



www.cvru.ac.in

DR. C.V. RAMAN UNIVERSITY

// Chhattisgarh, Bilaspur AN AISECT GROUP UNIVERSITY

Approved by : PCI | AICTE | NCTE | BCI | Member of : AIU | Recognized by : UGC

POs, PSOs and COs

**FACULTY OF
PHARMACY**



Add: Kargi Road, Kota, Bilaspur (C.G.)
Ph. 07753-253801, E-Mail: info@cvru.ac.in

FACULTY OF PHARMACY
DIPLOMA IN PHARMACY
PROGRAMME CODE: 12DIP001

PROGRAM OUTCOME (POS)

- **PO1: Pharmaceutical Knowledge:-** Students gain a deep knowledge regarding human body, its related diseases, analytical skills, drug molecules (Active Pharmaceutical Ingredients) along with excipients, natural drug resources, chemistry involved in API including synthesis of commonly used drugs, effect of drug on human body, toxicity and impurity profile, ADME studies of drugs (behavior of drug in human body), dosage form studies including novel approaches, designing and development of formulation stability studies, analysis etc.
- **PO2: Pharmacy and society:** Pharmacist provides complete health care data and practices to the people of the society and guides them to be healthy. The student also learns drug distribution system, patient counseling, industrial laws etc. Student gains expertise in storage and distribution of drugs with all precautions and in-depth knowledge of dose, adverse effect and other health related issues to deal with indoor and outdoor patients admitted in hospitals and also in public.
- **PO3: Environment and sustainability:** Understand the impact of the professional pharmacist in society and environment, and make an impact of it on the people of the society.
- **PO4: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmacy practice. Student is also trained in ethical behavior with physician, nurses and other paramedical staff for protecting patient's health.
- **PO5: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse team acts as a multidisciplinary person in every context.
- **PO6: Communication:** Communicate effectively on pharmaceutical activities with the community and with society.
- **PO7: Social Interaction:** Being a public welfare job a pharmacist would be able to interact with the people in a better way to cure them and make them feel healthy.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO1:** Able to apply the knowledge gained during the course of the program from pharmacology, pharmaceuticals, medicinal chemistry, Pharmacognosy, APHE, communication skills, pharmaceutical analysis, Biotechnology, biochemistry, cosmetology and environmental studies
- **PSO2:** Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.
- **PSO3:** Able to do multidisciplinary jobs in the pharmaceutical industries in various branches and would be able to write effective project reports in multidisciplinary environment in the context of changing technologies.

Course Code: 2DPHC1101

Course Name: Pharmaceutics - I

Course Objectives

Upon completion of this course the student should be able to:

- Understand the basics of different dosage forms, and pharmaceutical calculations
- Preparation of various conventional dosage forms

Course Outcome

- This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Course Code: 2DPHC1102

Course Name: Pharmaceutical Chemistry I

Course Objectives

Upon completion of the course the student shall be able to

- Write the structure, name and the type of isomerism of the organic compound
- Write the reaction, name the reaction and orientation of reactions
- Account for reactivity/stability of compounds,
- Identify/confirm the identification of organic compound

Course Outcome

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Course Code: 2DPHC1103

Course Name: Pharmacognosy

Course Objectives

Upon completion of this course the student should be able to:

- Understand the basics of Pharmacognosy and systems of medicines, classification of drugs and natural origin.
- Understand the adulteration and evaluation of drug.
- Understand the gross anatomical studies of different drugs.

Course Outcome

- The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine.

Course Code: 2DPHC1104

Course Name: Biochemistry & Clinical Pathology

Course Objectives

Upon completion of this course the student should be able to:

- Know brief introduction of biochemistry.
- Understand different properties of Carbohydrates, Lipids, Vitamins, Enzymes.

Course Outcome

- Biochemistry deals with complete understanding and brief chemistry and role of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions.

Course Code: 2DPHC1105

Course Name: Human Anatomy & Physiology

Course Objectives

Upon completion of this course the student should be able to:

- Understand Scope of Anatomy and physiology.
- Understand different parts and physiology and functioning of skeletal system, Cardiovascular System, skeletal System, Respiratory system, Urinary System, Muscular System & Central Nervous System.
- Understand the structure and function of different sensory organs and reproductive system.

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Code: 2DPHC1106

Course Name: Health Education & Community Pharmacy

Course Objectives

Upon completion of this course the student should be able to:

- Understand Concept of health.
- Should know the Nutrition and health
- Should be aware of Environment and health
- Should know about First aid and Emergency treatment during different emergency situation.

Course Outcome

- This chapter deals with the health, diseases and the prevention or cure of the different diseases.

Course Code: 2DPHC2101

Course Name: Pharmaceutics – II (Dispensing Pharmacy)

Course Objectives

Upon completion of this course the student should be able to:

- Understand Prescription and different terms used in prescription.
- Understand various types of Incompatibilities in prescriptions.

Course Outcome

- This chapter deals with the Prescription, drugs dispensing, their compatibilities and interactions, different dosage forms, route of administration of dosage forms.

Course Code: 2DPHC2102

Course Name: Pharmaceutical Chemistry – II

Course Objectives

Upon completion of this course the student should be able to:

- explain the stereo chemical aspects of organic compounds and stereo chemical reactions
- know the medicinal uses and other applications of organic compounds

Course Outcome

- This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Course Code: 2DPHC2103

Course Name: Pharmacology & Toxicology

Course Objectives

Upon completion of this course the student should be able to

- Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
- Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
- Observe the effect of drugs on animals by simulated experiments
- Appreciate correlation of pharmacology with other bio medical sciences

Course Outcome

- The main purpose of the subject is to understand what drugs do to the living organisms

and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs

Course Code: 2DPHC2104

Course Name: Pharmaceutical Jurisprudence

Course Objectives

Upon completion of the course, the student shall be able to understand:

- Various Indian Pharmaceutical Acts and Laws.
- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
- The code of ethics during the pharmaceutical practice

Course Outcome

This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Course Code: 2DPHC2105

Course Name: Drug Store and Business Management

Course Objectives

Upon completion of the course, the student shall be able to understand:

- Drug House Management, Sales, Recruitment, training, Banking and Finance, accounting concepts, Introduction to Budgeting.

Course Outcome

- This chapter deals with the Drug store management, sales, process of recruitment and training, accounting and budget management.

Course Code: 2DPHC2106

Course Name: Hospital and Clinical Pharmacy

Course Objectives

Upon completion of the course, the student shall be able to understand:

- The Hospital organization, Hospital Pharmacy, Drug Distribution system in Hospitals, Manufacturing of Pharmaceutical products.
- P.T.C. (pharmacy Therapeutic Committee), Hospital Formulary system and their organization, functioning, composition.

Course Outcome

- This chapter deals with hospital, hospital pharmacy, Drug Distribution system in Hospitals, Drug Information service, Drug Interactions and Bio-availability of drugs.

BACHELOR OF PHARMACY

PROGRAMME CODE: 12UGR001

PROGRAM OUTCOME (POs)

- **PO1: Pharmaceutical Knowledge:-** Students gain a deep knowledge regarding human body, its related diseases, analytical skills, drug molecules (Active Pharmaceutical Ingredients) along with excipients, natural drug resources, chemistry involved in API including synthesis of commonly used drugs, effect of drug on human body, toxicity and impurity profile, ADME studies of drugs (behavior of drug in human body), dosage form studies including novel approaches, designing and development of formulation stability studies, analysis etc.
- **PO2: Research Analysis:** Students could apply the knowledge in research field to make new discoveries.
- **PO3: Design & Development of dosage forms:** Various dosage forms could be prepared by the pharmacy students in the pharmaceutical companies for the ease of patients.
- **PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5: Modern methods usage:** Create, select, and apply appropriate techniques, resources, and modern methods with an understanding of the limitations and its usage. The student also learns to handle many instruments related to their studies which would help them work in a Pharmaceutical Industry, pharmacovigilance, regulatory requirements, legal processes etc.
- **PO6: Pharmacy and society:** Pharmacist provides complete health care data and practices to the people of the society and guides them to be healthy. The student also learns drug distribution system, patient counseling, industrial laws etc. Student gains expertise in storage and distribution of drugs with all precautions and in-depth knowledge of dose, adverse effect and other health related issues to deal with indoor and outdoor patients admitted in hospitals and also in public.
- **PO7: Environment and sustainability:** Understand the impact of the professional pharmacist in society and environment, and make an impact of it on the people of the society.
- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the pharmacy practice. Student is also trained in ethical behavior with physician, nurses and other paramedical staff for protecting patient's health.
- **PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse team acts as a multidisciplinary person in every context.
- **PO10: Communication:** Communicate effectively on pharmaceutical activities with the community and with society.

- **PO11: 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.
- **PO12: Social Interaction:** Being a public welfare job a pharmacist would be able to interact with the people in a better way to cure them and make them feel healthy.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO1:** Able to apply the knowledge gained during the course of the program from pharmacology, pharmaceuticals, medicinal chemistry, Pharmacognosy, APHE, communication skills, pharmaceutical analysis, Biotechnology, biochemistry, cosmetology and environmental studies
- **PSO2:** Able to apply the knowledge of ethical and management principles required to work in a team as well as to lead a team.
- **PSO3:** Able to do multidisciplinary jobs in the pharmaceutical industries in various branches and would be able to write effective project reports in multidisciplinary environment in the context of changing technologies.
- **PSO4:** Able to communicate easily and comfortably. Would be able to perform multitasks in multi fields including pharmaceutical & cosmetics. Research area would be strong.

Course Code: 3BPHC1101

Course Name: Human Anatomy and Physiology-I

Course Objectives

- Describe the various homeostatic mechanisms and their imbalances.
- Identify the various tissues and organs of different systems of human body.
- Perform the various experiments related to special senses and nervous system.
- Appreciate coordinated working pattern of different organs of each system

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Code: 3BPHC1102

Course Name: Pharmaceutical Analysis – I

Course Objectives

Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations

Course Outcome

- This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs

Course Code: 3BPHC1103**Course Name: Pharmaceutics- I****Course Objectives**

Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Outcome

- This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Course Code: 3BPHC1104**Course Name: Pharmaceutical Inorganic Chemistry****Course Objectives**

- Upon completion of course student shall be able to understand the medicinal and pharmaceutical importance of inorganic compounds

Course Outcome

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.

Course Code: 3BPHC1105**Course Name: Communication Skills****Course Objectives**

Upon completion of the course the student shall be able to

- Communicate effectively (Verbal and Non Verbal)
- Effectively manage the team as a team player
- Develop interview skills
- Develop Leadership qualities and essentials

Course Outcome

- This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Course Code: 3BPHC1106

Course Name: Remedial Biology

Course Objectives

Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant

Course Outcome

- To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Course Code: 3BPHC1107

Course Name: Remedial Mathematics

Course Objectives

Upon completion of the course the student shall be able to:-

- Know the theory and their application in Pharmacy
- Solve the different types of problems by applying theory

Course Outcome

- This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Course Code: 3BPHC2101

Course Name: Human Anatomy and Physiology-II

Course Objectives

Upon completion of this course the student should be able to:

- Describe the various homeostatic mechanisms and their imbalances.
- Identify the various tissues and organs of different systems of human body.
- Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
- Appreciate coordinated working pattern of different organs of each system
- Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both

homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Code: 3BPHC2102

Course Name: Pharmaceutical Organic Chemistry –I

Course Objectives

Upon completion of the course the student shall be able to

- write the reaction, name the reaction and orientation of reactions
- account for reactivity/stability of compounds,
- identify/confirm the identification of organic compound

Course Outcome

- This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

Course Code: 3BPHC2103

Course Name: Biochemistry

Course Objectives

Upon completion of course student shall be able to

- Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- Understand the metabolism of nutrient molecules in physiological and pathological conditions.
- Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Course Outcome

- Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Course Code: 3BPHC2104

Course Name: Pathophysiology

Course Objectives

Upon completion of the subject student shall be able to –

- Name the signs and symptoms of the diseases; and

- Mention the complications of the diseases.

Course Outcome

- Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Course Code: 3BPHC2105

Course Name: Computer Applications in Pharmacy

Course Objectives

Upon completion of the course the student shall be able to

- know the various types of databases
- know the various applications of databases in pharmacy

Course Outcome

- This subject deals with the introduction Database, Database Management system, and computer application in clinical studies and use of databases.

Course Code: 3BPHC2106

Course Name: Environmental Sciences

Course Objectives

Upon completion of the course the student shall be able to:

- Create the awareness about environmental problems among learners.
- Impart basic knowledge about the environment and its allied problems.
- Develop an attitude of concern for the environment.
- Motivate learner to participate in environment protection and environment improvement.
- Strive to attain harmony with Nature.

Course Outcome

- Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Course Code: 3BPHC3101

Course Name: Pharmaceutical Organic Chemistry –II

Course Objectives

Upon completion of the course the student shall be able to

- write the structure, name and the type of isomerism of the organic compound
- write the reaction, name the reaction and orientation of reactions
- account for reactivity/stability of compounds,

Course Outcome

- This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Course Code: 3BPHC3102

Course Name: Physical Pharmaceutics-I

Course Objectives

Upon the completion of the course student shall be able to

- Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Outcome

- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Code: 3BPHC3103

Course Name: Pharmaceutical Microbiology

Course Objectives

Upon completion of the subject student shall be able to;

- Understand methods of identification, cultivation and preservation of various microorganisms
- To understand the importance and implementation of sterilization in pharmaceutical processing and industry
- Learn sterility testing of pharmaceutical products.
- Understand the cell culture technology and its applications in pharmaceutical industries.

Course Outcome

- Study of all categories of microorganisms especially for the production of alcohol antibiotics, vaccines, and vitamins enzymes etc.

Course Code: 3BPHC3104**Course Name: Pharmaceutical Engineering****Course Objectives**

Upon completion of the course student shall be able:

- To understand the material handling techniques.
- To perform various processes involved in pharmaceutical manufacturing process.
- To carry out various test to prevent environmental pollution.
- To appreciate and comprehend significance of plant lay out design for optimum use of resources.
- To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course Outcome

- This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry.

Course Code: 3BPHC4101**Course Name: Pharmaceutical Organic Chemistry –III****Course Objectives**

At the end of the course, the student shall be able to

- explain the stereo chemical aspects of organic compounds and stereo chemical reactions
- know the medicinal uses and other applications of organic compounds

Course Outcome

- This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Course Code: 3BPHC4102**Course Name: Medicinal Chemistry – I****Course Objectives**

Upon completion of the course the student shall be able to

- understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
- know the Structural Activity Relationship (SAR) of different class of drugs
- write the chemical synthesis of some drugs

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Code: 3BPHC4103

Course Name: Physical Pharmaceutics-II

Course Objectives

Upon the completion of the course student shall be able to

- Understand various physicochemical properties of drug molecules in the designing the dosage forms
- Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations

Course Outcome

- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Code: 3BPHC4104

Course Name: Pharmacology-I

Course Objectives

Upon completion of this course the student should be able to

- Understand the pharmacological actions of different categories of drugs
- Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
- Observe the effect of drugs on animals by simulated experiments
- Appreciate correlation of pharmacology with other bio medical sciences

Course Outcome

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Course Code: 3BPHC5101

Course Name: MEDICINAL CHEMISTRY – II

Course Objectives

Upon completion of the course the student shall be able to

- Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
- Know the Structural Activity Relationship of different class of drugs
- Study the chemical synthesis of selected drugs

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Code: 3BPHC5102

Course Name: Industrial Pharmacy – I

Course Objectives

Upon completion of the course the student shall be able to

- Know the various pharmaceutical dosage forms and their manufacturing techniques.
- Know various considerations in development of pharmaceutical dosage forms

Course Outcome

- Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Course Code: 3BPHC5103

Course Name: Pharmacology-II

Course Objectives

Upon completion of this course the student should be able to

- Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
- Demonstrate the various receptor actions using isolated tissue preparation
- Appreciate correlation of pharmacology with related medical sciences

Course Outcome

- This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and

contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.

Course Code: 3BPHC5104

Course Name: Pharmacognosy And Phytochemistry – II

Course Objectives

Upon completion of the course, the student shall be able

- to understand the preparation and development of herbal formulation.
- to understand the herbal drug interactions
- to carryout isolation and identification of phytoconstituents

Course Outcome

- The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Course Code: 3BPHC5105

Course Name: Pharmaceutical Jurisprudence

Course Objectives

Upon completion of the course, the student shall be able to understand:

- The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- The code of ethics during the pharmaceutical practice

Course Outcome

- This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Course Code: 3BPHC6101

Course Name: Medicinal Chemistry – III

Course Objectives

Upon completion of the course student shall be able to

- Understand the chemistry of drugs with respect to their biological activity.
- Know the importance of SAR of drugs.

Course Outcome

- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

Course Code: 3BPHC6102

Course Name: Pharmacology – III

Course Objectives

Upon completion of this course the student should be able to:

- comprehend the principles of toxicology and treatment of various poisonings and
- Appreciate correlation of pharmacology with related medical sciences.

Course Outcome

- This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.

Course Code: 3BPHC6103

Course Name: Herbal Drug Technology

Course Objectives

Upon completion of this course the student should be able to:

- understand raw material as source of herbal drugs from cultivation to herbal drug product
- know the WHO and ICH guidelines for evaluation of herbal drugs
- Appreciate patenting of herbal drugs, GMP.

Course Outcome

- This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Course Code: 3BPHC6104

Course Name: Biopharmaceutics and Pharmacokinetics

Course Objectives

Upon completion of the course student shall be able to:

- Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
- To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
- Understand various pharmacokinetic parameters, their significance & applications.

Course Outcome

- This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.

Course Code: 3BPHC6105

Course Name: Pharmaceutical Biotechnology

Course Objectives

Upon completion of the subject student shall be able to;

- Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
- Importance of Monoclonal antibodies in Industries
- Appreciate the use of microorganisms in fermentation technology

Course Outcome

- Biotechnology has a long promise to revolutionize the biological sciences and technology.
- Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting.
- Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs.
- Biotechnology has already produced transgenic crops and animals and the future promises lot more.
- It is basically a research-based subject.

Course Code: 3BPHC6106

Course Name: Pharmaceutical Quality Assurance

Course Objectives

Upon completion of the course student shall be able to:

- understand the cGMP aspects in a pharmaceutical industry

- appreciate the importance of documentation
- understand the scope of quality certifications applicable to pharmaceutical industries

Course Outcome

- This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Course Code: 3BPHC7101

Course Name: Instrumental Methods of Analysis

Course Objectives

Upon completion of the course the student shall be able to

- Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
- Understand the chromatographic separation and analysis of drugs.

Course Outcome

This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Course Code: 3BPHC7102

Course Name: Industrial Pharmacy

Course Objectives

Upon completion of the course, the student shall be able to:

- Understand the process of technology transfer from lab scale to commercial batch
- Know different Laws and Acts that regulate pharmaceutical industry
- Understand the approval process and regulatory requirements for drug products

Course Outcome

- This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Course Code: 3BPHC7103

Course Name: Pharmacy Practice

Course Objectives

Upon completion of the course, the student shall be able to

- appreciate the pharmacy stores management and inventory control

- monitor drug therapy of patient through medication chart review and clinical review
- obtain medication history interview and counsel the patients
- identify drug related problems
- detect and assess adverse drug reactions
- interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states
- know pharmaceutical care services
- Appreciate the concept of rational drug therapy.

Course Outcome

- In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Course Code: 3BPHC7104

Course Name: Novel Drug Delivery Systems

Course Objectives

Upon completion of the course student shall be able

- To understand various approaches for development of novel drug delivery systems.
- To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.

Course Outcome

- This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Course Code: 3BPHC8101

Course Name: Biostatistics and Research Methodology

Course Objectives

Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Appreciate statistical techniques in solving the problems.

Course Outcome

- To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA,

Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Course Code: 3BPHC8102

Course Name: Social and Preventive Pharmacy

Course Objectives

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

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course Outcome

- The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Course Code: 3BPHC8103

Course Name: Pharma Marketing Management

Course Objective

- The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Course Outcome

- The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry.

Course Code: 3BPHC8104

Course Name: Pharmaceutical Regulatory Science

Course Objectives

Upon completion of the subject student shall be able to;

- Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- Know the regulatory approval process and their registration in Indian and international markets

Course Outcome

- This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Course Code: 3BPHC8105

Course Name: Pharmacovigilance

Course Objectives

At completion of this paper it is expected that students will be able to (know, do, and appreciate):

- Why drug safety monitoring is important?
- History and development of pharmacovigilance
- National and international scenario of pharmacovigilance
- Dictionaries, coding and terminologies used in pharmacovigilance
- Detection of new adverse drug reactions and their assessment
- International standards for classification of diseases and drugs
- Adverse drug reaction reporting systems and communication in pharmacovigilance
- Drug safety evaluation in pediatrics, geriatrics, pregnancy and lactation
- Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
- ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
- CIOMS requirements for ADR reporting
- Writing case narratives of adverse events and their quality.

Course Outcome

- This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Course Code: 3BPHC8106

Course Name: Quality Control and Standardization of Herbals

Course Objectives

Upon completion of the subject student shall be able to;

- know WHO guidelines for quality control of herbal drugs
- know Quality assurance in herbal drug industry
- know the regulatory approval process and their registration in Indian and international markets

Course Outcome

- In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Course Code: 3BPHC8107**Course Name: Computer Aided Drug Design****Course Objectives**

Upon completion of the course, the student shall be able to understand

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.

Course Outcome

- This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Course Code: 3BPHC8108**Course Name: Cell and Molecular Biology (Elective subject)****Course Objectives**

Upon completion of the subject student shall be able to;

- Summarize cell and molecular biology history.
- Summarize cellular functioning and composition.
- Describe protein structure and function.
- Describe cellular membrane structure and function.
- Describe basic molecular genetic mechanisms.
- Summarize the Cell Cycle

Course Outcome

- Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function.
- This is done both on a microscopic and molecular level.
- Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organisms such as humans, plants, and sponges.

Course Code: 3BPHC8109

Course Name: Cosmetic Science

Course Objective

- This course is intended to provide a comprehensive survey of ingredients fundamental to the cosmetic industry. The course will emphasize current trends in the selection of cosmetic ingredients. The chemistry and technology of cosmetic raw materials will be related to their behavioral properties as utilized in the construction of stable functional systems. In this way, it is intended to generate a better understanding of the contributions of ingredients to the performance of finished product formulations. Emphasis will be placed on recognizing and dealing with problem areas associated with the use of various ingredients. Safety considerations and other pertinent matters which can influence ingredient selection will be included in these discussions

Course Outcome

- This subject is designed to impart the knowledge of cosmetics including design, conduct and interpretations of results.

Course Code: 3BPHC8110

Course Name: Pharmacological Screening Methods

Course Objectives

Upon completion of the course the student shall be able to,

- Appreciate and demonstrate the various screening methods used in preclinical research
- Appreciate and demonstrate the importance of biostatistics and research methodology
- Design and execute a research hypothesis independently

Course Outcome

- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Course Code: 3BPHC8111

Course Name: Advanced Instrumentation Techniques

Course Objectives

Upon completion of the course the student shall be able to

- understand the advanced instruments used and its applications in drug analysis
- Understand the chromatographic separation and analysis of drugs.
- understand the calibration of various analytical instruments

Course Outcome

- This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.