MAR DIOSCORUS COLLEGE OF PHARMACY

HERMONGIRI VIDYAPEETAM, ALATHARA, SREEKARYAM, THIRUVANANTHAPURAM-695017

COURSE OUTCOME

PROGRAMME: B. PHARM

No.	Name of the Course	Course Outcome
	SEMESTER 1	
1.	**BP101T** **Human Anatomy and Physiology-I**	CO1: Apply the basic to advanced knowledge of human anatomical structures / gross anatomy of various organs to identify various disorders. CO2: Understand cellular level of organization, classification of tissues and skeletal system CO3: Understand homeostatic mechanisms and illustrated structures / functions of integumentary system CO4: Analyse the body fluids , blood functions and various diseases associated with it along with its signs & symptoms CO5: Analyse the physiology of various systems of body and different diseases associated with them.
2.	**BP102T** **Pharmaceutical Analysis- I**	CO1: Explain the fundamental concepts and scope of analytical chemistry, specifically in the context of pharmaceutical compounds. CO2: Demonstrate a thorough understanding of various volumetric analysis techniques including acid-base, redox, complexometric, and precipitation titrations. CO3: Understand and apply the principles of electrochemical methods of analysis such as potentiometry, conductometry, and polarography in pharmaceutical settings. CO4: Perform and interpret results from a variety of volumetric and electrochemical titrations with accuracy and precision. CO5: Develop critical analytical skills and laboratory techniques necessary for quality control and quantitative analysis in the pharmaceutical industry.
3.	**BP103T** **Pharmaceutics-I**	CO1: Know the history of profession of pharmacy CO2: Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations CO3: Understand the professional way of handling the prescription CO4: Preparation of various conventional dosage forms

4.	**BP104T** **Pharmaceutical Inorganic Chemistry**	CO 1: Fundamental Inorganic chemical concepts including bonding, structure and reactivity CO 2: chemical nature, properties application of various inorganic pharmaceutical including their role in drug formulation and delivery CO 3: various qualitative and quantitative methods for their analysis CO 4: Importance of pH and buffer system in pharmaceutical formulations CO 5: Analytical skills and storage of pharmaceuticals
5.	**BP105T** **Communication Skills**	CO1: Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation CO2: Communicate effectively (Verbal and Non-Verbal) CO3: Effectively manage the team as a team player CO4: Develop interview skills CO5: Develop Leadership qualities and essentials
6.	**BP106RBT** **Remedial Biology**	CO1: Know the classification and salient features of five kingdoms of life CO2: Understand the basic components of anatomy & physiology of plant CO3: Know understand the basic components of anatomy & physiology animal with special reference to human CO4: Define characters of living organisms, explain binomial nomenclature, classify kingdoms of life, and explain the morphology of flowering plants. CO5: Explain the composition of blood, human circulatory system, digestive and respiratory systems in detail.
	BP106RMT **Remedial Mathematics**	CO1: Know the theory and their application in Pharmacy CO2: Solve the different types of problems by applying theory CO3: Appreciate the important application of mathematics in Pharmacy
7.	**BP107P** **Human Anatomy and Physiology-I**	CO1: Understand handling of Compound microscope and develop knowledge of human gross and microscopic anatomy using prepared histological slides CO2: Understand the basic knowledge of gross anatomy to identify various tissues CO3: Apply the basic knowledge of skeletal system to distinguish between different bones of axial and appendicular skeleton

		CO4: Analyse the blood cells using haemocytometry and perform different kinds of blood tests CO5: Explain handling of different apparatus to determine the heart rate, pulse rate and blood pressure.
8.	**BP108P** **Pharmaceutical Analysis-I**	CO1: Perform and interpret results of limit tests for pharmaceutical substances such as sulphate, iron, and arsenic to ensure compliance with pharmacopeial standards. CO2: Prepare and standardize various titrants, including sodium hydroxide, sulphuric acid, sodium thiosulfate, potassium permanganate, and ceric ammonium sulphate, with appropriate analytical precision. CO3: Conduct assay procedures for pharmaceutical compounds using different titrimetric techniques such as acid-base titration, cerimetry, iodometry, complexometry, permanganometry, non-aqueous, and precipitation titrations. CO4: Apply electro-analytical methods such as conductometric and potentiometric titrations to determine the normality of acid and base solutions CO5: Demonstrate proficiency in handling laboratory instruments and in following Good Laboratory Practices (GLP) to ensure accuracy, repeatability, and safety during pharmaceutical analysis.
9.	**BP109P** **Pharmaceutics-I**	CO1: Preparation of various conventional dosage forms CO2: Concept of weighing and measuring pharmaceuticals calculation, pharmaceuticals powders or mixtures and liquid dosage form intended to used internally & externally. CO3: Select an appropriate container and storage conditions for a product along with the labeling of pharmaceuticals.
10.	**BP110P** **Pharmaceutical Inorganic Chemistry**	CO 1: Qualitative and Analytical skills CO 2: Synthetic approach for inorganic compounds CO 3: Qualitative evaluation skills CO 4: Rational use of reagents CO 5: Systematic analysis of cation and anions
11.	**BP111T** **Communication Skills**	CO1: Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation CO2: Communicate effectively (Verbal and Non-Verbal) CO3: Effectively manage the team as a team player CO4: Develop interview skills CO5: Develop Leadership qualities and essentials

12.	**BP112RBT** **Remedial Biology**	CO1: To understand the practical aspects in plant biology including cutting, staining and permanent slide preparations. CO2: Determine blood group, blood pressure and tidal volume of humans:
SEMESTER II		
13.	**BP201T** **Human anatomy and Physiology-II**	CO 1: Students would have studied about the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body. CO 2: They would have studied in detailed about energy and metabolism. CO 3: Students would able to identify the various organs of different systems of human body. CO 4: They would have performed and learnt about the experiments like neurological reflex, body temperature measurement CO 5: They would have studied elaborate on interlinked mechanisms in the maintenance of normal functioning of human body
14.	**BP202T** **Pharmaceutical Organic Chemistry-I**	CO 1: Write the structure, name of the organic compound. CO 2: Knowledge about the type of isomerism CO 3: Knowledge about the reactivity or stability of compounds CO 4: Knowledge about naming reactions of carbonyl compounds. CO 5: Knowledge about orientation of reactions.
15.	**BP 203T** **Biochemistry**	CO 1: Metabolism of biomolecules CO 2: Genetic organisation and Protein synthesis CO 3: Qualitative and quantitative analysis of biomolecules CO 4: Biochemical principles of organ function CO 5: Catalytic activity of enzymes and isoenzymes
16.	**BP 204T** **Pathophysiology**	CO 1: Understanding the etiology and pathogenesis of the selected disease states CO 2: Analyze the impact of disease on body systems and functions CO 3: Identify the signs and symptoms of the disease CO 4: Interpret clinical data and laboratory results in the context of pathophysiology CO 5: Apply knowledge of pathophysiology to clinical practice and patient care

17.	**BP205T** **Computer Applications in Pharmacy**	CO1: Know the various types of application of computers in pharmacy CO2: Know the various types of databases CO3: Know the various applications of databases in pharmacy CO4: Integrate and apply efficiently the contemporary IT tools to all pharmaceutical related activities. CO5:Acquire knowledge on the role of bioinformatics in drug discovery
18.	**BP206T** **Environmental Sciences**	CO1: Create the awareness about environmental problems among learners. CO2: Impart basic knowledge about the environment and its allied problems. CO3: Develop an attitude of concern for the environment. CO4: Motivate learner to participate in environment protection and environment improvement. CO5: Acquire skills to help the concerned individuals in identifying and solving environmental problems. CO6: Strive to attain harmony with Nature.
19.	**BP207P** **Human anatomy and Physiology-II**	CO1: Practical allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. CO2: To develop an insight on the subject. CO3: To study the integumentary and special senses using specimen, models, etc., CO4: To study the various systems using specimen, models, CO5: To examine the different types of taste. CO6: To demonstrate the visual acuity
20.	**BP208P** **Pharmaceutical Organic Chemistry-I**	CO 1: Apply the qualitative analysis of organic compounds. CO 2: Understand the steps involved in the identification of unknown organic compounds. CO 3: Know the principles of qualitative analysis. CO 4: Know the preparation of stereomodels of various functional groups. CO 5: Know the laboratory skills to prepare the organic compounds.

21.	**BP209P** **Biochemistry**	CO 1: Qualitatively analyze the normal and abnormal constituents of urine. CO 2: Quantitatively estimate the various constituents present in urine. CO 3: Study the factors affecting enzymatic activity. CO 4: Quantitatively estimate the various constituents in serum. CO 5: Qualitative analysis of carbohydrates and identification tests for proteins.
22.	**BP210P** **Computer Applications in Pharmacy**	CO 1: Create a HTML web page to save personal information. CO 2: Retrieve the information of a drug and its adverse effects using online tools. CO 3: Use the MS Office tools to store the patient informations.
SEMESTER- III		
23.	**BP301T** **Pharmaceutical Organic Chemistry-I**	CO 1: Acquire knowledge about structure of aromatic compounds. CO 2: Understand the orientation and reactivity of aromatic electrophilic substitution reaction. CO 3: Knowledge about the reactions and synthesis of polynuclear hydrocarbons. CO 4: Understand the reactions and stability of cycloalkanes. CO 5: Knowledge about reactions and acidity of phenols.
24.	**BP302T** **Physical Pharmaceutics-I**	CO1: Acquire knowledge on various solubility parameters and their applications in the development of delivery systems CO2: Understand the physicochemical properties in evaluation of dosage forms. CO3: Understand the importance of micrometrics in the development of dosage forms- CO4: To analyze and distinguish different complexes and the kinetics of protein binding CO5: Able to determine pH, prepare pharmaceutical buffers and isotonic solutions

25.	**BP303T** **Pharmaceutical Microbiology**	CO1: Understand methods of identification, cultivation and preservation of various microorganisms CO2: Importance of sterilization in microbiology. and pharmaceutical industry CO3: Learn sterility testing of pharmaceutical products. CO4: Microbiological standardization of Pharmaceuticals. CO5: Understand the cell culture technology and its applications in pharmaceutical industries.
26.	**BP304T** **Pharmaceutical Engineering**	CO1: Know various unit operations used in pharmaceutical industries CO2: Understand material handling techniques CO3: Know the working of various equipments used in different unit operations CO4: Perform various process involved in pharmaceutical manufacturing process CO5: Appreciate the various preventive methods used for control of corrosion in pharmaceutical industries
27.	**BP305P** **Pharmaceutical organic chemistry-II**	CO 1: Apply the basic knowledge of organic chemistry for synthesis of organic compounds. CO 2: Analyze principles of chemical reactions. CO 3: Know the principles of analysis of oils. CO 4: Know the interpretation of mechanism of reactions. CO 5: Understand the principles of recrystallization of organic compounds.
28.	**BP306P** **Physical Pharmaceutics-I**	CO1: To use microscopic methods to determine particle size. CO2: To determine Partition co− efficient of benzoic acid in benzene and water CO3: Measurement of bulk density, true density and porosity. CO4: Demonstrate the solubility of drugs at room temperature. CO5: To determine the angle of repose of pharmaceutical powders
29.	**BP307P** **Pharmaceutical Microbiology**	CO1: Understand different equipments and processing used in experimental microbiology. CO2: Demonstration of sterility testing of pharmaceuticals CO3: Able to do sub culturing and isolation methods of bacteria and fungus. CO4: Identification of bacterias using different staining methods and biochemical tests. CO6: Microbiological assay of antibiotics CO7: Motility determination by Hanging drop method.

30.	**BP308P** **Pharmaceutical Engineering**	CO1: Carry out different unit operations in pharmaceutical industry CO2: Understand the factors influencing various unit operations like filtration, evaporation etc CO3: Know the principle, construction and working of various equipments used in different unit operations CO4: Determine the particle size and particle size distribution by different methods CO5: Determine the humidity of air by different methods
SEMESTER- IV		
31.	**BP 401T** **Pharmaceutical Organic Chemistry-III**	CO 1: Acquire knowledge about principles of heterocyclic chemistry. CO 2: Understand the synthesis and reactions of five membered and six membered heterocyclic compounds. CO 3: Knowledge about the detailed mechanisms for common name reactions. CO 4: Understand Stereochemical features conformation of isomers. CO 5: Knowledge about the stereochemistry of biphenyl compounds.
32.	**BP402T** **Medicinal Chemistry I**	CO 1: Understand the biological factors affecting drug metabolism. CO 2: Understand the drug metabolism. CO 3: To know the SAR of different classification of drugs. CO 4: Understand the phase I and phase II metabolism. CO 5: Know the structure and pharmacological uses of different class of drugs.
33.	**BP403T** **Physical Pharmaceutics II**	CO1: Know the principles of chemical kinetics & to use them in assigning expiry date for formulation CO2: Formulation and evaluation of various dispersion systems CO3: Understand the concepts of Rheology CO4: Describe the principles of adsorption, types of interfacial phenomenon CO5: Understand the types of colloidal systems and its applications in pharmacy.

34.	**BP404T** **Pharmacology I**	CO1: Understand the pharmacological actions of different categories of drugs CO2: Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. CO3: Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. CO4: Observe the effect of drugs on animals by simulated experiments CO5: Appreciate correlation of pharmacology with other bio medical sciences
35.	**BP405T** **Pharmacognosy and Phytochemistry-I**	CO 1: Describe the techniques involved in the cultivation, collection, and processing of crude drugs. student can be to know about the relationship between Phytoconstituents and cultivation factors, time of collection and processing of crude drugs, how this factors can affect and change the nature, therapeutic quality and percentage yield of Phytoconstituents CO 2: Identify various crude drugs and outline their chemical nature and therapeutic uses. To know about the relationship between chemical nature of Phytoconstituents which is present in different species of crude drugs and its therapeutic relationship between species of crude drugs and Phytoconstituents CO 3: Apply standard evaluation methods to assess the quality and purity of herbal drugs. To know different application and evaluation methods to assess the quality and of herbal drugs and identification of crude drugs CO 4: To conduct morphological examinations for the identification of crude drugs of different species of same genera/similar looking crude drugs from different genera. CO 5: Illustrate the role of phytochemical constituents in the medicinal value of natural drugs.
36.	**BP406P** **Medicinal Chemistry-I**	CO 1: Apply the basic knowledge in the synthesis of medicinal compounds. CO 2: Analyze the principles and mechanism of chemical reactions. CO 3: Know the concept of moles in calculating theoretical yield. CO 4: Understand the estimation of percentage purity of medicinal compounds. CO 5: Understand the principles of partition coefficient of drugs

37.	**BP407P** **Physical Pharmaceutics-II**	CO1: Know the principles of chemical kinetics & to determine reaction rate constants. CO2: Determination of HLB number of a surfactant by saponification method CO3: Understand the concepts of Rheology and the ability to determine viscosity using different viscometers. CO4: Determination of surface tension of liquids CO5: Analyze the settling behaviors in suspensions
38.	**BP408P** **Pharmacology-I**	CO1: To gain knowledge of instruments and laboratory animals used in experimental pharmacology. CO2: To understand the practical aspects of Common laboratory techniques used for animal studies, different routes of drugs administration in mice/rats and pharmacological actions of different categories of drugs.
39.	**BP409P** **Pharmacognosy And Phytochemistry-I**	CO1: Students will able perform and Identify the crude drugs by identifying the phytoconstituents of crude drugs using chemical tests. CO2: Students will able perform and identify the crude drugs by measuring stomatal number, index and vein parameters in plant materials as a unique identification parameter. CO3: Students will able perform and identify the crude drugs by measuring fiber length, starch grain size shape and calcium oxalate crystals.as a unique identification parameter. CO4: students are able to find out qualitative and quantitative evaluation of phytoconstituents of a herbal drug by using extractive values, moisture, ,ash content, swelling index, foaming index etc
SEMESTER- V		
40.	**BP501T** **Medicinal Chemistry-II**	CO1: To correlate the chemical structure of drugs with their pharmacological activity, enabling a deeper understanding of drug design and mechanism of action. CO2: Demonstrate knowledge of drug metabolism, including biotransformation pathways and their influence on drug efficacy, toxicity, and therapeutic use. CO3: Analyse the Structure-Activity Relationships (SAR) of various drug classes to predict or improve biological activity and minimize side effects.

		CO4: Students will be able to write and explain the step-by-step chemical synthesis of selected drugs from different therapeutic categories. CO5: Students will critically evaluate the physicochemical properties of drugs (like solubility, pKa, lipophilicity) and their implications in pharmacokinetics and drug formulation.
41.	**BP502T** **Formulative Pharmacy**	CO1: To Know the various pharmaceutical dosage forms and their manufacturing techniques. CO2: To Know various considerations in development of pharmaceutical dosage forms CO3: Formulate solid dosage form and evaluate them for their quality CO4: Formulate Liquid dosage form and evaluate them for their quality CO5: Formulate semi solid dosage form and evaluate them for their quality
42.	**BP503T** **Pharmacology II**	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 CO 5: Understand the cell communication mechanism
43.	**BP504T** **Pharmacognosy and Phytochemistry-II**	CO 1: Understand basic metabolic pathways involved in the formation of secondary metabolites in plants. Student can be to know about the tracing of phytoconstituents, formation, stereospecific relation between phytoconstituents formation and activity. CO 2: Student can be to know about identification of medicinally important plants and their key phytoconstituents and its uses with respects to genera and species CO 3: Student can be to know about the application and selection of solvent, modern extraction techniques and its analysis techniques for herbal drug isolation and identification of secondary metabolites in the lab. CO 4: Students can gain knowledge on industrial production and applications of important phytochemicals.

44.	**BP505T Pharmaceutical Jurisprudence**	CO1: Pharmaceutical legislations and their implications in the development and marketing CO2: Various Indian pharmaceutical Acts and Laws CO3: The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals CO4: Detailed study of Schedules, Labelling and Packaging guidelines for drugs and cosmetics CO5: The code of ethics during the pharmaceutical practice Cosmetics sciences
45.	**BP506P Formulative Pharmacy**	CO1: To design and develop various pharmaceutical formulations, such as tablets and topical preparations, using different excipients and techniques. CO2: To evaluate the quality and performance of pharmaceutical formulations using various analytical techniques, such as disintegration testing, hardness testing, and friability testing. CO3: Understand the importance of preformulation studies and be able to apply principles of preformulation to optimize the formulation of pharmaceutical products. CO4: Demonstrate practical skills in formulation development, including the use of pharmaceutical equipment, preparation of dosage forms, and evaluation of formulation performance.
46.	**BP507P Pharmacology II**	CO1: To gain knowledge of effect of drug on different organs of animals to understand the mechanism of action of drugs. CO2: To understand the practical aspects of bioassays of various drugs using Chicken ileum preparation.
47.	**BP508P Pharmacognosy and Phytochemistry-III**	CO1: student can be to Identify crude drugs using morphological, histological, and powder characteristics, which is only parameter to differentiate each species CO2: Student can be able to do the Isolate and detect active phytoconstituents from natural sources. CO3: Student can be able to Perform chromatographic techniques like paper chromatography and TLC for phytochemical analysis. CO4: Student can be able to do extract and analyze volatile oils using distillation and TLC methods. CO5: Student can be able to do conduct chemical tests to analyze and confirm the identity of selected crude drugs.

SEMESTER-VI		
48.	**BP601T** **Medicinal Chemistry-III**	CO1: Students will be able to explain and apply modern drug design techniques, including QSAR, prodrug strategies, combinatorial chemistry, and Computer-Aided Drug Design (CADD), in the development of new therapeutic agents. CO2: Students will demonstrate an understanding of the chemistry and mechanism of action of drugs in relation to their biological activity and therapeutic effect. CO3: Students will analyse and interpret metabolic pathways, adverse effects, and therapeutic relevance of various drug classes for better clinical outcomes. CO4: Students will critically evaluate the Structure-Activity Relationships (SAR) to identify key functional groups responsible for pharmacological activity and guide modifications for enhanced efficacy. CO5: Students will be able to write and explain the chemical synthesis of important drugs, demonstrating the ability to trace each synthetic step and relate it to drug action and stability.
49.	**BP602T** **Pharmacology-III**	CO1: understand the mechanism of drug action and its relevance in the treatment of different infectious diseases CO2: comprehend the principles of toxicology and treatment of various poisonings CO3: appreciate correlation of pharmacology with related medical sciences.
50.	**BP603T** **Herbal Drug Technology**	CO1: Student can be able to know the processes involved in the cultivation and authentication of herbal raw materials as per WHO and ICH Guideline CO2: Student can be able to know the application of WHO and ICH guidelines for evaluating the quality of herbal drugs. CO3: Student can be able to know the use of herbal cosmetics, nutraceuticals, and natural sweeteners in healthcare. CO4: Student can be able to know the Interpret regulatory guidelines and patent issues related to herbal drug manufacturing. CO5: Student can be able to know the Formulation and evaluation herbal preparations following GMP standards.

51.	**BP604T** **Biopharmaceutics and Pharmacokinetics**	CO1: Understand the basic concept of biopharmaceutics and pharmacokinetics CO2: Derivation of pharmacokinetic parameters to describe the ADME of a drug CO3: Design of dosage regimen for a drug using pharmacokinetic and biopharmaceutics parameters CO4: Evaluation of drug product bio equivalency CO5: Solving the various clinical pharmacokinetic problems by the application of pharmacokinetic principles
52.	**BP605T** **Pharmaceutical Biotechnology**	CO1: Understanding the importance of Immobilized enzymes in Pharmaceutical Industries CO2: Genetic engineering applications in relation to production of pharmaceuticals CO3: Importance of Monoclonal antibodies in Industries CO4: Appreciate the use of microorganisms in fermentation technology
53.	**BP606T** **Quality Assurance**	CO1: To understand the CGMP aspects in a pharmaceutical industry CO2: To know the importance of documentation CO3: To understand the scope of quality certifications applicable to pharmaceutical industries CO4: understand the responsibilities of QA & QC departments
54.	**BP607P** **Medicinal Chemistry-III**	CO1: Demonstrate the ability to synthesize selected drugs and intermediates such as Sulphanilamide, Tolbutamide, and Hexamine through conventional and modern synthetic techniques. CO2: Perform qualitative and quantitative assays of essential pharmaceutical compounds including Isonicotinic acid hydrazide, Chloroquine, and Metronidazole using standard analytical procedures. CO3: Apply microwave irradiation techniques for the efficient preparation of medicinally important compounds with improved yield and reduced reaction time. CO4: Illustrate chemical structures, reaction mechanisms, and retrosynthetic pathways using Chemdraw® software, enhancing digital representation skills in medicinal chemistry. CO5: Analyse the physicochemical and drug-likeness properties (LogP, molecular weight, H-bond donors/acceptors) of drug molecules using computational tools, with emphasis on Lipinski's Rule of Five for evaluating oral bioavailability

55.	**BP608P** **Pharmacology-III**	CO1: To gain knowledge of effect of drug on different organs of animals, toxicity study and biostatical methods. CO2: To understand the practical aspects of evaluation of various pharmacological activities in animal model by simulated experiments by software and videos
56.	**BP609P** **Herbal Drug Technology**	CO1: Student can be able to Perform preliminary phytochemical screening of crude drugs. CO2: Student can be able to do the Determination Of ash values, moisture content, and extractive values of herbal drugs. CO3: Student can be able to analyze alcohol content in Asava and Arista formulations. CO4: Student can be able to prepare and standardize herbal formulations and cosmetics. CO5: Student can be able to Interpret pharmacopoeial standards and monographs for herbal drugs.
SEMESTER-VII		
57.	**BP701T** **Instrumental Methods of Analysis**	CO1: Explain the fundamental principles of instrumental methods used in pharmaceutical analysis, including their scope and significance. CO2: Describe the interaction of electromagnetic radiation with matter and its application in spectroscopic techniques for qualitative and quantitative drug analysis. CO3: Illustrate the principles, instrumentation, and applications of various chromatographic methods used for drug separation and analysis. CO4: Apply spectroscopic and chromatographic techniques for the detection, identification, and quantification of pharmaceutical substances. CO5: Interpret data obtained from modern analytical instruments and evaluate their use in quality control and regulatory compliance in pharmaceutical industries
58.	**BP702T** **Industrial Pharmacy**	CO1: To impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market CO2: To know the process of pilot plant and scale up of pharmaceutical dosage forms CO3: To understand the process of technology transfer from lab scale to commercial batch CO4: To know different Laws and Acts that regulate pharmaceutical industry CO5: To understand the approval process and regulatory requirements for drug products

59.	**BP703T** **Pharmacy Practice**	CO1: Aware of various drug distribution methods, pharmacy stores management and inventory control in a hospital CO2: To interpret selected laboratory results of specific disease states, monitor drug therapy of patients, identify drug related problems and detect and assess adverse drug reactions CO3: Able to provide pharmaceutical care services CO4: Able to do patient counseling in hospital, clinical and community pharmacy CO5: Appreciate the concept of rational drug therapy
60.	**BP704T** **Novel Drug Delivery System**	CO1: To understand various approaches for development of novel drug delivery systems. CO2: To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.
61.	**BP705P** **Instrumental Methods of Analysis**	CO1: Determine absorption maxima and evaluate the effect of different solvents on the absorption behavior of organic compounds using UV-Visible spectrophotometry. CO2: Perform quantitative estimations of pharmaceutical compounds such as dextrose, sulfanilamide, and paracetamol using colorimetry and UV spectrophotometry. CO3: Apply fluorescence spectroscopy and flame photometry techniques to estimate pharmaceutical substances like quinine sulfate, sodium, and potassium, including the study of fluorescence quenching. CO4: Analyze pharmaceutical samples for chloride and sulfate content using nephelometry and turbidometry with appropriate interpretation of results. CO5: Demonstrate proficiency in basic chromatographic techniques such as paper chromatography, TLC, and column chromatography, and understand the principles of advanced instruments like HPLC and GC through demonstration experiments.

62.	**BP706PS** **Practice School**	CO1: Exposed to real life professional activities in industry / hospital / community pharmacy set up CO2: Observed various activities of industry / hospital / community pharmacy CO3: Obtained basic training in the day to day activities of industry / hospital / community pharmacy CO4: Got experience of documentation of observation and report writing CO5: Learnt work culture of industry / hospital / community pharmacy
SEMESTER-VIII		
63.	**BP801T** **Biostatistics and Research Methodology**	CO1: How to select a research topic in his/her areas of interest. CO2: The fundamentals of collecting, analyzing and interpreting the relevant data. CO3: Different computational methods and softwares facilitating research
64.	**BP802T** **Social and Preventive Pharmacy**	CO1: Understand the concept of sociology, hygiene, health and disease CO2: Acquire high consciousness / realization of current issues related to health, preventive medicine and pharmaceutical problems within the country and world wide CO3: Understand the national health programs, its objectives, functioning and outcomes CO4: Have a critical way of thinking based on current health care development CO5: Evaluate alternate ways of solving problems related to health and pharmaceutical issues
65.	**BP803ET** **Pharmaceutical Marketing**	CO1: To provide an understanding of marketing concepts and techniques and the CO2: Application of the same in the pharmaceutical industry.
66.	**BP804ET** **Pharmaceutical Regulatory Science**	CO1: Know about the process of drug discovery and development CO2: Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals CO3: Know the regulatory approval process and their registration in Indian and international markets

67.	**BP805ET** **Pharmacovigilance**	CO1: Understand the principles and practices of pharmacovigilance CO2: Evaluate the causality of ADRs and assess their impact on patient safety CO3: Design and implement pharmacovigilance systems and processes CO4: Apply critical thinking skills to identify and mitigate safety risks CO5: Develop risk management plans and strategies to minimize drug-related risks.
68.	**BP806ET** **Quality Control and Standardization of Herbals**	CO1: Explain WHO, EU, and ICH guidelines for quality control of herbal drugs. CO2: Apply principles of cGMP, GAP, GMP, and GLP in the herbal drug industry. CO3: Evaluate herbal drugs using chromatographic and pharmacopoeial methods. CO4: Demonstrate understanding of regulatory requirements and documentation for herbal drug approval and export. CO5: Assess safety, stability, and efficacy of herbal medicines using standard protocols.
69.	**BP807ET** **Computer Aided Drug Design**	CO 1: Impart knowledge and skills necessary for computer applications in pharmaceutical research and development. CO 2: Acquire knowledge of computational modelling in preclinical and clinical development. CO 3: Understand the importance of Artificial intelligence. CO 4: Understand in silico drug design technology. CO 5: Analyze QSAR, structure activity relationship in drug development.
70.	**BP808ET** **Cell and Molecular Biology**	CO1: Summarize cell and molecular biology history. CO2: Summarize cellular functioning and composition. CO3: Describe the chemical foundations of cell biology. CO4: Summarize the DNA properties of cell biology. CO5: Describe protein structure and function, cellular membrane structure and function

71.	**BP809ET** **Cosmetic Science**	CO1: Know the cosmetic principles to address the needs of cosmetic industry. CO2: Understand formulation science and analytical techniques required to scientifically design and develop cosmetic products. CO3: Explain the scientific and technical aspects, high standards of practice and professional ethics within the cosmetic and toiletries industry CO4: Understand different cosmetics excipients in the development of cosmeceutical products CO5: Role of herbs in cosmetics
72.	**BP810ET** **Experimental Pharmacology**	CO1: Appreciate the applications of various commonly used laboratory animals. CO2: Appreciate and demonstrate the various screening methods used in preclinical research CO3: Appreciate and demonstrate the importance of biostatistics and research methodology CO4: Design and execute a research hypothesis independently
73.	**BP811ET** **Advanced Instrumentation Techniques**	CO1: understand the advanced instruments used and its applications in drug analysis CO2: understand the chromatographic separation and analysis of drugs. CO3: understand the calibration of various analytical instruments know analysis of drugs using various analytical instruments.
74.	**BP813PW** **Project Work**	CO1:Know the source of literature and literature survey CO2: Able to design research protocol and carry out study as per design CO3: Can analyze and interpret research data using appropriate statistical tools CO4: Capable of writing scientific documents CO5: Develop tendency to work in group

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COURSE OUTCOME

PROGRAMME: PHARM.D

No.	Name of the Course	Course Outcome
1.	**1.1 Human Anatomy and Physiology**	CO1: Students would have learnt the gross anatomy, histology and physiology of various organs of the human body. CO2: They would identify the various tissues and organs associated with the different organ systems with help of charts and specimens. CO3: They would have studied the coordination in functioning of different organs of each system. CO4: They would have understood the several physiological homeostatic mechanisms and their imbalances in human body. CO5: They would have learnt the interlinked mechanisms in the maintenance in normal and physical exercise conditions. CO6: They would have learnt and performed the hematological tests parameters, blood pressure recording, heart rate, pulse and respiratory volumes.
2.	**1.1HumanAnatomyand Physiology (Practical)**	CO1: To understand the practical aspects in Practical physiology is complimentary to the theoretical discussions in physiology. CO2: Practical allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. CO3: This is helpful for developing an insight on the subject.
3.	**1.2 Pharmaceutics**	CO1: Know the formulation aspects of different dosage forms CO2: Know about basic components of Prescription and its handling procedure CO3: Know about the development of profession of pharmacy, pharmaceutical industry and Pharmacopoeias CO4: Appreciate the importance of good formulation for effectiveness

		CO5: Do different pharmaceutical calculation involved in formulation including dose calculations.
4.	**1.2 Pharmaceutics (Practical)**	CO1: Able to understand the procedures involved in the preparation of solid and semisolid dosage forms CO2: Able to understand the procedures involved in the preparation of liquid dosage forms CO3: Able to do dose calculation from given official quantity. CO4: Able to understand labelling procedure and packaging of different types of dosage forms CO5: Able to understand different types of incompatibilities in formulation
5.	**1.3 Medicinal Biochemistry**	CO 1: Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases. CO: 2 Know the metabolic process of biomolecules in health and illness (metabolic disorders). CO: 3 Understand the genetic organization of mammalian genome , protein synthesis, replication, mutation and repair mechanism. CO:4 Understand the biochemical principles of organ function tests of kidney, liver and endocrine gland. CO 5: Do the qualitative analysis and determination of biomolecules in the body fluids and know the basic concepts of cell and metabolic process in healthy and illness conditions.
6.	**1.3 Medicinal Biochemistry (Practical)**	CO 1: Qualitatively analyze the normal and abnormal constituents of urine. CO 2: Quantitatively estimate the various constituents present in urine. CO 3: Study the factors affecting enzymatic activity. CO 4: Quantitatively estimate the various constituents in serum. CO 5: Qualitative analysis of carbohydrates and identification tests for proteins.

7.	**1.4 Pharmaceutical Organic Chemistry**	CO1: Demonstrate proficiency in IUPAC and common system nomenclature for various classes of organic compounds. CO2: Understand and explain the relationship between structure and physical properties of organic compounds. CO3: Describe and predict the mechanisms of free radical, nucleophilic, and electrophilic reactions, including substitution, addition, elimination, oxidation, and reduction processes. CO4: Assess the factors affecting the order of reactivity, orientation, and stability of organic compounds in different reactions. CO5: Explain and apply the principles of named organic reactions with mechanisms in organic synthesis, emphasizing their pharmaceutical relevance. Also able to identify and describe methods of preparation, purity testing, assay principles, and medicinal applications of important organic compounds.
8.	**1.4 Pharmaceutical Organic Chemistry (Practical)**	CO1: Students will be able to synthesize at least 8 different organic compounds using a variety of classical organic reactions and explain the underlying mechanisms. CO2: Students will demonstrate the ability to identify unknown organic compounds through systematic qualitative analysis and confirmatory derivative formation. CO3: Students will effectively use molecular models to represent and distinguish stereoisomers like cis-trans alkenes, and understand molecular geometry and configuration changes. CO4: Students will apply laboratory techniques such as melting point determination, TLC, and solvent extraction for compound purification and analysis. CO5: Students will follow proper safety protocols and accurately document laboratory findings, preparing them for advanced research or industrial laboratory settings.

9.	**1.5 Pharmaceutical Inorganic Chemistry**	CO1: Describe the fundamental principles and different type of titrimetric analysis with practical aspects. Explain theories of indicators and different types of indicators used in titrimetric analysis. CO2: Can perform preparation and standardization of volumetric solution. CO3: Describe the sources of errors in pharmaceutical analysis and method of minimization errors. CO4: Explain the sources of impurities and methods to determination determine the impurities in inorganic substance and pharmaceuticals. CO5: Prepare and identify different inorganic compounds. Knows the medicinal and pharmaceutical uses of inorganic compounds. Describe the properties, storage condition and application of radiopharmaceuticals.
10.	**1.5 Pharmaceutical Inorganic Chemistry (Practical)**	CO1: To understand the detection of impurities in pharmaceutical inorganic compound CO2: To understand preparation and standardisation of volumetric solution and carry out the estimation of inorganic compounds CO3: To understand the tests for purity of compound CO4: To familiarize with preparation of inorganic compounds CO5: To understand identification of unknown compound

11.	**1.6 Remedial Mathematics**	CO 1: Can apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences. CO 2: Able to create, use and analyze mathematical representations by applying mathematical theory CO 3: Know trigonometry, analytical geometry, matrices, determinant, integration differential equation, Laplace transform & their applications. CO 4: Perform abstract mathematical reasoning CO 5: Obtain knowledge of mathematical relationships
	1.6 Remedial Biology	CO1: To learn and understand the components of living world, structure and functional system of plant and animal kingdom. CO2: To know the classification and salient features of five kingdoms of life CO3: To understand the basic components of anatomy & physiology of plant CO4: To know understand the basic components of anatomy & physiology animal with special reference to human
12.	**1.6: Remedialbiology (Practical)**	CO1: To understand the practical aspects in plant biology including cutting, staining and permanent slide preparations. CO2: Determine blood group, blood pressure and tidal volume of humans.

MAR DIOSCORUS COLLEGE OF PHARMACY

HERMONGIRI VIDYAPEETAM, ALATHARA, SREEKARYAM, THIRUVANANTHAPURAM-695017

COURSE OUTCOME

PROGRAMME: M.PHARM -PHARMACEUTICS

No.	Name of the Course	Course Outcome
	SEMESTER-1	
1.	**MPH101T** **Modern Pharmaceutical Analytical Techniques**	CO1: Explain the principles and applications of advanced analytical techniques such as NMR spectroscopy, mass spectrometry, infrared (IR) spectroscopy, HPLC, and GC in pharmaceutical analysis. CO2: Identify and characterize pharmaceutical substances and excipients using appropriate instrumental methods. CO3: Analyze drugs in both single and combination dosage forms with precision using advanced analytical instruments. CO4: Develop theoretical knowledge related to the working, calibration, and troubleshooting of modern analytical instruments. CO5: Demonstrate practical skills in operating, maintaining, and interpreting results from instruments like HPLC, GC, IR, NMR, and mass spectrometer for quality control and research applications.
2.	**MPH102T** **Drug Delivery System**	CO1: Various approaches for the development of Novel drug delivery systems. CO2: Criteria for selection of drugs and polymers for the development of delivery system CO3: Approaches in developing transdermal delivery system. CO4: Understanding on Rate controlled drug delivery. CO5: Formulation and evaluation of Vaccine & Protein drug delivery systems.

3.	**MPH103T** **Modern Pharmaceutics**	CO1: Understand the concepts of preformulation studies. CO2: Knowledge on Optimization techniques & Pilot plant scale up techniques CO3: Evaluate various Industrial Management aspects and GMP considerations. CO4: Understand the Stability tests and sterilization process of formulations. CO5: To apply the statistical tests on the dissolution and release kinetic studies.
4.	**MPH104T** **Regulatory Affairs**	CO1: To understand the document process in pharmaceutical industry and requirements for product approval CO2: To study the regulatory requirements for product approval. CO3: To know the regulations for combination drug products and medical devices CO4: To grasp non clinical drug development submission requirements to regulatory agencies CO5: To learn the clinical trial protocol and pharmacovigilance safety monitoring in clinical trials.
5.	**MPH105P** **Pharmaceutics Practicals-I**	CO1: Hands- on experience with advanced pharmaceutical technologies like formulation, analytical methods, quality control CO2: Learn to analyse pharmaceuticals using various analytical methods like spectroscopy, chromatography etc. CO3: Develop laboratory skill like handling of equipments, analysing data etc CO4: Learn to solve problems and optimization of pharmaceutical products CO5: Develop skill in design and development of pharmaceutical formulations
	SEMESTER-II	
6.	**MPH201T** **Molecular Pharmaceutics**	CO1: Knowledge in Nanotechnology contribute to advancements in drug discovery and development CO2: Understand the events, biological process and methods involved in tumor targeting and Brain specific delivery. CO3: Development of gene therapy for delivering genes to specific cells and tissues for treating diseases. CO4: Knowledge of therapeutic antisense molecules and aptamers as drugs of future CO5: Development of targeted drug delivery that can minimize systemic exposure and reduce side effects.

7.	**MPH202T** **Advanced Biopharmaceutics and Pharmacokinetics**	CO1: Understanding the basic concepts in biopharmaceutics and pharmacokinetics. CO2: To describe the process of drug absorption, distribution, metabolism and elimination. CO3: Critical evaluation of biopharmaceutic studies involving drug product equivalency. CO4: Ability to design and evaluate the dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters. CO5: Understanding the concepts of in -vitro in-vivo correlations.
8.	**MPH203T** **Computer Aided Drug Delivery system**	CO1: Describe the evolution and role of computer technologies in pharmaceutical research and development, from early systems to modern informatics. CO2: Apply computational modeling techniques for simulating drug disposition and predicting pharmacokinetic behavior in preclinical studies. CO3: Utilize computer-based tools and optimization techniques for pharmaceutical formulation and product development. CO4: Analyze the applications of computer systems in clinical development, market analysis, and regulatory data management. CO5: Understand the integration of emerging technologies such as Artificial Intelligence (AI), Robotics, and Computational Fluid Dynamics (CFD) in drug design, development, and process optimization.
9.	**MPH204T** **Cosmetics and Cosmeceuticals**	CO1: Knowledge on regulation of cosmetics CO2: Knowledge on biological aspects of cosmetics CO3: Knowledge on formulation Building blocks CO4: Knowledge on design of cosmeceutical products CO5: Knowledge on herbal Cosmetics

10.	**MPH205P** **Pharmaceutics Practicals- II**	CO1: Hands- on experience with advanced technologies like microencapsulation, controlled release formulations CO2: Understand the principle and methods of in-vitro and in-vivo evaluation CO3: Learn to design and conduct research experiments in pharmaceutics CO4: Learn to develop innovative pharmaceutical formulation CO5: Develop skill to determine the pharmacokinetic and pharmacodynamic parameters of drugs.
	SEMESTER-III	
11.	**MRM301T** **Research Methodology and Biostatistics**	CO1: Explain the principles of general research methodology including study designs, scientific methods, literature review strategies, and advanced techniques for searching pharmaceutical databases both online and offline. CO2: Collect, organize, and analyze various types of research data using appropriate statistical tools, and apply both parametric and non-parametric tests to interpret results effectively. CO3: Understand ethical considerations in medical and pharmaceutical research, including research design principles such as randomization, blinding, informed consent, and the roles of ethics committees. CO4: Demonstrate knowledge of CPCSEA guidelines for laboratory animal use, including facility management, animal care, record keeping, and personnel training. CO5: Apply skills in scientific writing and communication to develop structured research reports and theses, present research findings through posters and seminars, and understand the fundamentals of publication ethics, plagiarism, and copyright.
12.	**Journal Club**	CO1: Able to collect relevant literature and critically evaluate them CO2: Learnt to make a PPT presentation scientifically and deliver the same CO3: Able to involve effectively in post presentation discussion

13.	**Project Discussion/ Presentation**	CO1: Able to select research topic through literature review CO2: Able to design research methodology CO3: Able to Present the selected research proposal convincingly
14.	**Research Work**	CO1: Able to carry out research work scientifically following research ethics CO2: Able to collect date, interpret them using appropriate statistical tools and arrive at conclusion scientifically CO3: Able to document the research work in the form of thesis in an acceptable format
15.	**Pre submission Discussion/Presentation**	CO1: Able to organize the research work for presentation CO2: Able to make PPT presentation of the research work scientifically and deliver the same CO3: Learnt to defend the research work scientifically and convincingly