrometry.											
CO4: Interpret spectral data to predict structure of a given compound.											
CO5: Summarize the parameters of ich guidelines for analytical method validation.											

**Course Outcomes (COs):**

Course: Pharmacology III - [BPH_C_704_T] Term: 7 - Semester											
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CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2		1								
CO4	2										

CO1: Identify the drug based on their category and pharmacological action.

CO2: Explain pharmacology of drugs given in the course.

CO3: Apply the basic knowledge of pharmacology in the selection of appropriate drug for the treatment of diseases mentioned in the course.

CO4: Identify the symptoms and discuss the management of heavy metal, drugs, methanol and opioid poisoning.

**Course Outcomes (COs):**

**Course: Pharm Juri - [BPH\_C\_705\_T] Term: 7 - Semester**

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2						1		1		
CO5	2										

CO1: Quote important legislations related to the profession of pharmacy

CO2: Describe pharmaceutical legislation.

CO3: Explain the method involved in pricing of drugs & pharmaceuticals.

CO4: Discuss offences & penalties concerned with laws for drugs and pharmaceuticals

CO5: Explain an insight of drug regulatory affairs

**Course Outcomes (COs):**

**Course: Pharmacognosy Lab II - [BPH\_C\_706\_L] Term: 7 - Semester**

CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2		1								
CO3	2										
CO4	2										



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C05	2		1								
C06	2							1			

CO1: Identify crude drugs based on morphological characters, microscopic characters and discuss biological source, chemical constituents, therapeutic uses and marketed formulations.

CO2: Apply the knowledge of microscopic characters in ascertaining the genuinity of powdered formulations.

CO3: Perform qualitative chemical tests on the crude drug samples containing various phytochemical classes.

CO4: apply analytical procedures and principles for quantitative determination of total aldehyde content from crude drugs

CO5: Carry out extraction and thin layer chromatography.

CO6: Report the results of the experiments and orally communicate (viva) the learnings of the experiments

### Course Outcomes (COs):

Course: Pharmaceutical Analysis Lab III - [BPH\_C\_707\_L] Term: 7 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11
C01	2			1							
C02	1			1							
C03	2			1							
C04	2		2								

CO1: Record, calculate and interpret data obtained by uv spectrophotometric analysis for pka determination and concentration determination by multicomponent analysis techniques.

CO2: Apply ich guidelines to validate an analytical method by uv spectroscopy and interpret results obtained.

CO3: Develop and optimize mobile phase composition for qualitative analysis by tlc and interpret qualitative analysis data by tlc and paper chromatography.

CO4: Outline working and application of column chromatography, hplc and gc.

### Course Outcomes (COs):

Course: Pharmacology Lab II - [BPH\_C\_708\_L] Term: 7 - Semester

CO	1	2	3	4	5	6	7	8	9	10	11



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C01	2										
C02		2									
C03	2		1								
C04	2										
C05	2		1				1				
C06	2								2		

C01: Define bioassay, list the types, methods and applications of bioassay.

C02: Plan and perform bioassay using cock ileum.

C03: Calculate and interpret unknown drug or concentration of agonist/antagonist.

C04: Discuss the preclinical models which provide evidences on drug and their pharmacological activity.

C05: Apply ethical, regulatory and toxicity guidelines/rules (oecd, cpcsea, schedule y) in drug/lead testing using preclinical animals

C06: Prepare report on the experimental findings and effectively communicate the pharmacological concepts mentioned in the course.

**Course Outcomes (COs):**

**Course: Pharmaceutical chemistry-III - [BPH\_C\_801\_T] Term: 8 - Semester**

CO	1	2	3	4	5	6	7	8	9	10	11
C01	2								1		1
C02	2										
C03	2		1								
C04	2										
C05	2										

C01: Identify different cns, ans drugs, analgesics and steroids in the treatment of different relevant disorders/diseases.

C02: Categorize different drugs with respect to chemical name, structures, mechanism etc.along with stereochemistry, synthesis of drugs.

C03: Predict the effects of structural modifications on different drugs activity (sar)

C04: Explain mechanism of action in relation to molecular targets (eg. receptors, neurotransmitters etc.)

C05: Explain active/inactive metabolites of the drugs with respects to pharmacological action, adr etc.



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**Course Outcomes (COs):**

Course: Pharmaceutics-IV - [BPH_C_802_T] Term: 8 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2	1									
CO2	2	1									
CO3	2	1								1	
CO4	3										
CO5	2	1									
CO6	2										

CO1: Discuss the knowledge of sterile technology in designing safe and effective injectables and ophthalmic products

CO2: Explain the rationale for oral sr/cr products, principles of design, development and evaluation of sr formulations

CO3: Summarize the concepts of validation and pilot plant scale up for large scale manufacturing operations

CO4: Summarize the concept of biopharmaceutics and significance of various pharmacokinetic parameters

CO5: Describe formulation considerations of microencapsules

CO6: Describe novel drug delivery systems

**Course Outcomes (COs):**

Course: Pharmaceutical chemistry Lab-II - [BPH_C_803_L] Term: 8 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2		1								
CO3	2										
CO4	2	1						1			
CO5	2									1	

CO1: Demonstrate various organic synthetic reactions by different methods.

CO2: Interpret reaction intermediates and final products using qualitative analysis.

CO3: Explain the theoretical concepts behind organic synthesis.

CO4: Report compiled experimental data of all organic synthesis and submit it in allotted time.



CO5: Understand the concept and techniques of waste management.

**Course Outcomes (COs):**

Course: Pharmaceutics Lab IV - [BPH_C_804_L] Term: 8 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2	1									
CO2	2	1	1								
CO3	2	1									
CO4	2	1	1								
CO5	2	1						2			

CO1: Demonstrate the intricacies of formulation, quality control and documentation of parenteral ,ophthalmic products, sustained release tablets and ndds.

CO2: Interpret and evaluate dissolution profile of different marketed formulations of sr tablets

CO3: Select suitable packaging container for a dosage form

CO4: Apply and interpret pharmacokinetic parameters of oral routes of administration.

CO5: Demonstrate oral and written communication skills and ability to plan the experimentation with proper time management

**Course Outcomes (COs):**

Course: Nutraceuticals and Dietary Supplements - [BPH_E_508_T] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2										
CO5	2										

CO1: Upon completion of the course student will be able to - 1. explain the concept of nutraceuticals and dietary supplements, classify these based on chemical nature, health benefits and mechanism of action.

CO2: 2. discuss the chemistry of phytochemicals, their health benefits, pharmacokinetics, interactions with food and recommended doses along with the marketed preparations

CO3: 3. explain the challenges in formulating nutraceuticals

CO4: 4. understand the significance of safety and stability studies of nutraceuticals



CO5: 5. describe the labeling and regulatory aspects for manufacture and sale of nutraceutical products.

**Course Outcomes (COs):**

Course: Cosmeticology - [BPH_E_509_T] Term: 5 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2					1		1			
CO2	2										
CO3	2							1			
CO4	2						1		1	1	

CO1: Discuss the various raw materials for cosmetics

CO2: Understand the toxicological aspects and toxicity testing for cosmetics.

CO3: Discuss the various cosmetics products w.r.t. raw materials, large scale manufacturing and functional and physicochemical evaluation

CO4: Know the regulatory guidelines and sensorial assessment for cosmetics

**Course Outcomes (COs):**

Course: Biopharmaceutics & Pharmacokinetics - [BPH_E_609_T] Term: 6 - Semester											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2										
CO5	2										

CO1: Explain the basic terms used in biopharmaceutics and pharmacokinetics

CO2: Understand the concept of pharmacokinetics models and significance of various pharmacokinetic parameters

CO3: Understand bcs classification, theories of dissolution and methods of dissolution testing

CO4: Explain the concepts of bioavailability and bioequivalence and ivivc

CO5: Solve problems based on principles of pharmacokinetics

**Course Outcomes (COs):**



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<b>Course: Pharmaceutical Excipients - [BPH_E_613_T] Term: 6 - Semester</b>											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2										
CO2	2										
CO3	2										
CO4	2										

CO1: Define, classify and elaborate on regulatory aspects of pharmaceutical excipients.

CO2: Understand the characterization and interactions of excipients with APIs and packaging materials

CO3: Elaborate on common and novel excipients in pharmaceuticals

CO4: Explain the role of polymers as excipients.

**Course Outcomes (COs):**

<b>Course: Project Work - [BPH_E_805_D] Term: 8 - Semester</b>											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3	3	3	1	2	2		2	1		1
CO2	3			3	2			2			1
CO3	3	2	3	3							2
CO4					3		1	1			1
CO5	3		3		2				2	2	1
CO6	2			1	1		1	3			2

CO1: Students will be able to apply basic knowledge in the pharmaceutical sciences to solve societal /research problems in a group.

CO2: Students will be able to acquire and summarize scientific information from a variety of sources.

CO3: Students will be able to apply techniques and instrumentation to solve problems

CO4: Students will be able to develop interpersonal skills to work as member or leader of group.

CO5: Analyze the impact of problem solution in social, industrial and environmental context for sustainable development

CO6: Students will be able to demonstrate written, visual, and/or oral presentation skills to communicate scientific findings.

**Course Outcomes (COs):**



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<b>Course: Pharmacovigilance - [BPH_E_806_T] Term: 8 - Semester</b>											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	2					1	1	1	1		1
CO2	2								1		
CO3	2					1	1	1	1		1
CO4	2										

CO1: Relate to the role of pharmacovigilance and its prevalence in different setups.

CO2: Discuss the different facets of adrs in normal as well as special populations with their relation to pharmacovigilance methods.

CO3: Classify regulatory knowledge of pharmacovigilance along with ae reporting, safety data generation and drug utilization.

CO4: Outline the regulatory processes in pharmacovigilance

<b>Course: Clinical Pharmacology - [BPH_E_807_T] Term: 8 - Semester</b>											
CO	1	2	3	4	5	6	7	8	9	10	11
CO1	3										
CO2	3		1								
CO3	3										
CO4			2								

**Course Outcomes (COs):**

CO1: Explain the role of the pharmacist in different setups like clinics, pharmacies, patient counselling, tdm, adr, di and in compliance to therapy.

CO2: Apply the knowledge of pharmacology and clinical pharmacy to recognise possibility of risk, adverse drug reaction, potential drug-drug interaction in prescription medicines given to the particular patient.

CO3: Describe basic principles of drug discovery and development, ethical guidelines/schedules, role of ethics committee, essential documents in clinical trials/research, ba-be studies and, gcp guidelines in the conduct of drug discovery and clinical research.

CO4: Analyse specific patient case, trends in drug use or prescribe to identify risk, adr, specific need to optimise health outcomes and provide personalise patient care.