Department of Pharmacy

Bachelor of Pharmacy

Program Outcomes

POs:

[PO.1]. Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding the programme of study.

[PO.2]. Critical Thinking: Take informed actions after identifying the assumptions that frame thinking and actions, checking out the degree to which these assumptions are accurate and valid, and look at our ideas and decisions (drug development its adversity and benefits) from different perspectives.

[PO.3]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

[PO.4]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings. Shall acquire the knowledge related to medicine and their effectively for the healthy society.

[PO.5]. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.6]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them with regard to how they should conduct in relation to the job, trade, fellow professionals, and general public.

[PO.7]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.8]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

[PO.9]. Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesising and articulating; Ability to recognise cause-and-effect, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

[PO.10]. Scientific interpretation: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and interpreted perspective.

[PO.11]: Information and digital literacy: Capability to use information and communications technology in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

Department of Pharmacy

Program Specific Outcomes

PSOs:

[PSO.1]. Detail understanding of theoretical and practical knowledge of all the subjects of pharmaceutical sciences.

[PSO.2]. Focus on Drug Discovery and Design, Drug Delivery, Drug Action and Clinical Sciences, Drug Analysis, Cost Effectiveness of Medicines, Drug Regulatory Affairs etc.

[PSO.3]. Exposure to current work practices as opposed to theoretical knowledge being taught in the classrooms.

[PSO.4]. Provide a real-time, supervised experience related to the professional tasks emphasized in course of study.

[PSO.5]. Develop knowledge of ethical and management principles to work as well as to lead teams.

[PSO.6]. Educate to contribute towards the promotion of National Health Policies (NRHM, NHM, RBSK etc.).

ARKA JAIN University
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Department of Pharmacy

Semester I

Department of Pharmacy

Subject: Human Anatomy and Physiology I - Theory

Code: PHM21001

4 Credits | Semester 1

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Explain the gross morphology, structure and functions of various organs of the human body
[CO.2]. Describe the various homeostatic mechanisms and their imbalances.
[CO.3]. Identify the various tissues and organs of different systems of human body.
[CO.4]. Perform the various experiments related to special senses and nervous system.
[CO.5]. Appreciate coordinated working pattern of different organs of each system.

Subject: Human Anatomy and Physiology I - Practical

Code: PHM21007

Credit - 2 | Semester 1

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand human body histology & microscopic process

[CO.2]. Understand both physiological/anatomical homeostatic mechanisms.

[CO.3]. Learn about human skeleton

[CO.4]. Learn about vital sign measurements

Department of Pharmacy

Subject: Pharmaceutical Analysis I - Theory

Code: PHM21002

4 Credits | Semester 1

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Develop the ideas with the fundamental of analytical chemistry
[CO.2]. Know the sources of mistakes and errors in analysis and their minimizing techniques
[CO.3]. Develop the fundamentals of volumetric analytical skills.
[CO.4]. Understand the fundamentals and mechanism of precipitation, and complexometric titration
[CO.5]. Understand the fundamentals and types of redox titration
[CO.6]. Acquire the basic knowledge in the principles of electrochemical analytical techniques

Subject: Pharmaceutical Analysis I -Practical

Code: PHM21008

2 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Learn the fundamental methodology to prepare different strength of standard solutions.
[CO.2]. Perform different types of titrations (neutralization, non-aqueous, precipitation, complexometry and redox titrations)
[CO.3]. Standardize different standard solutions
[CO.4]. Perform assay of different drugs by titrimetric method

Department of Pharmacy

Subject: Pharmaceutics I - Theory

Code: PHM21003

4 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Know the history of profession of pharmacy.
[CO.2]. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations.
[CO.3]. Understand the professional way of handling the prescription.
[CO.4]. Prepare various conventional dosage forms.

Subject: Pharmaceutics I- Practical

Code: PHM21009

2 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Gain required hands-on experience to prepare simple monophasic oral liquid dosage forms
[CO.2]. Understand basic methods to formulate conventional powder dosage forms
[CO.3]. Perform experiments on bi-phasic oral liquid dosage forms
[CO.4]. Learn the techniques to formulate conventional semisolid dosage forms

Department of Pharmacy

Subject: Pharmaceutical Inorganic Chemistry - Theory
Code: PHM21004
4 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the principles of limit tests.
[CO.2]. Understand different classes of inorganic pharmaceuticals and their analysis
[CO.3]. Know about identification and test for purity of different inorganic pharmaceuticals.
[CO.4]. Acquire knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
[CO.5]. Understand the medicinal and radiopharmaceutical importance of inorganic compounds
[CO.6]. Introduced to a variety of inorganic drug classes.

Subject: Pharmaceutical Inorganic Chemistry - Practical
Code: PHM21010
2 Credits | Semester I

Course Outcomes: At the end of the course, the students will be able to

[CO.1]. Design and execute detection of likely impurities in sample compounds.

[CO.2]. Know about different functions and role of major extracellular and intracellular electrolytes and buffer solutions

[CO.3]. Prepare different types gastrointenstinal agents and its category

[CO.4]. Carry out the preparation and study of important inorganic pharmaceuticals

Department of Pharmacy

Department of Pharmacy

Subject: Communication Skills - Theory

Code: PHM21005

2 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation.
[CO.2]. Communicate effectively (Verbal and Non Verbal)
[CO.3]. Effectively function in a team as a team player
[CO.4]. Develop skills necessary to succeed in an interview
[CO.5]. Develop Leadership qualities and essential requisite skill

Subject: Communication Skills - Practical

Code: PHM21011

1 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Communicate effectively without making grammatical mistakes.

[CO.2]. Develop the ability to speak English by developing vocabulary, and understanding phonetics

[CO.3]. Develop the ability to write letter, essay, report, curriculum vitae etc. in English.

[CO.4]. Develop the ability to listen and understand media, audio, video, speeches and the likes

Department of Pharmacy

Subject: Remedial Mathematics - Theory
Code: PHM21006
2 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Evaluate and demonstrate partial fraction, logarithms, functions and limits and continuity.
[CO.2]. Explain matrices and determination.
[CO.3]. Explain simple equations using graphs.
[CO.4]. Evaluate relationship and functions; fundamentals of trigonometry and geometry.
[CO.5]. Analyze sequences and binomial series.
[CO.6]. Evaluate calculus and integral calculus.

Subject: Remedial Biology - Theory
Code: PHM21013
2 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand classification system of the living world.
[CO.2]. Know the morphology and anatomy of plants and animals
[CO.3]. Understand the organ system in plant and their physiology
[CO.4]. Know the organ system in animals and their physiology
[CO.5]. Know about the nutrition and growth regulators of plant
[CO.6]. Understand cell biology (Basic Nature of Plant cell and Animal cell)

Department of Pharmacy

Subject: Remedial Biology – Practical

Code: PHM21012

1 Credits | Semester I

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand about the handling of microscopes and preparation of slides
[CO.2]. Know about the parts of plants and their microscopic characteristics
[CO.3]. Estimate different hematological parameters
[CO.4]. Know about the skeletal systems and bones

Department of Pharmacy

Semester II

Department of Pharmacy

Subject: Human Anatomy and Physiology II - Theory
Code: PHM22014
4 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand the gross morphology, structure and functions of various organs of the human body.
[CO.2]. Describe the various homeostatic mechanisms and their imbalances.
[CO.3]. Identify the various tissues and organs of different systems of human body.
[CO.4]. Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
[CO.5]. Appreciate coordinated working pattern of different organs of each system
[CO.6]. Appreciate the interlinked mechanisms in the maintenance of normal functioning (Homeostasis) of human body

Subject: Human Anatomy and Physiology II - Practical
Code: PHM22020
2 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the gross morphology, structure and functions of various organs of the human body.
[CO.2]. Describe the various homeostatic mechanisms and their imbalances
[CO.3]. Identify the various tissues and organs of different systems of human body.
[CO.4]. 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.

Department of Pharmacy

Subject: Pharmaceutical Organic Chemistry I - Theory
Code: PHM22015
4 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Elucidate upon the structure, name and the type of isomerism of the organic compound
[CO.2]. Understand the related reaction, name the reaction and orientation of reactions
[CO.3]. Understand the Account for reactivity/stability of compounds,
[CO.4]. Identify/confirm the identification of organic compound

Subject: Pharmaceutical Organic Chemistry I - Practical
Code: PHM22021
2 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Carry out preparation of suitable solid derivatives from organic compounds
[CO.2]. Demonstrate and understand Construction of molecular models
[CO.3]. Understand Classification of Organic Compounds and their Preliminary test, Solubility test etc.
[CO.4]. Execute Melting point/Boiling point of various organic compounds

Department of Pharmacy

Subject: Biochemistry – Theory
Code: PHM22016
4 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Acquire knowledge about chemistry and biological importance of biological macromolecules and biochemical energetic
[CO.2]. Understand the metabolism of carbohydrate in physiological and pathological conditions and biological oxidation of nutrient molecules.
[CO.3]. Understand the metabolism of lipids in physiological and pathological conditions.
[CO.4]. Understand the metabolism of proteins in physiological and pathological conditions
[CO.5]. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
[CO.6]. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

Subject: Biochemistry – Practical
Code: PHM22021
2 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand the basic principles of protein and polysaccharide structure
[CO.2]. Understand the basic principles of protein and polysaccharide structure
[CO.3]. Know the interpretation of data emanating from a clinical test lab
[CO.4]. Know how physiological conditions influence the structures and re-activities of biomolecules

Department of Pharmacy

Subject: Pathophysiology – Theory
Code: PHM22017
4 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Describe the etiology and basics of pathophysiology
[CO.2]. Acquire knowledge of signs and symptoms of various diseases
[CO.3]. Identify the complications of various diseases.
[CO.4]. Know about most commonly encountered pathophysiological state(s) and/or disease mechanism(s), as well as any clinical testing requirements

Subject: Computer Applications in Pharmacy – Theory
Code: PHM22018
3 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement
[CO.2]. Discuss about computers (I/O devices), binary conversion, applications of computers in pharmacy
[CO.3]. Describe Concept of common languages in computers, algorithm flow chart, solution of problems based on biostatistics and other simple problems of pharmaceutical interest.
[CO.4]. Explain MS Word, MS Excel, MS Power Point.
[CO.5]. Explain Concept of ISIS, RASMOL, CHEMSKETCH.
[CO.6]. Know the web-based tools for pharmacy practice. Apply the knowledge to design and develop digital tools for pharmaceutical applications.

Department of Pharmacy

Subject: Computer Applications in Pharmacy – Practical

Code: PHM22023

1 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand different types of software for structural drawings and prepare tables and charts for presentations of chemical and biological data.
[CO.2]. Apply their knowledge by the access to various search engines, scientific journals, and databases, & various pharmaceutical websites for scientific information purposes.
[CO.3]. Understand the usage of Computers in pharmacy related to information of drug data, records, files, drug management
[CO.4]. Know the role of computer in receiving details, storing & processing them and their dissemination

Subject: Environmental Sciences – Theory

Code: PHM22019

3 Credits | Semester II

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Become aware about environmental problems.
[CO.2]. Impart basic knowledge about the environment and its allied problems.
[CO.3]. Develop an attitude of concern for the environment.
[CO.4]. Motivate learner to participate in environment protection and environment improvement.
[CO.5]. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
[CO.6]. Strive to attain harmony with Nature.

Department of Pharmacy

Semester III

Department of Pharmacy

Subject: Pharmaceutical Organic Chemistry II – Theory
Code: PHM23024
4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Elucidate upon the structure, name and the type of isomerism of the organic compound
[CO.2]. Understand the reaction, name the reaction and orientation of reactions
[CO.3]. Account for reactivity/stability of compounds
[CO.4]. Identify/confirm the identification of organic compound

Subject: Pharmaceutical Organic Chemistry II – Practical
Code: PHM23028
2 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Elucidate upon the structure, name and the type of isomerism of the organic compound
[CO.2]. Understand the reaction, name the reaction and orientation of reactions
[CO.3]. Account for reactivity/stability of compounds
[CO.4]. Identify/confirm the identification of organic compound

Department of Pharmacy

Subject: Physical Pharmaceutics I - Theory
Code: PHM23025
4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Acquire knowledge about solubility phenomenon and its application in pharmaceutical practice.
[CO.2]. Acquire knowledge about physical principles pertaining to states of matter
[CO.3]. Understand various physicochemical properties of drug molecules and their applications.
[CO.4]. Illustrate the knowledge and concept of surface tension and interfacial tension and their importance in dispersion stability
[CO.5]. Acquire knowledge about drug complexes, protein binding in pharmacy.
[CO.6]. Acquire knowledge about the PH, buffers, isotonicity and their applications in biological and pharmaceutical fields.

Subject: Physical Pharmaceutics I - Practical
Code: PHM23029
2 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Handle different pharmaceutical instruments used in determining various physical properties such as surface tension and interfacial tension etc.
[CO.2]. Calculate physical parameters such as effect of surfactant and critical micellar concentration.
[CO.3]. Calculate critical solution temperature of phenol water system.
[CO.4]. Demonstrate the solubility of drug and its calculation.

Department of Pharmacy

Subject: Pharmaceutical Microbiology - Theory
Code: PHM23026
4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand methods of identification, cultivation and preservation of various microorganisms
[CO.2]. Understand the importance and implementation of sterilization in pharmaceutical processing and industry
[CO.3]. Learn sterility testing of pharmaceutical products.
[CO.4]. Carry out microbiological standardization of Pharmaceuticals.
[CO.5]. Understand the cell culture technology and its applications in pharmaceutical industries.

Subject: Pharmaceutical Microbiology - Practical
Code: PHM23030
2 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand methods of identification, cultivation and preservation of various microorganisms
[CO.2]. Understand the importance and implementation of sterilization in pharmaceutical processing and industry
[CO.3]. Learn sterility testing of pharmaceutical products.
[CO.4]. Carry out microbiological standardization of Pharmaceuticals.
[CO.5]. Understand the cell culture technology and its applications in pharmaceutical industries.

Department of Pharmacy

Subject: Pharmaceutical Engineering - Theory
Code: PHM23027
4 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know about the various unit operations used in Pharmaceutical industries.
[CO.2]. Understand the material handling techniques.
[CO.3]. Perform various processes involved in pharmaceutical manufacturing process.
[CO.4]. Carry out various tests to prevent environmental pollution.
[CO.5]. Appreciate and comprehend significance of plant lay out design for optimum use of resources.
[CO.6]. Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries

Subject: Pharmaceutical Engineering - Practical
Code: PHM23031
2 Credits | Semester III

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know about various unit operations used in Pharmaceutical industries.
[CO.2]. Understand the material handling techniques.
[CO.3]. Perform various processes involved in pharmaceutical manufacturing process.
[CO.4]. Carry out various tests to prevent environmental pollution.
[CO.5]. Appreciate and comprehend significance of plant lay out design for optimum use of resources.
[CO.6]. Appreciate the various preventive methods used for corrosion control in Pharmaceutical industries

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Semester IV

Department of Pharmacy

Subject: Pharmaceutical Organic Chemistry III – Theory
Code: PHM24032
4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the methods of preparation and properties of organic compounds
[CO.2]. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions.
[CO.3]. Know the medicinal usages and other applications of organic compounds
[CO.4]. Emphasize upon related definitions, types, mechanisms, examples, uses/applications

Subject: Medicinal Chemistry I – Theory
Code: PHM24033
4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the chemistry of drugs with respect to their pharmacological activity
[CO.2]. Understand the drug metabolic pathways, adverse effects and therapeutic value of drugs.
[CO.3]. Know the Structural Activity Relationship (SAR) of different classes of drugs
[CO.4]. Write the chemical synthesis of some drugs

Department of Pharmacy

Subject: Medicinal Chemistry I – Practical
Code: PHM24037
2 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the chemistry of drugs with respect to their pharmacological activity
[CO.2]. Understand the drug metabolic pathways, adverse effects and therapeutic value of drugs.
[CO.3]. Know the Structural Activity Relationship (SAR) of different classes of drugs
[CO.4]. Write the chemical synthesis of some drugs

Subject: Physical Pharmaceutics II – Theory
Code: PHM24034
4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the concept of colloidal dispersion systems.
[CO.2]. Illustrate fundamentals and pharmaceutical applications of rheology and deformation of solids.
[CO.3]. Understand the concept of formulation and stabilization of suspension
[CO.4]. Understand the concept of formulation and stabilization of emulsions
[CO.5]. Have basic understanding of micromeritics and its application in pharmacy.
[CO.6]. Analyze the reaction kinetics and chemical stability of various drug products

Department of Pharmacy

Subject: Physical Pharmaceutics II – Practical
Code: PHM24038
2 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Demonstrate effects of micromeritic parameters on pharmaceutical formulation.
[CO.2]. Demonstrate effect of flow characteristics of fluid for pharmaceuticals
[CO.3]. Analyse the stability of dispersions.
[CO.4]. Perform accelerated stability studies.

Subject: Pharmacology I – Theory
Code: PHM24035
4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Explain the general principles of pharmacology
[CO.2]. Describe pharmacokinetic, pharmacodynamic, adverse drug reactions and drug interactions
[CO.3]. Explain drug discovery and clinical evaluation of new drugs
[CO.4]. Explain the drugs acting on the peripheral nervous system
[CO.5]. Describe the drugs acting on the central nervous system
[CO.6]. Strengthen the basic knowledge in the field of pharmacology.

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Subject: Pharmacology I – Practical
Code: PHM24039
2 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Explain the commonly used instruments, laboratory animals used in experimental pharmacology.
[CO.2]. Describe the maintenance of laboratory animals as per CPCSEA guidelines.
[CO.3]. Explain the common laboratory techniques, blood withdrawal, serum and plasma separation, anesthetics, and euthanasia used for animal studies.
[CO.4]. Understand the administration of drug in mice/rats.

Subject: Pharmacognosy and Phytochemistry I - Theory
Code: PHM24036
4 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the techniques in the cultivation and production of crude drugs
[CO.2]. Know the crude drugs, their usages and chemical nature.
[CO.3]. Know the evaluation techniques for the herbal drugs
[CO.4]. Carry out the microscopic and morphological evaluation of crude drugs

Department of Pharmacy

Subject: Pharmacognosy and Phytochemistry I - Practical

Code: PHM24040

2 Credits | Semester IV

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the techniques in the cultivation and production of crude drugs
[CO.2]. Know the crude drugs, their usages and chemical nature.
[CO.3]. Know the evaluation techniques for the herbal drugs
[CO.4]. Carry out the microscopic and morphological evaluation of crude drugs

Department of Pharmacy

Semester V

Department of Pharmacy

Subject: Medicinal Chemistry II – Theory
Code: PHM25041
4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the chemistry of drugs with respect to their pharmacological activity
[CO.2]. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
[CO.3]. Know the Structural Activity Relationship of different class of drugs
[CO.4]. Study the chemical synthesis of selected drugs

Subject: Industrial Pharmacy I - Theory
Code: PHM25042
4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1] Know various pre-formulation considerations in development of pharmaceutical dosage forms
[CO.2]. Formulate solid (tablet), liquid orals and evaluate them for their quality
[CO.3]. Know the techniques of formulation of capsules/pellets and their quality evaluations
[CO.4]. Understand the formulation aspects and quality control of sterile dosage forms
[CO.5]. Know the preparation of various cosmetic products
[CO.6]. Know the formulation and evaluation of aerosols and understand materials used for packaging of pharmaceutical products.

Department of Pharmacy

Subject: Industrial Pharmacy I - Practical
Code: PHM25046
2 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know techniques for preparation of conventional parenteral dosage forms
[CO.2]. Gain hands-on experience for the preparation and evaluation of uncoated tablets and perform quality control test of marketed tablets
[CO.3]. Know the instrumental techniques involved in coating of tablets
[CO.4]. Know the formulation steps for development of conventional semisolids (cream/ointment/gel)

Subject: Pharmacology II – Theory
Code: PHM25043
4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the mechanism of drug action and its relevance in the treatment of different diseases
[CO.2]. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
[CO.3]. Demonstrate the various receptor actions using isolated tissue preparation
[CO.4]. Appreciate correlation of pharmacology with related medical sciences

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Subject: Pharmacology II – Practical
Code: PHM25047
2 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the mechanism of drug action and its relevance in the treatment of different diseases
[CO.2]. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
[CO.3]. Demonstrate the various receptor actions using isolated tissue preparation
[CO.4]. Appreciate correlation of pharmacology with related medical sciences

Subject: Pharmacognosy and Phytochemistry II - Theory
Code: PHM25044
4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
[CO.2]. Understand the preparation and development of herbal formulation.
[CO.3]. Understand the herbal drug interactions
[CO.4]. Carry out isolation and identification of phytoconstituents

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Subject: Pharmacognosy and Phytochemistry II - Practical
Code: PHM25048
2 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
[CO.2]. Understand the preparation and development of herbal formulation.
[CO.3]. Understand the herbal drug interactions
[CO.4]. Carry out isolation and identification of phytoconstituents

Subject: Pharmaceutical Jurisprudence – Theory
Code: PHM25048
4 Credits | Semester V

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand about the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
[CO.2]. Understand various Indian Pharmaceutical Acts and Laws
[CO.3]. Know about the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
[CO.4]. Understand the code of ethics during the pharmaceutical practice

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Semester VI

Department of Pharmacy

Subject: Medicinal Chemistry III - Theory
Code: PHM26049
4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the importance of drug design and different techniques of drug design.
[CO.2]. Understand the chemistry of drugs with respect to their biological activity.
[CO.3]. Know the metabolism, adverse effects and therapeutic value of drugs.
[CO.4]. Know the importance of SAR of drugs

Subject: Medicinal Chemistry III - Practical
Code: PHM26055
2 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the importance of drug design and different techniques of drug design.
[CO.2]. Understand the chemistry of drugs with respect to their biological activity.
[CO.3]. Know the metabolism, adverse effects and therapeutic value of drugs.
[CO.4]. Know the importance of SAR of drugs

Department of Pharmacy

Subject: Pharmacology III – Theory
Code: PHM26050
4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the mechanism of drug action and its relevance in the treatment of different diseases
[CO.2]. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
[CO.3]. Understand the mechanism of drug action and its relevance in the immunotherapy
[CO.4]. Appreciate correlation of pharmacology with related medical sciences.
[CO.5]. Understand about symptoms of several poisonings
[CO.6]. Understand the principles of toxicology and treatment of various poisonings

Subject: Pharmacology III – Practical
Code: PHM26056
2 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the dose calculation in pharmacological experiments.
[CO.2]. Determine hypoglycemic effects of Insulin in rabbits
[CO.3]. Carry out demonstration of animal experiments using simulated methods.
[CO.4]. Understand the acute skin/acute eye irritation of a test substance.

Department of Pharmacy

Subject: Herbal Drug Technology – Theory
Code: PHM26051
4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand raw material as source of herbal drugs from cultivation to herbal drug product
[CO.2]. Know about the WHO and ICH guidelines for evaluation of herbal drugs
[CO.3]. Know about the herbal cosmetics, natural sweeteners, and nutraceuticals
[CO.4]. Appreciate patenting of herbal drugs, GMP.

Subject: Herbal Drug Technology – Practical
Code: PHM26057
2 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand raw material as source of herbal drugs from cultivation to herbal drug product
[CO.2]. Know about the WHO and ICH guidelines for evaluation of herbal drugs
[CO.3]. Know about the herbal cosmetics, natural sweeteners, and nutraceuticals
[CO.4]. Appreciate patenting of herbal drugs, GMP.

Department of Pharmacy

Subject: Biopharmaceutics and Pharmacokinetics – Theory

Code: PHM26052

4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the basic concepts in biopharmaceutics & pharmacokinetics and their significance.

[CO.2]. Use plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.

[CO.3]. Understand the concepts of bioavailability and bioequivalence of drug products and their significance.

[CO.4]. Understand various pharmacokinetic parameters, their significance & applications.

Subject: Pharmaceutical Biotechnology - Theory

Code: PHM26053

4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the importance of Immobilized enzymes in Pharmaceutical Industries

[CO.2]. Comprehend Genetic engineering applications in relation to production of pharmaceuticals

[CO.3]. Understand the importance of Monoclonal antibodies in Industries

[CO.4]. Appreciate the usage of microorganisms in fermentation technology

Department of Pharmacy

Subject: Quality Assurance - Theory
Code: PHM26054
4 Credits | Semester VI

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the importance of quality in pharmaceutical products.
[CO.2]. Know the importance of Good manufacturing practices and the factors affecting the quality of pharmaceuticals
[CO.3]. Know the importance of Good laboratory practices and their documentation
[CO.4]. Understand the various documentation processes
[CO.5]. Understand calibration and validation and predict the errors and analyse the root cause.
[CO.6]. Know the process involved in manufacturing of pharmaceuticals in different departments

Department of Pharmacy

Semester VII

Department of Pharmacy

Subject: Instrumental Methods of Analysis - Theory
Code: PHM27058
4 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
[CO.2]. Understand the functional group determination by IR spectroscopy
[CO.3]. Gain knowledge on adsorption and partition chromatography
[CO.4]. Understand various instrumentation of GC and HPLC
[CO.5]. Understand various types of chromatographic techniques.
[CO.6]. Understand electrophoretic methods

Subject: Instrumental Methods of Analysis - Practical
Code: PHM27062
2 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand the samples analysis by spectroscopy
[CO.2]. Construct calibration curve with spectrophotometer
[CO.3]. Interpret the various functional group by spectroscopy
[CO.4]. Analyze drugs using various analytical instruments

Department of Pharmacy

Subject: Industrial Pharmacy II – Theory
Code: PHM27059
4 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the process of pilot plant and scale up of pharmaceutical dosage forms
[CO.2]. Understand the process of technology transfer from lab scale to commercial batch.
[CO.3]. Know different laws and acts that regulate pharmaceutical industry
[CO.4]. Understand the approval process and regulatory requirements for drug products
[CO.5]. Understand the quality management systems and its certifications
[CO.6]. Understand the Indian Regulatory requirements and approval procedures for New Drugs

Subject: Pharmacy Practice – Theory
Code: PHM27060
4 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Acquire knowledge of the organization and functions of hospital, hospital pharmacy and community pharmacy
[CO.2]. Acquire knowledge of drug distribution system, different committee and program in hospital
[CO.3]. Understand the drug and therapy related problems with the concept of Rational drug therapy to provide patient-centered care to diverse patients O using the best available evidence and monitor drug therapy.
[CO.4]. Understand the preparation and implementation of budget and concepts of clinical pharmacy
[CO.5]. Acquire knowledge of drug store management and inventory control
[CO.6]. Understand the interpretation of clinical laboratory data and utilisation of information services.

Department of Pharmacy

Subject: Novel Drug Delivery System – Theory
Code: PHM27061
4 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand controlled drug delivery system and its design.
[CO.2]. Understand various approaches for development of microencapsulation, mucosal, implantable drug delivery systems
[CO.3]. Understand formulation approaches of transdermal, gastroretentive, nasopulmonary drug delivery system and its applications
[CO.4]. Understand various targeted drug delivery sysetms and their applications
[CO.5]. Understand and apply the knowledge of ocular and intrauterine drug delivery systems
[CO.6]. Apply polymers in formulation of novel drug delivery systems

Subject: Practice School
Code: PHM27063
6 Credits | Semester VII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand concepts and techniques of pharmacy practice/ Clinical Pharmacy
[CO.2]. Understand the concepts and techniques of dispensing and patient counseling of drugs
[CO.3]. Know about drug formulary and PTC (Pharmacy and Therapeutics Committee)
[CO.4]. Understand the techniques used in procurement and storage of drugs
[CO.5]. Understand the techniques used in inventory management of drugs and expiry settlement
[CO.6]. Know about prescription reading, handling and auditing

Department of Pharmacy

Semester VIII

Department of Pharmacy

Subject: Biostatistics and Research Methodology – Theory

Code: PHM28064

4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand basic needs of Statistics and Biostatistics and learn concept of Frequency Distribution Measures of central tendency, Measures of dispersion and Correlation

[CO.2]. Learn basics of Regression, Parametric test and probability distribution with examples

[CO.3]. Learn the basics of Non-Parametric tests with examples and the application of biostatistics for assessing the pharmaceutical experimental data by Curve fitting.

[CO.4]. Learn basics of Blocking design and Hypothesis testing in Simple and Multiple regression models.

[CO.5]. Learn the confounding system for Two-level factorial design and Advantage of factorial design and basics of Response Surface methodology

[CO.6]. Understand the applications of Biostatics in Pharmacy and appreciate statistical techniques in solving the problems

Subject: Social and Preventive Pharmacy– Theory

Code: PHM28065

4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Acquire high consciousness/realization of current issues related to health

[CO.2]. Get knowledge about pharmaceutical problems within the country and worldwide

[CO.3]. Understand about various preventive medicines

[CO.4]. Have a critical way of thinking based on current healthcare development

[CO.5]. Evaluate alternative ways of solving problems related to health and pharmaceutical issues

[CO.6]. Design a better health care service system

Department of Pharmacy

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Pharmaceutical Marketing– Theory
Code: PHM28066
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand marketing concepts and techniques of pharmaceutical products
[CO.2]. Understand the Pharma market
[CO.3]. Know about pharmaceutical product management
[CO.4]. Understand the promotion techniques and understand the job of professional sales representative
[CO.5]. Know about pharmaceutical marketing channels
[CO.6]. Know the pricing of pharmaceuticals

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Pharmaceutical Regulatory Science – Theory

Code: PHM28067
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know about the process of drug discovery and development
[CO.2]. Know about the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
[CO.3]. Know the regulatory approval process and their registration in Indian and international markets
[CO.4]. Know about legal aspects and quality policies for drug manufacturing
[CO.5]. Develop knowledge on the procedure of conducting and safely monitoring the clinical trails

[CO.6]. Produce responsible Regulatory affairs professional and technically expertise in Regulatory Aspects

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Pharmacovigilance – Theory

Code: PHM28068
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know the importance and attributes of drug safety monitoring
[**CO.2].** Know the history, development and procedures of pharmacovigil
[**CO.3].** Become aware about the national and international scenarios of pharmacovigilance
[CO.4]. Develop the skills of classifying drugs, diseases and adverse drug reactions in students
[CO.5]. Know the stock holders and guidelines of pharmacovigilance programmes
[CO.6]. Know the dictionaries, coding and terminologies used in pharmacovigilance

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Quality Control and Standardization of Herbals – Theory

Code: PHM28069
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Know about the WHO guidelines for quality control of herbal drugs
[CO.2]. Know about the Quality assurance in herbal drug industry

[CO.3]. Know about the regulatory approval process and their registration in Indian and international markets

[CO.4]. Appreciate EU and ICH guidelines for quality control of herbal drugs

Department of Pharmacy

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Computer Aided Drug Design –Theory
Code: PHM28070
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Understand Design and discovery of lead molecules.
[CO.2]. Understand the role of drug design in drug discovery process
[CO.3]. Understand the concept of QSAR and docking
[CO.4]. Understand various strategies to develop new drug like molecules.
[CO.5]. Understand the design of new drug molecules using molecular modeling software

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Cell and Molecular Biology – Theory

Code: PHM28071
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Learn about cell and molecular biology history.
[CO.2]. Describe the chemical foundations of cell biology.
[CO.3]. Understand the protein structure and function.
[CO.4]. Understand the cellular membrane structure and function.

Department of Pharmacy

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Cosmetic Science – Theory

Code: PHM28072
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to

[CO.1]. Have a thorough understanding about the ingredients as found in cosmetics.
[CO.2] Understand the principles of formulation and building blocks of skin care products
[CO.3]. Understand the principles of formulation and building blocks of hair and dental care products
[CO.4]. Understand the role of herbs in cosmetics
[CO.5]. Understand the principles of Cosmetic evaluation
[CO.6]. Understand the Cosmetic problems associated with Hair and skin.

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Experimental Pharmacology – Theory

Code: PHM28073
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Appreciate the applications of various commonly used laboratory animals.
[CO.2]. Appreciate and demonstrate the various screening methods used in preclinical research
[CO.3]. Appreciate and demonstrate the importance of biostatistics and research methodology
[CO.4]. Design and execute a research hypothesis independently

Department of Pharmacy

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Advanced Instrumentation Techniques – Theory

Code: PHM28074
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand the advanced instruments used and their applications in drug analysis
[CO.2]. Understand the chromatographic separation and analysis of drugs.
[CO.3]. Understand the calibration of various analytical instruments
[CO.4]. Know how to analyze drugs using various analytical instruments.

Discipline Specific Elective (DSE) Course
(Select any TWO)

Subject: Dietary Supplements and Nutraceuticals– Theory

Code: PHM28075
4 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand the need of supplements by different groups of people to maintain healthy life.
[CO.2]. Understand the outcome of deficiencies in dietary supplements.
[CO.3]. Appreciate the components in dietary supplements and their applications.
[CO.4]. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.

Department of Pharmacy

Subject: Project Work

Code: PHM28076
6 Credits | Semester VIII

Course Outcomes: At the end of the course, students will be able to:

[CO.1]. Understand some basic concepts related to research and respective methodologies
[CO.2]. Understand some basic concepts of review.
[CO.3]. Identify and select correct research and review topics
[CO.4]. Select and define appropriate research problems and parameters.
[CO.5]. Carry out research work and interpret the results
[CO.6]. Write a research report and thesis