

Program - B.Pharm

B.Pharm I Semester

Human Anatomy & Physiology – I (Theory)

Course Outcome:

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

- Explain gross morphology, structure and functions of various organs of the human body.
- Describe various homeostatic mechanisms and their imbalances.
- Identify various tissues and organs of different systems of the human body.
- Appreciate coordinated working pattern of different organs of each system
- Continually develop scientific reasoning and the ability to interpret data through the biochemical parameters.
- Critically evaluate health articles and medical journals related to Anatomy and Physiology.

■ **Human Anatomy & Physiology - I (Practical)**

Course Outcome:

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

- Understand the processes involved with maintenance of homeostasis and anticipate what may occur when homeostatic balance mechanisms are lost.
- Identify structures in the body and analyze their relationship when other structures.
- Employ the scientific process for understanding principles of Anatomy and Physiology.
- Analyze Anatomy and Physiology observations and data and determine the potential physiological consequences.
- Describe development, regeneration and normal function of body systems.
- Demonstrate practical knowledge of human gross and microscopic Anatomy using human cadavers and prepared histological slides.

Pharmaceutical Analysis-I (Theory)

Course Outcome:

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

- Understand the basic concepts and principles of titrimetric, gravimetric and electrochemical analyses.
- Apply the principles of titrimetric and gravimetric methods in the analyses of pharmaceuticals.
- Explain concentration, calculation of a solution, its preparation, standardization and its storage conditions.
- Describe the sources of errors commonly developed during drug analyses and methods to minimize them.
- Discuss the techniques of conductometry, potentiometry and polarography and their applications in the analysis of pharmaceuticals
- **Pharmaceutical Analysis - I (Practical)**

Course Outcome:

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

- Prepare primary and secondary standard solutions.
- Perform standardization of secondary standard solutions.
- Determine percentage purity of given pharmaceutical drugs by titrimetric analysis.

Determine normality of a solution by electro-analytical methods

Pharmaceutics – I (Theory)**Course Outcome:**

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

- Describe the history of pharmacy profession and its scope.
- Handle the prescription in a professional manner.
- Select the dose for a drug.
- Identify & suggest correction method for any possible pharmaceutical incompatibility in a formulation/prescription.
- Formulate and evaluate conventional dosage forms.

Pharmaceutics – I (Practical)**Course Outcome:**

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

- Compound some conventional solid, liquid and semisolid dosage forms.
- Select an appropriate container and storage conditions for a product.
- Label the pharmaceuticals.

Pharmaceutical Inorganic Chemistry(Theory)**Course Outcome:**

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

- Explain the effects of impurities in pharmaceuticals.
- Describe the principles and methods of limit tests to control common impurities in pharmaceutical substances.
- Explain different pharmaceutical buffers, their preparations, uses in pharmaceutical system, measurement of tonicity.
- Explain the medicinal importance of pharmaceutical inorganic compounds.
- Discuss the principles and methodology of assay of several inorganic drugs.

Pharmaceutical Inorganic Chemistry(Practicals)**Course Outcome:**

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

- Adjudge the level of specific impurities in the given inorganic compounds by performing different limit tests.
- Use different chemical methods to prepare inorganic pharmaceuticals.
- Perform identification tests as per Indian Pharmacopoeia.
- Determine the impurities qualitatively by performing tests for purity.

Communication Skills (Theory)

Course Outcome:

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

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

Communication Skills (Practical)

Course Outcome:

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

- Recognize phonemes for proper articulation of words
- Explain the key concepts of writing skills and listening skills
- Apply listening skills and reading skills for comprehension
- Demonstrate conversation skills using appropriate body language and tone
- Demonstrate audience – centric presentation
- Develop professional written document

Remedial Biology (Theory)

Course Outcome:

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

- Identify a given plant part based on its macroscopic and microscopic characteristics.
- Explain the classification of plants, plant cell and its organelles.
- Describe the physiological processes in plants and humans.
- Explain the type of tissues present in human body.
- Discuss the anatomy and functions of systems of the human body.
- Appraise the coordinated working pattern of different organs of human body.

Remedial Biology (Practical)

Course Outcome:

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

- Identify different types of human bones
- Prepare microscopic sections of parts of the plant
- Identify various systems of frog using computer models
- Determine Blood groups
- Record blood pressure and tidal volume

Remedial Mathematics (Theory)

Course Outcome:

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

- Explains the principles of matrix algebra, analytical geometry, differential and Integral calculus, differential Equations and Laplace Transforms.
- Solve simple problems associated with functions, Limits, continuity and partial fractions.
- Apply the appropriate standard form of matrix algebra and differential equation in solving problems in applications of Pharmaceutical equations.
- Solve simple mathematical problems associated with matrix algebra, differential equations and Laplace transforms.
- Solve complex mathematical problems associated with matrix algebra, differential and integral calculus, as well as Laplace Transforms.

B.Pharm II Semester

Anatomy & Physiology – II (Theory)

Course Outcome:

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

- Describe and integrate knowledge about the functions and needs of the various tissues, organs and organ systems, and explain how they relate to health and common pathologies and their pharmacological treatments in the context of disease, trauma and exercise.
- Measure basic physiological parameters, perform basic analyses, and interpret the data, taking into account the limitations of the morphology on the conclusions that can be drawn.
 - Integrate knowledge of skills in human physiology with other areas of science such as sport and exercise science, and paramedical courses.

Human Anatomy and Physiology - II (Practical)

Course Outcome:

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

- Categorize nervous system and recognizes cells of the nervous system.
- Explain the importance of nervous system.
- Explain the physiology of skeletal muscle contraction.
- Explain the properties of digestive and excretory system.
- Explain the importance of respiratory system.
- Explain the structure and functions of male and female reproductive systems.

Pharmaceutical Organic Chemistry-I(Theory)

Course Outcome:

- After the successful completion of the course, students should be able to:
- Will classify organic compounds based on their general characteristics and functional groups present.
- Will be able to outline synthetic strategies of important organic compounds.
- Discuss the possible isomers of organic compounds.
- Describe the mechanisms in organic reactions.
- Outline the properties and uses of organic compounds studied.

Pharmaceutical Organic Chemistry - I (Practical))

Course Outcome:

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

- Detect the extra elements present in compounds.
- Identify organic compounds by systematic qualitative analysis.
- Determine the boiling point/melting point of organic compounds.
- Construct molecular models of compounds using atomic models sets.

Biochemistry (Theory)

Course Outcome:

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

- Describe the concepts of biological oxidation and bioenergetics
- Explain the role, classification and metabolism of various bio molecules i.e. carbohydrates, proteins and lipids
- To study the application of enzyme inhibition in pharmaceutical industry
- Discuss the Metabolism of nucleic acids and protein biosynthesis

Biochemistry (Practical)

Course Outcome:

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

- Identify normal and abnormal biochemical constituents of urine.
- Determine carbohydrates and proteins.
- Perform identification tests as per Indian Pharmacopoeia.
- Estimate biochemical parameters in blood and urine.
- Analyse and determine the factors affecting enzyme activity.
- Analyse and report the physiological and pathological constituents of urine.
- Handle various instruments used in biochemical investigations.

Pathophysiology (Theory)

Course Outcome:

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

- Explain the signs and symptoms of diseases.
- Describe the principles of Cell Injury and Adaptation.
- Identify storage conditions for inorganic pharmaceuticals.
- Explain the mechanisms involved in inflammation and repair.
- Outline the etiology and pathogenesis of the selected disease states and the complications of systemic conditions to their etio-pathogenesis.

Computer Applications In Pharmacy (Theory)**Course Outcome:**

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

- Explain the applications of computer in Pharmacy.
- Explain bioinformatics and their impact in vaccine discovery.
- Analyse the different types of databases.
- Create data bases using MS Access, SQL.
- Identify the role of computers for data analysis in the field of preclinical development.

Computer Applications in Pharmacy (Practical)**Course Outcome:**

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

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

Environmental Science (Theory)**Course Outcome:**

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

- Describe the natural resources.
- Generate interest in environment improvement.
- Create awareness about ecosystems and their functions.
- Develop an attitude of concern towards environmental pollution.
- Recommend necessary measures for identifying and solving environmental issues.

B.Pharm III Semester

Pharmaceutical Engineering (Theory)

Course Outcome:

1. Explain the theoretical principles involved in unit operations
2. Describe the basic concepts involved in pharmaceutical operations
3. Perform various processes involved in pharmaceutical manufacturing processes.
4. Explain the process of heat exchangers, filters, centrifuges, dryers, refrigeration systems etc. required for the manufacturing of various pharmaceutical formulations
5. Analyse the efficiency of equipments of important operations such as filtration, drying and evaporation.
6. Explain the significance of construction materials in the designing and operation of equipments.
7. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries
8. Recommend the coordinated functioning of several unit operations for completion of any unit process.

Pharmaceutical Engineering (Practical)

Course Outcome:

1. Perform experiments related to unit operations
2. Operate equipments used in the manufacture of pharmaceutical products.
3. Interpret results of the experiments conducted
4. Illustrate the material and energy requirements for optimizing the pharmaceutical unit processes.

Pharmaceutical Organic Chemistry-II (Theory)

Course Outcome:

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

- Explain the general principles and mechanisms involved in organic reactions.
- Distinguish the products obtain through simple organic reactions.
- Discuss the reactivity, orientation and stability of organic reactions.
- Describe the chemistry of fats and oils.
- Differentiate the polynuclear organic compounds with respect to their chemistry.
- Structure and uses of important organic compound

Pharmaceutical Organic Chemistry-II (Practicals)

■ Course Outcome:

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

- Take up synthesis of various organic compounds by different chemical reactions.
- Purify organic compounds using various procedures like recrystallization and steam distillation.
- Determine the purity of fats and oils.
- Calculate the percentage yields of the products obtained by synthesis
- Apply recrystallization and steam distillation methods for purification of synthesized organic compounds

Physical Pharmaceutics - I (Theory)

Course Outcome:

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

- Describe the principles of solubility and partition coefficient
- Explain physical principles of states of matter and phase rule.
- Assess the importance of pH and buffers in manufacturing pharmaceutical dosage forms and maintaining stability.
- Solve problems related to states of matter, concentration expression, buffers and isotonic solutions.
- Recognize basic rules and equations regarding physical principles essential for pharmaceutical applications.

Physical Pharmaceutics-I (Practical)

Course Outcome:

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

- Perform solubility studies for different drugs.
- Determine pKa values and estimate HLB values.
- Perform and determine the percentage composition.

Calculate Critical Micellar Concentration of various surfactants

Pharmaceutical Microbiology (Theory)

■ Course Outcome:

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

- Describe the classification, methods of identification, microbial growth/reproduction, cultivation, quantification and preservation.
- Explain the microbial control techniques such as sterilization, sterility tests, disinfection and preservation of pharmaceutical products.

- Recommend appropriate methods for microbiological standardization and cell culture technology.

Pharmaceutical Microbiology (Practical)

Course Outcome:

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

- Study of apparatus used in microbiology
- Different methods of sterilization and sterility testing of pharmaceuticals
- Prepare culture media for the growth of microorganisms
- Identify and isolate bacteria
- Perform aseptic procedures for inoculation
- Determine MIC of antimicrobial agents.

B.Pharm IV Semester

Physical Pharmacy II

Course Outcome:

After undergoing this course students will be able to:

- Explain the concepts of rheological sciences and flow properties of pharmaceutical preparations
- Describe the factors leading to instability of dispersion systems
- Discuss the effect of particle size distribution of powders on the manufacture of dosage forms
- Outline the principles of chemical kinetics in stability testing
- Apply the principles of micromeritics, rheology, chemical kinetics, stability and course dispersion in the formulation development and evaluation of dosage forms

Physical Pharmacy II (Practical)

Course Outcome:

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

1. Estimate various flow properties of powders.
2. Determine the particle size using various methods.
3. Understand the effect of suspending agents on sedimentation volume.
4. Determine various order of reactions.

Pharmaceutical Organic Chemistry – III (Theory)

Course Outcome:

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

Outline the concepts of stereochemistry of organic compounds
Explain the synthesis and medicinal uses of heterocyclic compounds and stereoisomers
Describe the chemistry of heterocyclic compounds
Explain the important named reactions for synthesis of organic compounds
Discuss the reactions of heterocyclic compounds

Medicinal Chemistry-I (Theory)

Course Outcome:

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

Classify medicinal compounds according to their chemical structure
Identify the effect of physicochemical properties on biological action and drug metabolic pathways
Explain the mode of action, synthesis and therapeutic uses and side effects of drugs
Discuss the relationship between the structures of medicinal compounds and their biological activity
Discuss the pharmacological actions and adverse effects of medicinal compounds
Apply the principles of synthetic chemistry to predict the synthesis of drug molecules

Medicinal Chemistry-I(Practicals)

Course Outcome:

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

1. Synthesize medicinal compounds
2. Estimate partition coefficient of drugs
3. Determine the amount of drug present in a sample
4. Estimate purity of drugs

Pharmacology-I(Theory)

Course Outcome:

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

- Define the terminologies used in pharmacology
- Explain the pharmacokinetics and mechanism of drug action at organ system/sub cellular/macromolecular levels
- Outline the stages of drug development
- Explain the pharmacology of drugs acting on Nervous System
- Recognize adverse drug reactions and drug interactions

Pharmacology-I(Practicals)

Course Outcome:

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

- Identify the appliances used in experimental pharmacology
- Demonstrate routes of drug administration in animals
- Choose suitable anesthetics for animal studies
- Demonstrate drug action using computer models
- Perform common laboratory techniques in animals
- Recommend procedures for laboratory animal maintenance

Pharmacognosy & Phytochemistry I (Theory)

Course Outcome:

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

- Describe the scope and evolution of Pharmacognosy
- Explain the chemical nature, uses and evaluation of crude drugs
- Explain the cultivation, collection and processing of drugs of natural origin
- Describe the role of herbal drugs in traditional systems of medicine
- Discuss the medicinal importance of marine drugs
- Compare the morphological characteristics of market samples with the authentic drugs

Pharmacognosy & Phytochemistry I (Practical)

Course Outcome:

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

- Demonstrate chemical tests to identify unorganized crude drugs
- Evaluate the quality and purity of crude drugs
- Perform linear measurements for crude drug identification
- Develop quality control methods for standardisation of herbal drugs

B.Pharm V Semester

Medicinal Chemistry - II (Theory)

Course Outcomes:

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

- Explain the relationship between structure and biological activity of various drug molecules.
- Discuss the most of various classes of drug molecules.
- Depict synthetic routes of important medicinal agents.

Pharmacology - II (Theory)

Course Outcomes:

After successful completion of this course students will be able to:

- Describe the principles, applications and types of bioassay
- Explain the pharmacokinetics and mechanism of drug action at organ system/ sub cellular/macromolecular levels
- Explain the pharmacology of drugs acting on systems
- Recognize adverse drug reactions and drug interactions
- Discuss drug mechanisms and their relevance in the treatment of diseases

Pharmacology II (Practical)

Course Outcomes

After successful completion of this course students will be able to:

- Choose physiological salt solutions for isolated tissue preparations
- Demonstrate drug effects using computer models
- Conduct experiments on isolated tissue preparation and *in vivo* studies
- Interpret the effect of spasmogens and spasmolytics on suitable tissue preparations

Industrial Pharmacy - I (Theory)

Course Outcomes:

After successful completion of this course students will be able to:

- Describe the physiochemical properties important for formulation of solid, liquid and sterile dosage forms.
- Interpret formulation data and subsequent analysis data towards choice of the most relevant formulations.
- Produce pharmaceutical formulations from known reference sources in a

- quality that is suitable for patient use.
- Explain the concept and importance of testing of product performance, and the ability to interpret such data.
 - Describe the principles of sterile production and explain why quality assurance and validation of critical steps in the production process are of particular importance.
 - Develop cosmetics and with desired Safety, stability, and efficacy.

Industrial Pharmacy - I (Practical)

Course Outcomes

After successful completion of this course students will be able to:

- Prepare formulations of different dosage forms as per the batch formula
- Select suitable packaging container for a dosage form
- Operate different equipment's used in preparation of dosage forms
- Relate the physicochemical properties of drugs to dosage form characteristics
- Evaluate different dosage forms by performing quality control tests

Pharmacognosy and Phytochemistry II (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Emphasizes on basic metabolic pathways, techniques employed in the elucidation of biosynthetic pathway and formation of different secondary metabolites through these pathways.
- Describes the source, chemistry and therapeutic/commercial applications of secondary metabolites.

Pharmacognosy and Phytochemistry II (Practical)

Course Outcomes

After successful completion of this course students will be able to:

- Identify crude drugs by morphological and microscopical characteristics
- Isolate phytoconstituents from crude drugs
- Perform Paper and Thin Layer Chromatography
- Isolate and analyse volatile oils
- Carryout chemical tests for the identification of unorganized crude drugs

Pharmaceutical Jurisprudence (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the importance of code of pharmaceutical ethics
- Recognize the provisions of acts pertaining to drugs and cosmetics

- Explain the latest amendments with respect to DPCO and Patent and design act
- Discuss the concepts of price fixation of pharmaceutical products
- Summarize the Pharmaceutical Acts and Laws and their implications in the development and marketing of pharmaceuticals
- Analyze the labeling requirements of scheduled and non scheduled formulations

B.Pharm VI Semester

Medicinal Chemistry-III(Theory)

Course Outcomes

After successful completion of this course students will be able to:

1. Explain the basis of chemotherapy.
2. Objectives: synthetic strategies of important medicinal agents.
3. Discuss the mechanism of action of various medicinal agents studied including their therapeutic use.
4. Correlate the relationship between structure and biological activity of drug molecules.
5. Discuss various strategies involved in drug design and drug discovery.

Medicinal Chemistry – III (Practical)

Course Outcomes

After successful completion of this course students will be able to:

1. Explain the physicochemical properties of drugs using drug design software.
2. Draw chemical structures and reactions by Chem draw software.
3. Analyze the purity of medicinal compounds.
4. Prepare medicinally important compounds / intermediates.

Pharmacology-III(Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Classify drugs based on their therapeutic utility
- Explain the pharmacology of drugs
- Explain the principles of toxicology and treatment of poisoning
- Discuss the significance of biological clock in diseases and chronotherapy
- Discuss drug mechanisms and their relevance in the treatment of diseases and poisoning

Pharmacology III (Practical)

Outcomes

After successful completion of this course students will be able to:

- Calculate doses for laboratory animals
- Perform toxicity studies following standard guidelines
- Estimate biochemical parameters in body fluids

- Demonstrate effect of drugs using computer models
- Apply statistical methods for interpretation of experimental results
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Herbal Drug Technology (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Describe the WHO guidelines for Good agricultural and collection practices of herbal raw materials
- Discuss WHO and ICH guidelines for the assessment of herbal drugs.

Herbal Drug Technology (Practical)

Course Outcomes

- After undergoing this course students will be able to:
- Perform phytochemical screening of the extracts
- Prepare herbal formulations and herbal cosmetics using standardised extracts
- Evaluate excipients of natural origin
- Carryout monograph analysis of herbal drugs
- Determine alcohol content, aldehyde content, total alkaloids and phenol content

Biopharmaceutics and Pharmacokinetics (Theory):

Course Outcomes

After undergoing this course, student will be able to:

1. Understand the passage of drugs through the body: ADME.
2. Explain the biopharmaceutical factors associated with each administration route.
3. Assess the absolute and relative bioavailability of drugs from different dosage forms using either plasma or urine data.
3. Describe the different pharmacokinetic models.
4. Evaluate and estimate drug changes in the body by using pharmacokinetic models.
5. Ability to estimate drug clearance.
6. Evaluate drug bioavailability and bioequivalence.
7. Analyze the pharmacokinetic parameters influencing drug dosing.

Pharmaceutical Biotechnology (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Describe the applications of immobilized enzymes and microbes in Pharmaceutical industries
- Explain the aspects of genetic engineering in relation to production of pharmaceuticals
- Illustrate the applications of Recombinant DNA technology
- Explain the process of production of products by fermentation
- Discuss the significance of immunology and monoclonal antibodies in Pharmaceutical Sciences
- Identify the market samples containing biotechnological products

Pharmaceutical Quality Assurance (Theory)

Course Outcomes

- Acquire knowledge on various quality assurance systems, processes and current regulatory guidelines related to manufacturing and distribution.
- Address quality issues and provide solutions needed to attain Quality leadership in an environment of continual improvement.
- Understand the importance of effective documentation.
- To prepare professionally competent individuals with Quality concept being engrained to achieve global quality standards in pharmaceutical industries.

B.Pharm VII Semester

Instrumental Methods of Analysis (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the importance of modern instrumentation in pharmaceutical analysis
- Describe the fundamental principles and applications of spectroscopic techniques Viz., UV- Visible, IR, FTIR, Flame photometry and Nephelo-turbidimetry
- Discuss the principle and applications of chromatographic and Electrophoretic techniques
- Identify appropriate instrumental techniques for the analysis of drugs in bulk or in various dosage forms.

Instrumental methods of Analysis (Practical)

Course Outcomes

After successful completion of this course students will be able to:

- Discuss the effect of impurities on the quality of drugs and behavioral pattern of drugs
- Understand the SOP and usage of software associated with various analytical instruments
- Gain knowledge of interpretation of spectra and of chromatograms.

Industrial Pharmacy II - Theory

Course Outcomes

After successful completion of this course students will be able to:

- Manage the scale up process in pharmaceutical industry.
- Assist in technology transfer.
- Critically examine and evaluate scientific data and conclusions intended for regulatory review
- Enable improvement of the regulatory environment by implementing and upholding good regulatory practices

Novel Drug Delivery Systems (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Understand the concepts and applications of Novel Drug Delivery Systems.
- Apply knowledge in developing various novel formulations as per requirements.
- Analyze various evaluation parameters for oral, parenteral, topical etc. drug delivery systems.
- Formulate industrially feasible, cost effective strategy for development of new dosage forms.

Pharmacy Practice (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Know the business and professional practice management skills in community pharmacy
- Conduct medication history interview and provide patient counseling
- Identify and resolve various prescription related problems
- Identify, categorize, assess and report Adverse Drug Reactions
- Answer drug and poison information queries
- Interpret clinical laboratory test(s) for specific diseases.

Pharmacy School (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Acquire knowledge about hospital, hospital pharmacy and its organization with different policies implemented.
- Know various drug distribution methods and inventory control involved in a hospital.
- Know the concept of Therapeutic Drug Monitoring and implementation.
- Identify drug related problems, detect and monitor adverse drug reactions.
- Organize and know pharmaceutical care services.
- Develop skills and services needed to perform unbiased medication information functions.
- Interpret clinical laboratory test(s) for specific diseases.
- Know the significance and practice of rational drug use.

B.Pharm VIII Semester

Biostatistics and Research Methodology (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Recognize the importance of biostatistics in pharmacy
- Select appropriate clinical study design for clinical studies.
- Write the components of protocol used in clinical experiments
- Statistically calculate the sample size required for the clinical studies.
- Display the outcome of the clinical studies by selecting appropriate graphs.
- Present, organize, and summarize the collected clinical data by descriptive statistics.
- Generalize the results from the sample study to the appropriate population by testing of hypothesis with the help of inferential statistics.
- Demonstrate the operation of M.S. Excel, SPSS, MINITAB^(R), DoE (Design of Experiment)

Social and Preventive Pharmacy (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the concepts of health, disease, hygiene and socio cultural factors related to health

- Explain the concepts of prevention, control and cause of diseases.
- Analyse the different national health intervention programmes
- Describe the Objectives:, functioning and importance of national programmes for prevention and control of diseases.
- Discuss the types of community services offered in urban and rural areas.
- Illustrate the general measures of prevention and control of infections and diseases.

Pharmaceutical Marketing (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Marketing concepts and techniques and the application of the same in the pharmaceutical industry.
- Market research and distribution channels along with their implementation in the pharmaceutical industry.
- Concepts of branding and product management
- Theories on promotion, sales and pricing of a product

Pharmaceutical Regulatory Science (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Take independent responsibility for the development of novel drug and generic drug along with their drug products, from concepts to clinics.
- Independently initiate and carry out proper actions between regulatory authorities and the marketing application authorization applicant/holder.
- Critically examine and evaluate scientific data and conclusions intended for regulatory review
- Enable improvement of the regulatory environment by implementing and upholding good regulatory practices

Pharmacovigilance (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Appreciate the historical development and describe the national and international scenario of pharmacovigilance.
- Describe the drug disease classification, coding and terminologies used in pharmacovigilance.
- Detect, assess and manage the adverse drug reactions.
- Learn the vaccine safety surveillance, pharmacogenomics, ICH guidelines and CIOMS.
- Assess the methods to generate safety data during post approval phases of

the drug.

Quality Control and Standardization of Herbals (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the WHO guidelines for herbal drugs
- Describe the quality assurance processes in herbal drug industry
- Describe the regulatory approval processes and their registration in Indian and International markets
- Discuss the application of chromatographic techniques in standardization of herbal drugs
- Discuss EU and ICH guidelines for quality control of herbal drugs
- Prepare the documents for New Drug Application and herbal drugs export registration

Computer Aided Drug Design(Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the methodology involved in Design and discovery of lead molecules
- Identify the Objectives: of QSAR , molecular modeling and virtual screening methods
- Discuss the concepts of QSAR and docking
- Apply the strategies of drug design to develop new molecules with therapeutic activity
- Design new drugs using informatics and databases

Cell and Molecular Biology (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Explain the receptor signal transduction processes and molecular pathways affected by drugs.
- It also appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process.
- Explain the flow of genetic information from DNA to Proteins
- Apply the concepts of rDNA technologies and genomics analysis to discover new therapeutic drug molecules

Cosmetic Science (Theory)

Course Outcomes

After undergoing this course, student will be able to:

- Classification and key components used in different cosmetics and cosmeceuticals.
- Recognize the role of the ingredients and herbs used
- Advanced current technologies used for manufacturing the cosmetics at lab scale and industry scale
- Justify the need for skin care and sun screen products
- Scientific learning's to develop cosmetics and cosmeceuticals with desired Safety, sensory, stability, and efficacy

Pharmacological Screening Methods (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Describe the regulatory guideline for maintenance and conduct of experiments on laboratory animals
- Design the protocol for preclinical drug discovery
- Expertise in routes of drug administration and blood withdrawal techniques using animals
- Adeptness in animal dose calculations
- Proficiency in interpretation of preclinical statistical preclinical data

Advanced Instrumentation Techniques (Theory)

Course Outcomes

After successful completion of this course students will be able to:

- Understand significance and concept of advanced instrumentation
- Understand the benefits of advanced instruments in comparison with other conventional methods.
- To work on downsizing the conventional methods.
- Become proficient in advanced instruments
- Implement the knowledge of choosing the right instruments

Project Work

Course Outcomes

After successful completion of this course students will be able to:

- Work in team and undertake a project in the area of Pharmacy
- Apply concepts of pharmaceutical sciences for executing the project
- Apply appropriate research methodology while formulating a project
- Define specifications, synthesize, analyse, develop and evaluate a project
- Present, exhibit and document the project work
- Develop a project report