

M.S. Ramaiah University of Applied Sciences

New BEL Road, MSR Nagar, Bangalore – 560054



**RAMAIAH
UNIVERSITY**
OF APPLIED SCIENCES

PO, PSO, PEO & CO

Programme: B.Pharm. (Bachelor of Pharmacy)

Programme Code: 009

Programme Outcome (PO)

Programme Specific Outcome (PSO)

Programme Educational Objectives (PEO)

Course Outcomes (CO)

Registrar
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

Approved in 23rd ACM (Resolution 23.05) held on 15th July 2021

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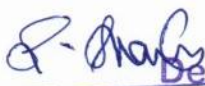
Faculty of Pharmacy (FPH)

Programme Name: B.Pharm. (Bachelor of Pharmacy)

Programme Outcomes (POs)

B. Pharm. graduates will be able to:

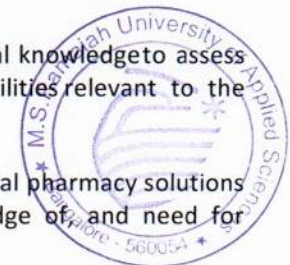
- PO-1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- PO-2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- PO-3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- PO-4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- PO-5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
- PO-6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- PO-7. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- PO-8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
- PO-9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
- PO-10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
- PO-11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.


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Programme Specific Outcomes (PSOs)

At the end of the B. Pharm program, the graduate will be able to:

- PSO-1. Apply the knowledge in Pharmaceutical Chemistry, Pharmaceutics, Pharmacology, Pharmacognosy and Pharmacy Practice to develop innovative and safe solutions to real-world problems
- PSO-2. Adapt to various advancements in synthesis, formulation, standardization and analysis of pharmaceuticals
- PSO-3. Demonstrate the leadership qualities and strive for the betterment of organization, environment, and society
- PSO-4. Demonstrate an understanding of the importance of life-long learning through professional development, practical training, and specialized certifications

Program Educational Objectives (PEOs)

The objectives of the B. Pharm Programme are to:

- PEO-1. Provide students with a strong foundation in pharmacy to enable them to devise and deliver efficient solutions to challenging problems in Pharmacy and allied disciplines
- PEO-2. Impart analytic and cognitive skills required to develop innovative solutions for R&D, Industry, and societal requirements
- PEO-3. Provide sound theoretical and practical knowledge of Pharmacy, managerial and entrepreneurial skills to enable students to contribute to the well-being and welfare of the society
- PEO-4. Inculcate strong human values and social, interpersonal and leadership skills required for professional success in evolving global professional environments



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Course Outcomes (COs)

Course Title & Code: Human Anatomy and Physiology – I (Theory) (BPC101)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the gross morphology, structure and functions of organs of the human body
- CO-2. Explain the composition and functions of blood and body fluids
- CO-3. Appraise the coordinated working pattern of different organs of each system of human body
- CO-4. Discuss the role of homeostatic mechanisms in the maintenance of proper health
- CO-5. Elaborate the cellular and tissue levels of organization in the human body

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Analysis (Theory) (BPC102)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the sources of errors in pharmaceuticals and methods to minimize them
- CO-2. Summarise the basic concepts and principles of specified titrimetric methods
- CO-3. Analyse the concentration of a solution using titrimetric methods
- CO-4. Compile the techniques of Conductometry, Potentiometry and Polarography for quantitative analysis of medicinal substances
- CO-5. Discuss the applications of titrimetric methods in pharmaceutical analysis

Course Outcomes (COs)

Course Title & Code: Pharmaceutics-I (Theory) (BPC103)

After the successful completion of this course, the student will be able to:

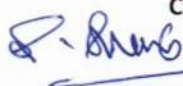
- CO-1. Summarize the history of the profession of pharmacy and the professional way of handling prescription
- CO-2. Identify and select appropriate dosage forms according to route of administration
- CO-3. Solve pharmaceutical calculations for compounding dosage forms
- CO-4. Design and develop pharmaceutical dosage forms with appropriate ingredients, suitable labels and apt storage conditions
- CO-5. Analyze the instabilities observed in formulations and suggest suitable remedial measures to overcome the same
- CO-6. Propose evaluation tests for dosage forms according to official standards

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Inorganic Chemistry (BPC104)

After the successful completion of this course, the student will be able to:

- CO-1. Understand the monographs of inorganic drugs and pharmaceuticals as per Pharmacopoeia along with the history of Pharmacopoeia



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- CO-2. Knowledge about the effects of impurities, sources of impurities in inorganic drugs and pharmaceuticals and to discuss the principles and methodology of limit test
- CO-3. Understand the different classes of inorganic pharmaceuticals along with their medicinal importance and physiological role of electrolytes
- CO-4. Outline methods to prepare, discuss the principles and methodology of assay for inorganic pharmaceuticals along with its properties and medicinal uses
- CO-5. Explain different pharmaceutical buffers, their preparations, uses in pharmaceutical system, measurement of tonicity
- CO-6. Apply knowledge on radiopharmaceuticals

Course Outcomes (COs)

Course Title & Code: Communication Skills (Theory) (BPC105)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the key terminologies of process of communication
- CO-2. Identify the importance of tone, body language and active listening as elements of effective communication
- CO-3. Interpret the factors influencing communication perspectives
- CO-4. Explain the nuances of audience – centric presentation
- CO-5. Demonstrate effective interview skills
- CO-6. Apply appropriate communication style in professional context

Course Outcomes (COs)

Course Title & Code: Remedial Mathematics (Theory) (BPC106)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the principles of matrix algebra, analytical geometry, differential and integral calculus, differential Equations and Laplace Transforms
- CO-2. Solve simple problems associated with functions, limit, continuity and partial fractions
- CO-3. Apply the appropriate standard form of matrix algebra and differential equation involving problems in applications of Pharmaceutical equations
- CO-4. Solve simple mathematical problems associated with matrix algebra, differential equations and Laplace transforms
- CO-5. Solve complex mathematical problems associated with matrix algebra, differential and integral calculus as well as Laplace Transforms
- CO-6. Explain the principles of matrix algebra, analytical geometry, differential and integral calculus, differential Equations and Laplace Transforms

Course Outcomes (COs)

Course Title & Code: Remedial Biology Theory (BPC107)

After the successful completion of this course, the student will be able to:

- CO-1. Illustrate a given plant part based on its macroscopic and microscopic characteristics
- CO-2. Explain the classification of plants, plant cell and its organelles



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- CO-3. Relate the physiological processes in plants and humans
- CO-4. Classify the type of tissues present in human body
- CO-5. Explain the anatomy and functional systems of the human body
- CO-6. Discuss the coordinated working pattern of different organs of human body

Course Outcomes (COs)

Course Title & Code: Human Anatomy and Physiology – I (Practical) (BPL108)

After the successful completion of this course, the student will be able to:

- CO-1. Classify different types of human bones
- CO-2. Identify different types of human tissues
- CO-3. Determine Blood Pressure, Pulse rate, Blood grouping, Body temperature
- CO-4. Estimate Blood cells, Hemoglobin content, ESR, Bleeding time and Clotting time

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Analysis (Practical) (BPL109)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate the preparation of primary and secondary standard solutions
- CO-2. Determine the strength of secondary standard solutions
- CO-3. Assess the percentage purity of a given compound by titrimetric analysis
- CO-4. Estimate the compounds present in different samples quantitatively using various titrimetric methods including electrochemical methods such as Potentiometry and Conductometry

Course Outcomes (COs)

Course Title & Code: Pharmaceutics-I (Practical) (BPL110)

After the successful completion of this course, the student will be able to:

- CO-1. Justify the selection of dosage form based on nature of drug and excipients
- CO-2. Formulate and dispense liquid dosage forms
- CO-3. Formulate and dispense semisolid and bulk solid dosage forms
- CO-4. Design appropriate labels for pharmaceutical dosage forms
- CO-5. Analyze and solve instability problems observed in pharmaceutical formulations



Course Outcomes (COs)

Course Title & Code: Pharmaceutical Inorganic Chemistry (BPL111)

After the successful completion of this course, the student will be able to:

- CO-1 Identify the impurities in given inorganic compounds by performing limit tests

- CO-2. Determine the impurities qualitatively by performing tests for purity
- CO-3. Use different methods to prepare inorganic pharmaceuticals
- CO-4. Perform identification tests of inorganic compounds as per Indian Pharmacopoeia

Course Outcomes (COs)

Course Title & Code: Communication Skills (Practical) (BPL112)

After the successful completion of this course, the student will be able to:

- CO-1. Recognize phonemes for proper articulation of words
- CO-2. Explain the key concepts of writing skills and listening skills
- CO-3. Explain the key concepts of writing skills and listening skills
- CO-4. Demonstrate conversation skills using appropriate body language and tone
- CO-5. Demonstrate audience – centric presentation
- CO-6. Develop professional written document

Course Outcomes (COs)

Course Title & Code: Remedial Biology (Practical) (BPL113)

After the successful completion of this course, the student will be able to:

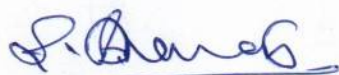
- CO-1. Identify different types of human bones
- CO-2. Prepare microscopic sections of parts of the plant
- CO-3. Analyze various systems of frog using computer models
- CO-4. Determine Blood groups
- CO-5. Record blood pressure and tidal volume

Course Outcomes (COs)

Course Title & Code: Human Anatomy and Physiology – II (Theory) (BPC114)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the structure of chromosomes, DNA and steps in protein synthesis
- CO-2. Explain the homeostatic mechanisms and their imbalances
- CO-3. Appraise the gross morphology, structure and functions of organs of the human body
- CO-4. Discuss the interlinked mechanisms involved in the maintenance of normal functioning of human body
- CO-5. Elaborate the coordinated working pattern of different organs of each system of humanbody



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Course Outcomes (COs)

Course Title & Code: Pharmaceutical Organic Chemistry-I (Theory) (BPC115)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the name, structure and possible isomers of organic compounds
- CO-2. Summarize general reactions of organic compounds
- CO-3. Identify the properties and uses of some important organic compounds
- CO-4. Analyze reactivity, orientation and stability of organic compounds
- CO-5. Discuss the mechanisms involved in organic reactions

Course Outcomes (COs)

Course Title & Code: Biochemistry (Theory) (BPC116)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the different types of biomolecules and their significance
- CO-2. Outline the concepts of bioenergetics and biological oxidation
- CO-3. Explain the metabolism of carbohydrate, proteins and lipids
- CO-4. Explain the concepts of nucleotides and nucleic acids
- CO-5. Discuss the role of enzymes in biochemical reactions

Course Outcomes (COs)

Course Title & Code: Pathophysiology (Theory) (BPC117)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the signs and symptoms of diseases
- CO-2. Explain the principles of Cell Injury and Adaptation
- CO-3. Appraise the mechanisms involved in inflammation and repair
- CO-4. Discuss the etiology and pathogenesis of the selected disease states
- CO-5. Elaborate the complications of systemic conditions to their etio-pathogenesis


Course Outcomes (COs)

Course Title & Code: Computer Applications in Pharmacy (Theory) (BPC118)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the applications of computer in Pharmacy
- CO-2. Summarize bioinformatics and their impact in vaccine discovery
- CO-3. Analyze the different types of databases
- CO-4. Develop data bases using MS Access, SQL
- CO-5. Formulate the role of computers for data analysis in the field of preclinical development




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Course Outcomes (COs)

Course Title & Code: Environmental Sciences (Theory) (BPC119)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the natural resources
- CO-2. Develop interest in environment improvement
- CO-3. Construct awareness about ecosystems and their functions
- CO-4. Develop an attitude of concern towards environmental pollution
- CO-5. Formulate necessary measures for identifying and solving environmental issues

Course Outcomes (COs)

Course Title & Code: Human Anatomy and Physiology – II (Practical) (BPL120)

After the successful completion of this course, the student will be able to:

- CO-1. Identify the tissues and organs of human body
- CO-2. Differentiate various Family planning devices
- CO-3. Record body temperature
- CO-4. Demonstrate functioning of sense organs, reflex activity and general neurological examination
- CO-5. Estimate blood cell count, tidal volume, vital capacity and BMI

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Organic Chemistry – I (Practical) (BPL121)

After the successful completion of this course, the student will be able to:

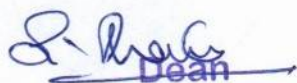
- CO-1. Demonstrate molecular models of compounds using atomic models sets
- CO-2. Identify organic compounds by preparing solid derivatives
- CO-3. Analyze organic compounds by systematic qualitative analysis
- CO-4. Determine the boiling point/ melting point of organic compounds

Course Outcomes (COs)

Course Title & Code: Biochemistry (Practical) (BPL122)

After the successful completion of this course, the student will be able to:

- CO-1. Identify normal and abnormal biochemical constituents of urine
- CO-2. Determine carbohydrates and proteins by qualitative and quantitative analysis
- CO-3. Interpret the metabolic disorders based on laboratory values
- CO-4. Estimate biochemical parameters in blood and urine
- CO-5. Construct planned experiments and prepare laboratory report in a standard format


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Course Outcomes (COs)

Course Title & Code: Computer Applications in Pharmacy (Practical) (BPL123)

After the successful completion of this course, the student will be able to:

- CO-1. Use MS Word to create questionnaires and other documentation related to pharmacy
- CO-2. Use MS Access to modify the data bases created
- CO-3. Handle web and XML pages to export table, forms and queries
- CO-4. Generate report; work with queries on MS Access
- CO-5. Create database, HTML web page

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Organic Chemistry-II (Theory) (BPC224)

After the successful completion of this course, the student will be able to:

- CO-1. Explain fats, oils and its analytical constants
- CO-2. Identify the structure, properties, stability and uses of organic compounds
- CO-3. Distinguish the products obtained through organic reactions
- CO-4. Discuss the synthesis, chemistry and uses of polynuclear hydrocarbon
- CO-5. Discuss the mechanism involved in organic synthesis

Course Outcomes (COs)

Course Title & Code: Physical Pharmaceutics -I (Theory) (BPC225)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the principles of solubility, partition coefficient and distribution law
- CO-2. Explain factors related to surface and interfacial properties of drugs and dosage forms
- CO-3. Discuss the importance of complexation and protein binding properties of drug molecules in designing of dosage forms
- CO-4. Analyze the various properties of matter and apply the principles of physicochemical properties in the formulation development
- CO-5. Assess the importance of pH and buffers in manufacturing pharmaceutical dosage forms and maintaining stability

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Microbiology (Theory) (BPC226)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the history and developments in the field of microbiology including classification, cultivation and types of microscopic techniques
- CO-2. Summarize growth requirements, isolation, preservation and identification techniques of microbes


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- CO-3. Outline principles involved in sterilization, disinfection, sterility testing and evaluation of antimicrobials
- CO-4. Apply concept of aseptic techniques in preventing contamination and discuss principles of microbiological assay with their application
- CO-5. Explain factors affecting microbial spoilage of pharmaceutical products, their preservation and discuss techniques of animal cell culture with their application

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Engineering (Theory) (BPC227)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate an understanding of basic concepts in pharmaceutical engineering
- CO-2. Classify and discuss types of equipments used in pharmaceutical engineering operations
- CO-3. Compare and contrast the applications of various pharmaceutical equipments
- CO-4. Determine specific parameters related to unit operations and evaluate their efficiency
- CO-5. Select suitable materials for pharmaceutical plant construction and study the factors involved therein

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Organic Chemistry-II (Practical) (BPL228)

After the successful completion of this course, the student will be able to:

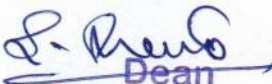
- CO-1. Synthesize organic compounds by different chemical reactions
- CO-2. Compare theoretical yield and practical yield of synthesized compound
- CO-3. Apply recrystallization and steam distillation methods for purification of synthesized organic compounds
- CO-4. Determine the purity of fats and oils by performing quantitative analysis

Course Outcomes (COs)

Course Title & Code: Physical Pharmaceutics -I (Practical) (BPL229)

After the successful completion of this course, the student will be able to:

- CO-1. Determine the partition coefficient of the given drug samples
- CO-2. Perform the CST method for determination of percentage composition
- CO-3. Estimate the HLB number of surfactants by saponification method
- CO-4. Determine the CMC of surfactants
- CO-5. Calculate the surface tension of the given sample by specific methods


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Course Outcomes (COs)

Course Title & Code: Pharmaceutical Microbiology (Practical) (BPL230)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the principle involved in isolation, identification, sterilization, sterility testing and antimicrobial standardization
- CO-2. Demonstrate practical skills/ competencies in usage of tools and performing microbiological techniques
- CO-3. Analyze and utilize appropriate sterilization, disinfection and sterility testing techniques
- CO-4. Identify microbes using suitable techniques
- CO-5. Develop oral and written skills for effective communication of experimental results

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Engineering (Practical) (BPL231)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate the functioning of equipments involved in pharmaceutical operations
- CO-2. Plan an experiment with different types of materials used in unit operations
- CO-3. Compare and contrast the applications of pharmaceutical equipment for the experiment
- CO-4. Interpret results of the experiments conducted
- CO-5. Predict the results of the experiment with the change in parameters

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Organic Chemistry – III (Theory) (BPC232)

After the successful completion of this course, the student will be able to:

- CO-1. Recall the chemistry of heterocyclic compounds
- CO-2. Outline the synthesis and medicinal uses of heterocyclic compounds
- CO-3. Select important named reactions for synthesis of organic compounds
- CO-4. Analyze the concepts of stereochemistry of organic compounds
- CO-5. Explain the various configurations and conformations of organic compounds

Course Outcomes (COs)

Course Title & Code: Medicinal Chemistry-I (BPC233)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the history to medicinal chemistry
- CO-2. Explain the effect of physicochemical properties and drug metabolism on biological action and discuss the drug metabolic pathways
- CO-3. Classify medicinal compounds according to their chemical structure



- CO-4. Discuss the relationship between the structures of medicinal compounds and their biological activity
- CO-5. Acquire knowledge on mode of action and therapeutic uses of medicinal agents
- CO-6. Outline the synthetic route of selective drug molecules using the principles of synthetic chemistry

Course Outcomes (COs)

Course Title & Code: Physical Pharmaceutics II (Theory) (BPC234)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the various properties of colloidal dispersions and its application in pharmaceuticals
- CO-2. Recall the concepts of rheological sciences and flow properties of pharmaceutical preparations
- CO-3. Discuss the factors leading to stability and instability of emulsions and suspensions
- CO-4. Analyze the effect of particle size distribution of powders on the manufacture of dosage forms
- CO-5. Outline the principles of chemical kinetics in stability testing

Course Outcomes (COs)

Course Title & Code: Pharmacology-I (Theory) (BPC235)

After the successful completion of this course, the student will be able to:

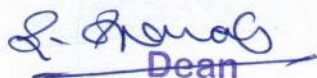
- CO-1. Summarize the terminologies, pharmacokinetic and dynamic concepts in pharmacology
- CO-2. Recognize adverse drug reactions and drug interactions
- CO-3. Describe the pharmacology of drugs acting on nervous system
- CO-4. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels
- CO-5. Discuss the drug mechanisms and their relevance in the treatment of neurological diseases

Course Outcomes (COs)

Course Title & Code: Pharmacognosy & Phytochemistry-I (Theory) (BPC236)

After the successful completion of this course, the student will be able to:

- CO-1. Outline evolution and scope of Pharmacognosy
- CO-2. Explain Pharmacognostical scheme and evaluation of crude drugs
- CO-3. Elaborate cultivation, collection and processing of drugs of natural origin including modern aspects
- CO-4. Summarize the role of herbal drugs in traditional systems of medicine
- CO-5. Discuss medicinal importance of marine drugs
- CO-6. Elaborate on the Plant tissue culture and its applications


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Course Outcomes (COs)

Course Title & Code: Medicinal Chemistry- I (Theory) (BPL237)

After the successful completion of this course, the student will be able to:

- CO-1. Synthesize compounds of medicinal interest
- CO-2. Estimate the purity of drugs by performing assays
- CO-3. Determine the partition coefficient of the pharmaceutical compounds

Course Outcomes (COs)

Course Title & Code: Physical Pharmaceutics II (Practical) (BPL238)

After undergoing this subject student will be able to:

- CO-1. Demonstrate micromeritic properties of powder samples
- CO-2. Suggest suitable stabilizing agents for suspension based on sedimentation parameter
- CO-3. Determine viscosity of liquids
- CO-4. Determine the reaction rate constants of first and second order reactions
- CO-5. Design and carry out stability studies following standard guidelines

Course Outcomes (COs)

Course Title & Code: Pharmacology I (Practical) (BPL239)

After the successful completion of this course, the student will be able to:

- CO-1. List the appliances used in experimental pharmacology
- CO-2. Identify the routes of drug administration in animals
- CO-3. Outline the suitable anesthetics for animal studies
- CO-4. Demonstrate drug action using computer models
- CO-5. Perform common laboratory techniques in animals and recommend procedures for their maintenance


Course Outcomes (COs)

Course Title & Code: Pharmacognosy & Phytochemistry-I (Practical) (BPL240)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate chemical tests to identify unorganized crude drugs
- CO-2. Evaluate the quality and purity of crude drugs
- CO-3. Perform linear measurements for crude drug identification
- CO-4. Develop quality control methods for standardization of herbal drugs
- CO-5. Conduct planned experiments and prepare laboratory report in a standard format




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Course Outcomes (COs)

Course Title & Code: Pharmacognosy & Phytochemistry-I (Practical) (BPL240)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate chemical tests to identify unorganized crude drugs
- CO-2. Evaluate the quality and purity of crude drugs
- CO-3. Perform linear measurements for crude drug identification
- CO-4. Develop quality control methods for standardization of herbal drugs
- CO-5. Conduct planned experiments and prepare laboratory report in a standard format

Course Outcomes (COs)

Course Title & Code: Medicinal Chemistry-II (Theory) (BPC341)

After the successful completion of this course, the student will be able to:

- CO-1. Classify medicinal compounds based on their chemical structure
- CO-2. Explain the mechanism of action and therapeutic uses drugs
- CO-3. Explain the adverse effects of medicinal compounds
- CO-4. Discuss the synthesis of drug molecules using the principles of synthetic chemistry
- CO-5. Discuss the relationship between the structures of medicinal compounds and their biological activity

Course Outcomes (COs)

Course Title & Code: Industrial Pharmacy-I (Theory) (BPC342)

After the successful completion of this course, the student will be able to:


- CO-1. Explain the pre-formulation considerations in designing dosage forms and their impact on stability
- CO-2. Evaluate pharmaceutical formulations and dosage forms
- CO-3. List the types, regulatory requirements and quality control of packaging materials
- CO-4. Discuss the formulation of tablets, capsules, pellets, liquid orals, parenterals, aerosols and cosmetics
- CO-5. Develop a dosage form depending on the physico-chemical properties of the active ingredient
- CO-6. Design suitable packaging for pharmaceuticals and cosmetic preparations

Course Outcomes (COs)

Course Title & Code: Pharmacology-II (Theory) (BPC343)

After the successful completion of this course, the student will be able to:

- CO-1. Appraise the pharmacology of drugs acting on cardiovascular system
- CO-2. Outline the pharmacology of drugs acting on urinary system


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- CO-3. Summarize the pharmacological aspects of drugs acting on biogenic amines
- CO-4. Discuss drug mechanisms and their relevance in the treatment of endocrine diseases
- CO-5. Elaborate the principles, applications and types of bioassay

Course Outcomes (COs)

Course Title & Code: Pharmacognosy and Phytochemistry-II (Theory) (BPC344)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the basic metabolic pathways involved in the production of primary and secondary metabolites
- CO-2. Outline the source, chemistry and commercial applications of secondary metabolites
- CO-3. Explain the methods of industrial production and estimation of phytoconstituents
- CO-4. Discuss the methods of extraction, isolation, identification and estimation of phytoconstituents
- CO-5. Discuss the medicinal importance of secondary metabolites
- CO-6. Identify the marketed formulations containing secondary metabolites

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Jurisprudence (Theory) (BPC345)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the importance of code of pharmaceutical ethics
- CO-2. Summarize the provisions of acts pertaining to drugs and cosmetics
- CO-3. Apply the concepts of price fixation for pharmaceutical products
- CO-4. Recommend labeling requirements for scheduled and non-scheduled formulation
- CO-5. Appraise implications of pharmaceutical acts and laws in development and marketing of pharmaceuticals
- CO-6. Discuss latest amendments with respect to laws governing the pharmaceutical profession

Course Outcomes (COs)

Course Title & Code: Industrial Pharmacy-I (Practical) (BPL346)

After the successful completion of this course, the student will be able to:

- CO-1. Relate the physicochemical properties of drugs to characteristics of dosage forms
- CO-2. Develop different dosage forms as per the batch formula
- CO-3. Select suitable packaging container for a dosage form
- CO-4. Make use of different equipments and instruments for preparation of dosage forms
- CO-5. Evaluate different dosage forms by performing quality control tests



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Course Outcomes (COs)

Course Title & Code: Pharmacology II (Practical) (BPL347)

After the successful completion of this course, the student will be able to:

- CO-1. Choose physiological salt solutions for isolated tissue preparations
- CO-2. Demonstrate drug effects using computer models
- CO-3. Examine the effect of drugs using *In-vivo* and *In-vitro* methods
- CO-4. Determine the potency of drugs using various bioassay methods
- CO-5. Interpret the effect of spasmogens and spasmolytics on suitable tissue preparations

Course Outcomes (COs)

Course Title & Code: Pharmacognosy and Phytochemistry-II (Practical) (BPL348)

After the successful completion of this course, the student will be able to:

- CO-1. Identify crude drugs by morphological and microscopical characteristics
- CO-2. Isolate phytoconstituents from crude drugs
- CO-3. Perform Paper and Thin Layer Chromatography
- CO-4. Isolate and analyze volatile oils
- CO-5. Perform chemical tests for the identification of unorganized crude drugs

Course Outcomes (COs)

Course Title & Code: Medicinal Chemistry – III (Theory) (BPC349)

After the successful completion of this course, the student will be able to:

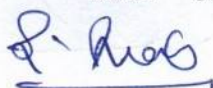
- CO-1. Find the structural features and classify the medicinal compounds
- CO-2. Interpret the synthetic and stereo chemical aspects of drugs
- CO-3. Explain the mode of action, metabolism, adverse effects and therapeutic uses of drugs
- CO-4. Construct the relationship between the structural features of drug molecules with their biological activity
- CO-5. Recommend methods for the synthesis of drug molecules
- CO-6. Elaborate the importance and techniques of drug design

Course Outcomes (COs)

Course Title & Code: Pharmacology – III (Theory) (BPC350)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the pharmacology of drugs used to treat respiratory and GI disorders
- CO-2. Classify drugs based on their antimicrobial spectrum



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- CO-3. Illustrate the mechanism and pharmacological actions of various chemotherapeutic agents
- CO-4. Discuss the pharmacology of immunostimulant/suppressants, antimalignant, drugs used in the treatment of UTI and STDs
- CO-5. Elaborate principles of drug poisoning and explain the significance leading to chronotherapy

Course Outcomes (COs)

Course Title & Code: Herbal Drug Technology (Theory) (BPC351)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the herbs as raw materials and their cultivation
- CO-2. Explain the principles and formulations of traditional systems of medicine and the requirements of Herbal drug industries
- CO-3. Discuss the importance of nutraceuticals, herbal cosmetics, herbal excipients and herbal formulations
- CO-4. Analyze herb-drug and herb-food interactions
- CO-5. Elaborate on WHO and ICH guidelines for the assessment of herbal drugs including regulatory issues
- CO-6. Appraise GMP and patenting of herbal drugs

Course Outcomes (COs)

Course Title & Code: Biopharmaceutics and Pharmacokinetics (Theory) (BPC352)

After the successful completion of this course, the student will be able to:

- CO-1. Discuss drug absorption and distribution with factors affecting them
- CO-2. Elaborate drug metabolism and excretion
- CO-3. Discuss concepts of bioavailability and bioequivalence, their methods of measurement and techniques for enhancing bioavailability
- CO-4. Determine various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling with their application in deciding dosage regimen in clinical setting
- CO-5. Illustrate non-linear pharmacokinetics with drug disposition and its significance

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Biotechnology (Theory) (BPC353)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize the appliances of immobilized enzyme and microbes in Pharmaceutical industries
- CO-2. Explain the aspects of genetic engineering in relation of production of pharmaceuticals
- CO-3. Illustrate the applications of Recombinant DNA technology
- CO-4. Explain the process of production of products by fermentation



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- CO-5. Discuss the significance of immunology and monoclonal antibodies in Pharmaceutical Sciences
- CO-6. Identify the market samples containing biotechnological products

Course Outcomes (COs)

Course Title & Code: Quality Assurance (Theory) (BPC354)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the aspects of Quality by Design.
- CO-2. Illustrate the importance of documentation in quality control and quality assurance.
- CO-3. Summarize the concepts of Quality control, Quality Assurance and Total quality management.
- CO-4. Appraise the cGMP aspects in pharmaceutical industry.
- CO-5. Discuss the scope of quality certifications applicable to pharmaceutical industries.
- CO-6. Compile the responsibilities of QA & QC departments

Course Outcomes (COs)

Course Title & Code: Medicinal Chemistry – III (Practical) (BPL355)

After the successful completion of this course, the student will be able to:

- CO-1. Synthesize medicinal compounds/intermediates
- CO-2. Apply software 'CHEM DRAW' to draw chemical structures and reactions
- CO-3. Analyze the purity of medicinal compounds
- CO-4. Determine the physicochemical properties of drugs using Drug Design Software
- CO-5. Assess the results and prepare the laboratory report in a standard format

Course Outcomes (COs)

Course Title & Code: Pharmacology III (Practical) (BPL356)

After the successful completion of this course, the student will be able to:

- CO-1. Calculate doses for laboratory animals
- CO-2. Perform toxicity studies following standard guidelines
- CO-3. Estimate biochemical parameters in body fluids
- CO-4. Demonstrate effect of drugs using computer models
- CO-5. Apply statistical methods for interpretation of experimental results


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Course Outcomes (COs)

Course Title & Code: Herbal Drug Technology (Practical) (BPL357)

After the successful completion of this course, the student will be able to:

- CO-1. Perform phytochemical screening of the extracts and monograph analysis of herbal drugs
- CO-2. Prepare herbal formulations and herbal cosmetics using standardized extracts
- CO-3. Evaluate excipients of natural origin
- CO-4. Determine alcohol content, aldehyde content, total alkaloids and phenol content
- CO-5. Conduct planned experiments and prepare laboratory report in a standard format

Course Outcomes (COs)

Course Title & Code: Instrumental Methods of Analysis (Theory) (BPL357)

After the successful completion of this course, the student will be able to:

- CO-1. Theory of electronic, atomic and molecular spectra. Fundamental laws of photometry
- CO-2. Discuss the fundamental principles and applications of UV-visible and IR spectroscopy,
- CO-3. Summarize the principles/ theoretical aspects of Chromatographic and Electrophoresis techniques
- CO-4. Elaborate on the working of the different modern analytical instruments
- CO-5. Explain the applications of the various analytical techniques

Course Outcomes (COs)

Course Title & Code: Industrial Pharmacy-II (Theory) (BPC459)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the process of pilot scale of operations from lab scale to commercial batch
- CO-2. Describe the principles and documentation guidelines of technology development and transfer in pharmaceuticals
- CO-3. Evaluate global regulatory guidelines, IND, NDA that support drug product development
- CO-4. Discuss the relevance of TQM, ISO, six sigma and GLP principles in pharmaceuticals
- CO-5. Analyze the regulatory requirements and approval procedures for new drugs and pharmaceuticals

Course Outcomes (COs)

Course Title & Code: Pharmacy Practice (Theory) (BPC460)

After the successful completion of this course, the student will be able to:

- CO-1. Appraise the organization of hospital, drug distribution methods, budgeting, and inventory control
- CO-2. Explain therapeutic drug monitoring



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- CO-3. Plan and conduct medication history interviews and patient counselling
- CO-4. Recommend pharmaceutical care services
- CO-5. Assess drug related problems and adverse drug reactions
- CO-6. Elaborate the significance of clinical laboratory tests

Course Outcomes (COs)

Course Title & Code: Novel Drug Delivery Systems (Theory) (BPC461)

After the successful completion of this course, the student will be able to:

- CO-1. Outline various approaches in design of controlled release formulations and select suitable polymers for specific drug delivery systems
- CO-2. Summarize the principles in designing mucosal and implantable drug delivery systems
- CO-3. Elaborate approaches in development of transdermal, gastro retentive and naso pulmonary drug delivery systems
- CO-4. Discuss concept of targeted drug delivery systems and microencapsulation with their applications
- CO-5. Explain formulation approaches for ocular and intrauterine drug delivery systems

Course Outcomes (COs)

Course Title & Code: Instrumental methods of Analysis (Practical) (BPL462)

After the successful completion of this course, the student will be able to:

- CO-1. Operate instruments such as UV-visible spectrometer, flame photometer, fluorimeter
- CO-2. Identify the components of a mixture mixtures by using separation techniques of
- CO-3. Estimate the quantity of a drug in a given mixture or solution
- CO-4. Analyse the given sample using fluorimetric and nepheloturbidimetric techniques
- CO-5. Conduct planned experiments and prepare laboratory reports in a standard format

Course Outcomes (COs)

Course Title & Code: Practice School - Pharmaceutical Chemistry (BPL462)

After the successful completion of this course, the student will be able to:

- CO-1. Demonstrate qualitative and quantitative analysis of drugs and formulations using Infra-Red (IR) and UV-Visible spectrophotometers
- CO-2. Develop skills in separation and identification of pharmaceuticals using chromatographic techniques
- CO-3. Analyze the spectra of given medicinal compounds
- CO-4. Determine the protein structure of targets, binding affinity and ADMET properties of ligands using computational techniques
- CO-5. Predict the QSAR and pharmacophore model for the given dataset

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Course Outcomes (COs)

Course Title & Code: Practice School - Advanced Herbal Drug Technology (BPM463-PG)

After the successful completion of this course, the student will be able to:

- CO-1. Acquire knowledge to recognize plant species of medicinal importance
- CO-2. Carryout extraction and isolation of phytoconstituents
- CO-3. Prepare and evaluate herbal cosmetics and nano formulations
- CO-4. Conduct *in vitro* pharmacological assays to evaluate herbal drugs
- CO-5. Perform molecular docking studies to predict therapeutic properties of phytoconstituents

Course Outcomes (COs)

Course Title & Code: Animal Facility Management and Pharmacological Screening Techniques (BPM463-PL)

After the successful completion of this course, the student will be able to:

- CO-1. Acquire knowledge in basic documents and requirements for animal house establishment
- CO-2. Study the role and responsibilities of CPCSEA and Institutional Animal Ethics Committee
- CO-3. Recognize the functional areas of animal facility
- CO-4. Elaborate CPCSEA guidelines and SOPs
- CO-5. Design protocol for drug testing on lab animals and alternatives to testing on animals

Course Outcomes (COs)

Course Title & Code: Practice School – Pharmacy Practice (BPM463-PP)

After the successful completion of this course, the student will be able to:

- CO-1. Summarize drug information through critical analysis
- CO-2. Demonstrate knowledge on clinical trials
- CO-3. Analyze and interpret the clinical cases and laboratory test results
- CO-4. Identify, assess, monitor, report and manage adverse drug reactions and medication errors
- CO-5. Appraise the scientific content of research reports and take part in technical writing
- CO-6. Design a comprehensive research protocol

Course Outcomes (COs)

Course Title & Code: Practice School - Pharmaceutical Manufacturing Science (BPM463-PS)

After undergoing this course students will be able to:

- CO-1. Acquire skills in tablet manufacturing process
- CO-2. Conduct operations on freeze dryer, fluidized bed dryer for dosage form development
- CO-3. Design the experiments in the lab using softwares
- CO-4. Conceptualize the advances in packaging technology
- CO-5. Develop micro and nanoparticulate formulations


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Course Outcomes (COs)

Course Title & Code: Biostatistics & Research Methodology (BPC464)

After the successful completion of this course, the student will be able to:

- CO-1. Recognize the importance of biostatistics and research methodology in pharmacy
- CO-2. Identify appropriate statistical methods for data analysis
- CO-3. Demonstrate the operation of M.S. Excel, SPSS, R and MINITAB®, DOE (Design of Experiment)
- CO-4. Explain the methods of testing hypothesis
- CO-5. Analyze results by statistical methods
- CO-6. Discuss the methods of collection of data and its analysis and interpretation

Course Outcomes (COs)

Course Title & Code: Social and Preventive Pharmacy (Theory) (BPC465)

After the successful completion of this course, the student will be able to:

- CO-1. Recall the types of community services offered in urban and rural areas
- CO-2. Outline the concepts of health, disease, and hygiene
- CO-3. Make use of the different national health intervention programmes
- CO-4. Criticize the importance of national health prevention and control programmes
- CO-5. Elaborate the general measures of prevention and control of infections and diseases

Course Outcomes (COs)

Course Title & Code: Pharma Marketing and Management (Theory) (BPE466)

After the successful completion of this course, the student will be able to:

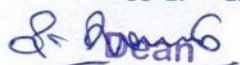
- CO-1. Explain the concepts of marketing, marketing channels, and market research, including other emerging concepts
- CO-2. Summarize marketing mix and its importance in a pharmaceutical industry setup
- CO-3. Outline the concepts of product and brand management
- CO-4. Discuss the principles, concepts and strategies of management and marketing in the pharmaceutical sector
- CO-5. Discuss promotional and sales techniques
- CO-6. Elaborate the factors determining the pricing of pharmaceuticals

Course Outcomes (COs)

Course Title & Code: Pharmaceutical Regulatory Science (Theory) (BPE467)

After the successful completion of this course, the student will be able to:

- CO-1. Explain the significance of new drug discovery and development



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- CO-2. Discuss the regulatory guidelines of orange book and federal register
- CO-3. Recognize the regulatory authorities and guidelines across the world
- CO-4. Discuss the concepts of registration of Indian drug product in overseas market
- CO-5. Outline the procedure for conducting clinical trials in India
- CO-6. Apply the principles of regulatory guidelines in new drug development, clinical trials, registration of new products in India and overseas

Course Outcomes (COs)

Course Title & Code: Pharmacovigilance (Theory) (BPE468)

After the successful completion of this course, the student will be able to:

- CO-1. Recall the historical development, national and international scenario of pharmacovigilance
- CO-2. Outline the drug disease classification, coding and terminologies used in pharmacovigilance and detection of adverse drug reactions and their assessment
- CO-3. Explain vaccine safety surveillance, pharmacogenomics, ICH guidelines and CIOMS
- CO-4. Assess drug safety evaluation in special population
- CO-5. Appraise methods to generate safety data during post approval phases of drug

Course Outcomes (COs)

Course Title & Code: Quality Control and Standardization of Herbals (Theory) (BPE469)

After the successful completion of this course, the student will be able to:

- CO-1. Explain WHO guidelines for the evaluation of herbal drugs
- CO-2. Outline the quality assurance process in herbal drug industry
- CO-3. Elaborate on the regulatory approval process and their registration in Indian and International market
- CO-4. Discuss the applications of chromatographic techniques in standardization of herbal drugs
- CO-5. Apprise EU and ICH guidelines for quality control of herbal drugs
- CO-6. Prepare the documents for new drug application and export registration

Course Outcomes (COs)

Course Title & Code: Computer Aided Drug Design (Theory) (BPE470)

After the successful completion of this course, the student will be able to:

- CO-1. CO-1. Outline the methodology involved in Design and discovery of lead molecules
- CO-2. CO-2. Identify the objectives of QSAR, molecular modeling and virtual screening methods
- CO-3. CO-3. Apply the strategies of drug design to develop new molecules with therapeutic activity
- CO-4. CO-4. Discuss the concepts of QSAR and docking
- CO-5. CO-5. Design new drugs using informatics and databases



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Course Outcomes (COs)

Course Title & Code: Cell and Molecular Biology (Theory) (BPE471)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the composition, types, properties and reproduction of cell
- CO-2. Explain the functions of DNA/ RNA and the flow of molecular information
- CO-3. Explain protein structure, protein pathways and protein synthesis
- CO-4. Illuminate the basics of molecular genetic mechanisms and cell signaling
- CO-5. Discuss the clinical significance of cell signaling mechanisms

Course Outcomes (COs)

Course Title & Code: Cosmetic Science (Theory) (BPE472)

After the successful completion of this course, the student will be able to:

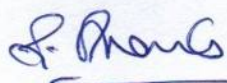
- CO-1. Classify cosmetics and cosmeceutical products on several criteria
- CO-2. Outline the necessity of excipients in the formulation of cosmetics
- CO-3. Identify factors influencing the performance of skincare care products
- CO-4. Appraise role of herbs in cosmetics
- CO-5. Justify the need and concepts of sun screen products
- CO-6. Propose suitable formulation and evaluation methods for different classes of cosmetics

Course Outcomes (COs)

Course Title & Code: Experimental Pharmacology (Theory) (BPE473)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the CPCSEA and OECD guidelines for the maintenance and conduct of experiments on laboratory animals
- CO-2. Determination of dosage of drug and summarize the applications of commonly used laboratory animals
- CO-3. Explain the preclinical screening of drugs using various experimental models
- CO-4. Identify an appropriate model for the evaluation of drugs acting on various systems
- CO-5. Summarize research methodology and biostatistics



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Course Outcomes (COs)

Course Title & Code: Advanced Instrumentation Techniques (Theory) (BPE474)

After the successful completion of this course, the student will be able to:

- CO-1. Outline the extraction techniques used in Pharmaceutical Analysis
- CO-2. Explain the principles of advanced instrumental analysis such as NMR, thermal methods of analysis and hyphenated techniques
- CO-3. Examine the principles and applications of Radio immunoassay and X –ray diffraction methods
- CO-4. Appraise the stepwise calibration of specified analytical Instruments
- CO-5. Discuss the principles of advanced Instrumental methods in drug analysis

Course Outcomes (COs)

Course Title & Code: Dietary Supplements and Nutraceuticals (Theory) (BPE475)

After the successful completion of this course, the student will be able to:


- CO-1. Explain the role of nutraceuticals and dietary supplements in health care
- CO-2. Outline the manifestation of nutritional deficiencies
- CO-3. Explain the role of phytochemicals as nutraceuticals
- CO-4. Appraise the regulatory requirements on food safety and adulteration of foods
- CO-5. Discuss the role of free radicals and antioxidants in the etiology of diseases/conditions
- CO-6. Discuss the significance of dietary supplements/nutraceuticals in health maintenance

Course Outcomes (COs)

Course Title & Code: Project Work (BPP476)

After the successful completion of this course, the student will be able to:

- CO-1. Take part in team work and undertake a project in the area of Pharmacy
- CO-2. Apply concepts of pharmaceutical sciences for executing the project
- CO-3. Apply appropriate research methodology while formulating a project
- CO-4. Explain specifications, synthesize, analyse, develop and evaluate a project
- CO-5. Elaborate the project work, exhibit and document the work
- CO-6. Develop a project report


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