Annexure-20A of AC-51/2025

MGM SCHOOL OF PHARMACY

(Constituent unit of MGM Institute of Health Sciences Deemed to be University u/s 3 of UGC Act 1956) Grade '$A^{+\,+}$' Accredited by NAAC
Sector-01, Kamothe, Navi Mumbai – 410 209

PROGRAM OUTCOMES

Program Outcomes (POs) are broad statements that describe the knowledge, skills, and abilities a student is expected to acquire upon successful completion of a course or academic program. POs provide a clear understanding of the expected learning achievements and prepare students to apply their knowledge effectively in professional, societal, and personal contexts.

1.Pharmaceutical Knowledge: Acquire foundational knowledge of the core and basics associated with the profession of pharmacy, including pharmaceutical sciences, biomedical sciences, behavioural, social and administrative pharmacy sciences and manufacturing practices. **2.Practical Skills:** Develop the ability to prepare, dispense, and manage pharmaceuticals with an understanding of their therapeutic uses and side effects.

3.Problem Solving: Apply scientific and critical thinking skills to solve real-world healthcare problems.

4.Research and Innovation: Demonstrate the ability to engage in research and contribute to advancements in the pharmaceutical field.

5.Communication Skills: Effectively communicate with patients, healthcare professionals, and peers.

6. **Ethics and Professionalism:** Exhibit ethical conduct and professionalism in all aspects of pharmacy practice, adhering to legal and regulatory standards.

7. **Lifelong Learning:** Develop a commitment to continuous education and professional development in the ever-evolving field of pharmacy.

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8. Social Responsibility and Environmental Sustainability: Address societal healthcare needs by promoting public health and environmental challenges by sustainable pharmaceutical practices.

B. Pharm First Year (I SEM) 2019 pattern

BP101T HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Define the basic concepts in Human Anatomy & Physiology, Explain how the separate systems interact to yield integrated physiological responses.
CO2	Explain the gross morphology, structure and functions of various organ systems of the human body. Link the physiology and pathophysiology of several diseases.
CO3	Identify the various types of tissues, bones and organs of different systems of the human body. Describe the various homeostatic mechanisms and their imbalances.

BP102T PHARMACEUTICAL ANALYSIS (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Explain the relevance & significance of Pharmaceutical Analysis
CO2	Describe titrimetric and gravimetric methods of analysis with principles, indicators used therein and applications.
CO3	Explain the basics of electrochemical analysis for quantitative and qualitative analysis

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BP103T PHARMACEUTICS- I (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Discuss the historical evolution and development of the pharmacy profession, explain the importance of prescriptions in pharmaceutical practice and analyse the scope of pharmacy in healthcare and industry.
CO2	Perform basic pharmaceutical calculations and analyze different types of pharmaceutical incompatibilities (physical, chemical, and therapeutic) and their impact on drug stability and efficacy.
CO3	Explain monophasic and biphasic dosage forms, powders, suppositories and semisolids with respect to their definition, classification, types, formulation and evaluation aspects.

BP104T PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Explain the relevance and significance of inorganic chemistry in pharmaceuticals, including pharmaceutical aids, necessities, acids, bases, buffers, and official compounds.
CO2	Describe different pharmacopoeias, monographs, purity standards, limit tests for impurities, and official waters used in pharmaceutical preparations.
CO3	Classify and summarize electrolytes, dental products, antidotes, gastrointestinal agents, ions, expectorants, emetics, haematinics, astringents, and radiopharmaceuticals, along with their pharmaceutical applications.

BP105T COMMUNICATION SKILLS (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation.
CO2	To communicate effectively verbal as well as nonverbal and to develop interview skills, presentation skills and group discussion skills.
CO3	Effectively manage the team as a team player and develop Leadership qualities and essentials.

BP106RBT REMEDIAL BIOLOGY (Theory)

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Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Explain the classification and salient features of five kingdoms of life.
CO2	Explain the basic concepts of anatomy & physiology of plants.
CO3	Explain the basic concepts of anatomy & physiology animals with special reference to human.

BP106RMT REMEDIAL MATHEMATICS (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Apply the knowledge of matrices and determinants in solving Pharmacokinetic equations.
CO2	Apply the lessons learnt in fractions and logarithms for solving pharmaceutical problems.
CO3	Apply knowledge of Calculus and Integration in solving pharmaceutical problems.
CO4	Apply knowledge of Differential equations in solving pharmaceutical problems.

BP107P HUMAN ANATOMY AND PHYSIOLOGY (Practical)

CO1	Demonstrate the principle and working of various instruments used in HAP.
CO2	Identify microscopic features of various types of cells and tissues
CO3	Perform hematological tests and also record BP, heart rate & pulse rate.
CO4	Identify gross anatomy and physiology of various bones.

BP108P PHARMACEUTICAL ANALYSIS (Practical)

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CO1	**Perform** limit tests to analyze the given compound for permissible levels of inorganic impurities.
CO2	**Determine** the molarity and normality of a given solution through titrimetric , and electrochemical techniques such as potentiometry and conductometry.
CO3	Apply the principles of volumetric analysis to perform assays and evaluate the purity of a compound

BP109P PHARMACEUTICS I (Practical)

CO1	Apply skill for measuring, weighing and mixing of ingredients required for formulation of dosage forms.
CO2	Calculate the working formula from the given master formula for conventional dosage forms.
CO3	Formulate, design label, perform basic evaluation and dispense conventional dosage forms.

BP110P PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

CO1	Perform few limit test and explain its significance
CO2	Perform identification tests for inorganic compounds.
CO3	Prepare some inorganic pharmaceutical compounds.

CO4	Determine swelling index, acid neutralizing property, presence of iodate and iodine in some inorganic compounds.

BP111P COMMUNICATION SKILLS (Practical)

CO1	Develop fundamental communication skills through interactive English language lab software.
CO2	Enhance pronunciation and advanced language proficiency using practical learning techniques.
CO3	Improve writing, interview handling, presentation, and group discussion skills for effective professional communication.
CO4	To develop writing skills, interview handling skills, presentation skills and group discussion skills using English language lab software.

BP112RBP REMEDIAL BIOLOGY (Practical)

CO1	Demonstrate different techniques used in histology
CO2	Explain the structure of cell of animal and plants with its inclusions
CO3	Study of different physiological parameters of human
CO4	Illustrate study of frog using computer model

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BP201T Human Anatomy and Physiology II (Theory)

CO1	Develop a vocabulary of different body parameters to effectively communicate information related to human anatomy and physiology.
CO2	Explain the structure and functions of nervous, digestive, respiratory, urinary endocrine and reproductive system.
CO3	Discuss the genetics and energetics

BP202T Pharmaceutical Organic Chemistry-I (Theory)

CO1	Apply systematic nomenclature according to IUPAC rules, and identify the different types of structural isomerism exhibited by organic compounds
CO2	Predict the mechanisms of various organic reactions, including substitution, elimination, addition, rearrangement, oxidation.
CO3	Describe the properties, uses and reactivity of major functional groups such as alkanes, alkenes including conjugated dienes, alcohols, alkyl halides, aliphatic amines, and carbonyl compounds

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BP 203T Biochemistry (Theory)

CO1	**Classify and Explain** the structure, classification, and biological significance of biomolecules, bioenergetics, and energy-rich compounds in cellular metabolism.
CO2	**Evaluate and Describe** metabolic pathways of carbohydrates, lipids, amino acids, and nucleotides, including their regulation, disorders, and significance in physiological and pathological conditions.
CO3	**Demonstrate and Apply** enzyme kinetics, inhibition mechanisms, and their role in drug design, diagnostics, and therapeutic applications.

BP 204T Pathophysiology (Theory)

CO1	Describe basic principles of cell injury and mechanism of inflammation
CO2	Discuss pathophysiology of disorders viz CVS, CNS, Respiratory system, GIT, Endocrine system including Cancer
CO3	Describe pathophysiology of disorders of Bones and Joints
CO4	Explain pathophysiology of selected infectious diseases including STDs

BP205T Computer Application In Pharmacy (Theory)

CO1	Describe different application of computers in pharmaceutical industry
CO2	Explain several types of databases used in Pharmacy
CO3	Identify various applications of databases in pharmacy
CO4	Understand importance of computers in preclinical pharmacy

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BP206T Environmental Sciences (Theory)

CO1	Elaborate the natural resources available, their advantages and disadvantages on the human and animal health and plants.
CO2	Explain the ecology, energy flow and various ecosystems in the environment describing the biodiversity of state and India
CO3	Describe various environmental pollution, role of individuals in the pollution and disaster management.

BP207P Human Anatomy and Physiology-II (Practical)

CO1	Explain the anatomy, physiology, and functions of various human body systems and special senses using specimens, models, and charts.
CO2	Demonstrate sensory, reflex, and neurological functions using specific methods.
CO3	Perform physiological measurements, reproductive health tests, and microscopic observations.

BP208P Pharmaceutical Organic Chemistry-I (Practical)

CO1	Perform qualitative analyses of organic compounds using appropriate chemical tests, physical constants to identify functional groups and elucidate structural features

CO2	Prepare and purify simple derivatives of organic compounds

BP209P Biochemistry (Practical)

CO1	Identify proteins, amino acids, carbohydrates and abnormal constituents of urine by various qualitative as well as quantitative tests.
CO2	Detect presence of some serum constituents like creatinine, sugar and total cholesterol and study its significance.
CO3	Demonstrate action of salivary amylase on starch and understand denaturation of enzymes along with enzymatic hydrolysis, effect of temperature and substrate concentration

BP210P Computer Application In Pharmacy (Practical)

CO1	To create a HTML web page to show personal information
CO2	To design a form in MS Access to view, add, delete and modify the patient record in the database.
CO3	To creating and working with queries in MS Access and exporting tables, queries, forms and reports to web pages

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Second Year B. Pharm Semester –III

BP301T Pharmaceutical Organic Chemistry-II (Theory)

CO1	**Understand and Analyze** the structure, resonance, and reactivity of benzene and its derivatives, applying Huckel's rule to determine aromaticity
CO2	**Evaluate and Apply** the concepts of acidity, basicity, and substituent effects in phenols, aromatic amines, and aromatic acids, demonstrating their influence on chemical reactivity and synthetic applications.
CO3	**Analyze and Interpret** the properties, reactions, and analytical constants of fats, oils, and polynuclear hydrocarbons, relating them to industrial and medicinal applications.

BP301T Physical Pharmaceutics I (Theory)

CO1	Apply fundamental theories, laws, and equations related to different states of matter, solubility, surface and interfacial tension, and their significance in pharmaceutical sciences.

CO2	Analyze the principles of complexation, protein binding, and buffer systems, and their applications in drug formulation, stability, and isotonicity.
CO3	Utilize physicochemical properties of drugs to develop, evaluate, and optimize various dosage forms, ensuring effective drug release and stability.

BP303T Pharmaceutical Microbiology (Theory)

CO1	Explain methods of identification, cultivation and preservation of various microorganisms.
CO2	Understand the effectiveness of sterilization processes implemented in pharmaceutical industry.
CO3	Understand mode of action disinfectants, sterility testing & microbiological assays of various pharmaceutical products.
CO4	Summarize types of microbial spoilages & preservation of pharmaceutical products.
CO5	Outline the cell culture technology and its applications in pharmaceutical industries.

BP304T Pharm Engineering (Theory)

CO1	Explain the principles and equipments used for various pharmaceutical operations like size reduction, size separation, mixing , filtration ,centrifugation and fluid mechanics
CO2	Apply various heat transfer processes including evaporation , distillation and drying in pharmaceutical processing

CO3	Evaluate materials used in pharmaceutical plant construction including corrosion prevention methods

BP305P Pharmaceutical Organic Chemistry-II (Practical)

CO1	Apply safety procedure and precautions in the laboratory
CO2	Perform experiments involving laboratory techniques like recrystallization, steam distillation.
CO3	Synthesize and purify organic compounds relevant to organic compounds.
CO4	Characterize and analyze various types of oils, fats and other organic substances.

BP308P Pharm Engineering (Practical)

CO1	Measure the humidity , moisture content, loss on drying and construct the drying curves for different substances to optimize drying techniques
CO2	Investigate the radiative properties , heat transfer coefficient , efficiency, factors influencing the rate of filtration and evaporation and crystallization

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CO3	Evaluate the operation of various pharmaceutical machinery and process like mixing , size reduction , size distribution

Second Year B. Pharm Semester –IV

BP401T Pharmaceutical Organic Chemistry-III (Theory)

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Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Explain stereoisomerism with chirality, racemic modification & its resolution and asymmetric synthesis with suitable examples
CO2	Analyze the conformational and geometric isomerism including determining the outcomes of stereospecific and stereoselective reactions.
CO3	Describe and categorise heterocyclic compounds with their structures, numbering, types, synthesis, reactivity and their applications in medicinal chemistry.
CO4	Explain various name reactions along with their mechanism & synthetic importance.

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BP402T Medicinal Chemistry-I (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	**Explain and Analyze** the chemistry of drugs concerning their pharmacological activity, metabolism, adverse effects, and therapeutic value.
CO2	**Evaluate and Apply** the principles of **Structure-Activity Relationship (SAR)** to different drug classes to understand their chemical and biological interactions.
CO3	**Demonstrate and Illustrate** the chemical synthesis of selected drugs, highlighting key reaction mechanisms and their pharmaceutical significance.

BP403T Physical Pharmaceutics II (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Apply the principles of physicochemical properties, micromeritics, and rheology in the design and development of pharmaceutical dosage forms.
CO2	Utilize chemical kinetics to assess drug stability, perform stability testing, and determine the shelf life of formulations.
CO3	Analyze the behavior and interactions of drugs and excipients in formulation development, ensuring effective drug delivery and performance.

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BP 404T Pharmacology-I (Theory)

CO1	Define basic terminologies of pharmacology, Understand the pharmacological actions, adverse effects, interactions of different categories of drugs.
CO2	Explain the mechanism of action of various drugs at organ system/subcellular/macromolecular level.
CO3	Applying the basic pharmacokinetic and pharmacodynamics knowledge of various drugs act on ANS and CNS to treat various diseases.

BP405T Pharmacognosy & Phytochemistry-I (Theory)

CO1	Discuss the concepts of pharmacognosy, classification, evaluation and identification of the crude drugs. Apply quality control techniques to evaluate the quality of crude drugs.
CO2	Distinguish the difference between primary and secondary metabolites. Analyse the role of role of pharmacognosy in identifying and classifying plant metabolites
CO3	Interpret the designation plants products such as fibers, hallucinogens, teratogens, and natural allergens and Understand the fundamental aspects of plant tissue culture
CO4	Critically evaluate the role of pharmacognosy in both allopathy and traditional systems of medicine. Asses the important of pharmacognosy in drug discovery and development

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BP409P Pharmacognosy & Phytochemistry-I (Practical)

CO1	Analyze various crude drugs using different chemical tests
CO2	Apply the quantitative microscopic techniques in the determination of leaf constants
CO3	Perform the microscopy of root bark powder to detect adulteration
CO4	Evaluate the crude drugs for their quality and purity by pharmacoepial methods

BP406P Medicinal Chemistry-I (Practical)

CO1	Synthesize, purify and characterize medicinally useful intermediates/ compound by appropriate method.
CO2	Perform an assay of the given samples of medicinally useful compounds and report the percentage purity
CO3	Determine the partition coefficient of given drug by shake flask method.

BP407P Physical Pharmaceutics II (Practical)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Analyze particle size, distribution, density, porosity, and flow properties using various characterization techniques.

CO2	Evaluate the viscosity of liquids and semisolids, as well as sedimentation behavior and surfactant properties, to optimize formulation performance.
CO3	Determine reaction rate constants and conduct stability studies to assess the shelf life and stability of pharmaceutical formulations.

BP408P Pharmacology-I (Practical)

CO1	Discuss the basics of experimental pharmacology, commonly used instruments and care & handling of laboratory animals as per CPCSEA guidelines.
CO2	Describe different methods for blood withdrawal, anesthetics, euthanasia and different routes of drug administration.
CO3	Demonstrate the effect of various drugs on animals by simulated techniques.

Universal Human Values and Professional Ethics (Theory)

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CO1	To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
CO2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
CO3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

Resolution No. 4.2 of Academic Council (AC-52/2025): Resolved to approve course outcomes for B. Pharm Semesters V and VI, effective from AY 2025-26 onwards [ANNEXURE-10].

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Annexure-10 of AC-52/2025

B. PHARM THIRD YEAR (SEM V) 2019 PATTERN

BP501T MEDICINAL CHEMISTRY – II (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Explain the chemistry of drugs with respect to their pharmacological activity.
CO2	Correlate the drug metabolic pathways, adverse effects, therapeutic value, and Structure – Activity Relationship (SAR) of different classes of drugs.
CO3	Analyze and illustrate the chemical synthesis of selected drugs.

BP502T INDUSTRIAL PHARMACY -I (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Analyse various Preformulation parameters for different dosage forms (solid, liquid etc.) including their physical and chemical properties.
CO2	Explain formulation considerations (selection of excipients and their role in formulation) and evaluation parameters of tablets, capsules, pellets and liquid orals.
CO3	Outline formulation considerations (selection of excipients and their role in formulation) and evaluation parameters of parenterals and opthalmics
CO4	Define, evaluate and perform quality control and stability studies of cosmetics and pharmaceutical aerosols. Explain various pharmaceutical packaging materials, containers, their quality control tests and stability aspects

BP503T PHARMACOLOGY - II (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Explain the pharmacology of drugs acting on cardiovascular, renal, endocrine, autacoid, and reproductive systems.
CO2	Classify drugs and analyze therapeutic uses, mechanisms, adverse effects, and contraindications of drugs in major systemic disorders.
CO3	Apply pharmacological knowledge for rational drug therapy, safe clinical use, and biological standardization (bioassay) of drugs.

BP504T PHARMACOGNOSY & PHYTOCHEMISTRY - II (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Analyze and categorize basic metabolic pathway in synthesizing various types of secondary metabolites with their biogenetic studies
CO2	Pharmacognostic study, chemical classes, biosourses, therapeutic uses and application of secondary metabolites
CO3	Demonstrate the isolation, identification, analysis, industrial production, estimation and utilization of phytoconstituents
CO4	Study the isolation and modern extraction techniques for crude drugs

BP505T PHARMACEUTICAL JURISPRUDENCE (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Describe the importance and scope of pharmaceutical jurisprudence and its role in regulating pharmacy practice in India.
CO2	Explain and understand the key provisions, legal definitions specified in major pharmaceutical laws. Analyse the structure and functions of regulatory bodies.
CO3	Understand ethical and legal responsibilities and penalties related to various acts and rules.

BP506P INDUSTRIAL PHARMACY -I (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Preformulation studies on paracetamol, aspirin, or any other drug.
CO2	Prepare and evaluate capsules and coated tablets.
CO3	Formulate and evaluate injections.
CO4	Formulate and evaluate cream

BP507P PHARMACOLOGY – II (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Demonstrate in-vitro experimental techniques and analyze the effects of drugs on isolated tissues and animal models.
CO2	Perform dose-response studies and bioassays for evaluation and standardization of drugs.
CO3	Evaluate pharmacological activities such as cardiovascular, diuretic, anti-inflammatory, and analgesic effects using suitable models.

BP508P PHARMACOGNOSY & PHYTOCHEMISTRY - II (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Identification of phytoconstituents in the crude drug by chemical tests
CO2	Application of Pharmacognostical study of crude drugs
CO3	Isolation of phytoconstituents from the crude drugs
CO4	Detection of Phytoconstituents by chromatographic techniques

B. PHARM THIRD YEAR (SEM VI) 2019 PATTERN

BP601T MEDICINAL CHEMISTRY-III (Theory)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Explain the importance of drug design and differentiate techniques of drug design
CO2	Correlate chemistry of drugs w.r.t. biological activity and evaluate metabolism, adverse effects & therapeutic value
CO3	Analyze SAR of different drug classes to correlate structure with activity

BP602T PHARMACOLOGY-III (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Understand the classification, mechanisms of action, and therapeutic applications of drugs acting on the respiratory and gastrointestinal systems. Explain drug action based on receptor interaction, enzyme modulation, and physiological response.
CO2	Analyze the pharmacological characteristics and clinical relevance of antimicrobial agents, including antibiotics, antifungals, antivirals, antimalarials, and anticancer drugs. Discuss resistance mechanisms and appropriate therapeutic use.
CO3	Demonstrate knowledge of immunopharmacological agents, including immunostimulants, immunosuppressants, monoclonal antibodies, and biosimilars. Evaluate their role in the management of immune-related and chronic conditions.
CO4	Explain the principles of toxicology and chronopharmacology, including types of toxicity, clinical management of poisoning, and the influence of biological rhythms on drug efficacy and safety.

BP603T HERBAL DRUG TECHNOLOGY (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Apply the knowledge and understand raw material as source of herbal drugs from cultivation to formulation of Ayurvedic dosage form with the role of Indian system of medicine
CO2	Understand the concept of Nutraceuticals and their role in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastrointestinal diseases
CO3	Apply the knowledge on formulation of Herbal Cosmetics using Herbal excipients
CO4	Understand the WHO and ICH guidelines for evaluation of herbal drugs. Understand Regulatory Issues - Regulations in India and Schedule T

BP604T BIOPHARMACEUTICS & PHRAMCOKINETICS (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Explain the fundamental concepts of biopharmaceutics and pharmacokinetics and their .significance in drug therapy
CO2	Analyze plasma drug concentrationtime data to calculate pharmacokinetic parameters interpret .drug absorption, distribution, metabolism, and excretion
CO3	Evaluate the concepts of bioavailability and bioequivalence to assess the therapeutic performance of drug products
CO4	Apply dissolution principles and *in-vitro in- vivo* correlation (IVIVC) in the design an development .of dosage forms

BP605T PHARAMACEUTICAL BIOTECHNOLOGY (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	Explain the fundamental concepts of biotechnology including enzyme technology, immunology, microbial technology, genetic engineering, and protein engineering.
CO2	Analyze genetic organization of different cells and compare methods of gene transfer, mutagenesis, and detection at the genomic level.
CO3	Apply genetic engineering techniques for the production of recombinant DNA (rDNA) products and biopharmaceuticals
CO4	Evaluate the role of fermenter technology in the production of vitamins, antibiotics, and other biotechnological products.

BP606T PHARMACEUTICAL QUALITY ASSURANCE (THEORY)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	**Explain** the principles of quality assurance, quality management systems, and international guidelines (ICH, ISO, NABL).
CO2	**Describe** the roles of organization, personnel, premises, and raw material management in establishing a pharmaceutical quality system.
CO3	**Discuss** Good Laboratory Practices, quality control procedures, and documentation requirements in pharmaceutical manufacturing.
CO4	**Summarize** the principles and procedures of calibration, validation, and warehousing practices in maintaining pharmaceutical product quality.

BP607P MEDICINAL CHEMISTRY-III (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon completion of theory topics, learner should be able to:

CO1	**P**reparation of drugs and intermediates using both classical and microwave-assisted synthesis techniques.
CO2	**Perform** assays of selected drugs.
CO3	**Construct** chemical structures using ChemDraw® software, **determine** physicochemical properties through computational tools, and **analyze** drug-likeness using Lipinski's Rule of Five.

BP608P PHARMACOLOGY-III (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Apply fundamental experimental techniques in pharmacology, including dose calculation, evaluation of drug effects on various organ systems (gastrointestinal, endocrine, respiratory), and the use of animal models to assess pharmacological activities such as anti-ulcer, antiallergic, and hypoglycemic effects.
CO2	Demonstrate the ability to perform and interpret laboratory assays, including estimation of biochemical parameters, acute toxicity testing (oral, skin, eye), pyrogen testing, and pharmacokinetic calculations, while adhering to ethical and regulatory standards.
CO3	Utilize appropriate biostatistical methods (Student's *t* test, ANOVA, Chi-square, non-parametric tests) to analyze experimental data, interpret results, and draw valid scientific conclusions in pharmacological research.

BP 609P HERBAL DRUG TECHNOLOGY (PRACTICAL)

Course learning objectives related to knowledge and cognitive skills: Upon the completion of theory topics, learner should be able to:

CO1	Perform preliminary phytochemical screening and carry out monograph analysis of herbal crude drugs.
CO2	Incorporate herbal extracts into cosmetic and herbal preparations and evaluate their quality.
CO3	Determine alcohol content and evaluate excipients of natural origin.
CO4	Estimate aldehyde content, phenol content, and total alkaloids in herbal

.