



# MAR DIOSCORUS COLLEGE OF PHARMACY

(Owned & Managed by the Charitable & Educational Society of the Thiruvananthapuram Orthodox Diocese Reg. No. 977/91)

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## COURSE OUTCOME

### PROGRAMME: B. PHARM

Sl. No	Name of the Course	Course Outcome
<b>SEMESTER 1</b>		
1.	<b>BP101T Human Anatomy and Physiology-I</b>	<p>CO1: Explain the concepts and compare cellular and tissue level of organization</p> <p>CO2: Describe anatomy &amp; physiology of skin , skeleton system and joints</p> <p>CO3: Apply the knowledge of body fluids, blood and lymphatic system to assess various disorders</p> <p>CO4: Recognize the anatomical structures and physiological functions of peripheral nervous system and special sense organs</p> <p>CO5: Evaluate the structure and functions of the heart and blood vessels to assess cardiovascular disorders</p>
2.	<b>BP102T Pharmaceutical Analysis- I</b>	<p>CO1: Explain the fundamental concepts and scope of analytical chemistry, specifically in the context of pharmaceutical compounds.</p> <p>CO2: Demonstrate a thorough understanding of various volumetric analysis techniques including acid-base, redox, complexometric, and precipitation titrations.</p> <p>CO3: Understand and apply the principles of electrochemical methods of analysis such as potentiometry, conductometry, and polarography in pharmaceutical settings.</p> <p>CO4: Perform and interpret results from a variety of volumetric and electrochemical titrations with accuracy and precision.</p> <p>CO5: Develop critical analytical skills and laboratory techniques necessary for quality control and quantitative analysis in the pharmaceutical industry.</p>

3.	<p style="text-align: center;"><b>BP103T</b> <b>Pharmaceutics-I</b></p>	<p>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</p>
4.	<p style="text-align: center;"><b>BP104T</b> <b>Pharmaceutical Inorganic Chemistry</b></p>	<p>CO 1: Describe the sources of impurities and methods to control them in pharmaceutical substances. Apply the knowledge of limit tests (e.g., for chloride, sulphate, iron, arsenic, lead) in evaluating pharmaceutical substances. CO 2: Classify and understand the principles behind the identification and purity testing of various inorganic pharmaceutical compounds. CO 3: Describe the role of essential and trace elements in human body and their pharmaceutical applications. CO 4: Importance of pH and buffer system in pharmaceutical formulations CO 5: Understand the Properties, Measurement , Storage and uses of radiopharmaceuticals</p>
5.	<p style="text-align: center;"><b>BP105T</b> <b>Communication Skills</b></p>	<p>CO1: Understand the behavioural 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</p>
6.	<p style="text-align: center;"><b>BP106RBT</b> <b>Remedial Biology</b></p>	<p>CO1: Know the classification and salient features of five kingdoms of life CO2: Understand the basic components of anatomy &amp; physiology of plant CO3: Know understand the basic components of anatomy &amp; 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.</p>

	<p><b>BP106RMT</b> <b>Remedial Mathematics</b></p>	<p>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</p>
7.	<p><b>BP107P</b> <b>Human Anatomy and Physiology-I</b></p>	<p>CO1: Perform the Hematological tests like blood cell counts, hemoglobin estimation, ESR, bleeding and clotting time CO2: Determine heart rate, pulse rate and blood pressure CO3: Operate the compound microscope for blood cell counts and histological study CO4: Identify the different type of bones and tissues of human body</p>
8.	<p><b>BP108P</b> <b>Pharmaceutical Analysis-I</b></p>	<p>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.</p>
9.	<p><b>BP109P</b> <b>Pharmaceutics-I</b></p>	<p>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 &amp; externally. CO3: Select an appropriate container and storage conditions for a product along with the labelling of pharmaceuticals.</p>

10.	<b>BP110P Pharmaceutical Inorganic Chemistry</b>	<p>CO 1: Perform limit tests for common inorganic impurities</p> <p>CO 2: Analyze the purity and quality of inorganic pharmaceutical substances as per Indian Pharmacopoeia (IP) standards.</p> <p>CO 3: Identify inorganic pharmaceutical compounds through systematic qualitative analysis using physical and chemical tests.</p> <p>CO 4: Prepare pharmaceutical compounds like boric acid</p> <p>CO 5: Maintain a proper laboratory record of observations and inferences following Good Laboratory Practices (GLP)</p>
11.	<b>BP111T Communication Skills</b>	<p>CO1: Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation</p> <p>CO2: Communicate effectively (Verbal and Non-Verbal)</p> <p>CO3: Effectively manage the team as a team player</p> <p>CO4: Develop interview skills</p> <p>CO5: Develop Leadership qualities and essentials</p>
12.	<b>BP112RBT Remedial Biology</b>	<p>CO1: To understand the practical aspects in plant biology including cutting, staining and permanent slide preparations.</p> <p>CO2: Determine blood group, blood pressure and tidal volume of humans:</p>
<b>SEMESTER II</b>		
13.	<b>BP201T Human anatomy and Physiology-II</b>	<p>CO 1: Students would have studied about the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body.</p> <p>CO 2: They would have studied in detailed about energy and metabolism.</p> <p>CO 3: Students would able to identify the various organs of different systems of human body.</p> <p>CO 4: They would have performed and learnt about the experiments like neurological reflex, body temperature measurement</p> <p>CO 5: They would have studied elaborate on interlinked mechanisms in the maintenance of normal functioning of human body</p>

14.	<p style="text-align: center;"><b>BP202T</b> <b>Pharmaceutical Organic Chemistry-I</b></p>	<p>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.</p>
15.	<p style="text-align: center;"><b>BP 203T</b> <b>Biochemistry</b></p>	<p>CO 1: Describe the structure and functions of biomolecules such as carbohydrates, proteins, lipids, nucleic acids, and enzymes.  CO 2: Explain the metabolic pathways of biomolecules and their regulation  CO 3: Discuss the biological oxidation process, including the electron transport chain (ETC) and oxidative phosphorylation.  CO 4: Understand the mechanism of enzyme action, enzyme kinetics, types of enzyme inhibition, and clinical importance of enzymes.  CO 5: Correlate biochemical processes with clinical and pathological conditions, preparing students for further pharmacological and clinical studies</p>
16.	<p style="text-align: center;"><b>BP 204T</b> <b>Pathophysiology</b></p>	<p>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</p>
17.	<p style="text-align: center;"><b>BP205T</b> <b>Computer Applications in Pharmacy</b></p>	<p>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</p>

18.	<p style="text-align: center;"><b>BP206T</b> <b>Environmental Sciences</b></p>	<p>CO1: To develop an understanding of the multidisciplinary nature of environmental studies</p> <p>CO2: To analyze various natural resources, their uses, associated problems, and conservation strategies</p> <p>CO3: To provide a foundational understanding of ecosystems, their structure, functions, and diversity</p> <p>CO4: To examine the causes, effects, and control measures of various types of environmental pollution</p> <p>CO5: To foster environmental awareness and responsibility through critical thinking and practical applications</p>
19.	<p style="text-align: center;"><b>BP207P</b> <b>Human anatomy and Physiology-II</b></p>	<p>CO1: Practical allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.</p> <p>CO2: To develop an insight on the subject.</p> <p>CO3: To study the integumentary and special senses using specimen, models, etc.,</p> <p>CO4: To study the various systems using specimen, models,</p> <p>CO5: To examine the different types of taste.</p> <p>CO6: To demonstrate the visual acuity</p>
20.	<p style="text-align: center;"><b>BP208P</b> <b>Pharmaceutical Organic Chemistry-I</b></p>	<p>CO 1: Apply the qualitative analysis of organic compounds.</p> <p>CO 2: Understand the steps involved in the identification of unknown organic compounds.</p> <p>CO 3: Know the principles of qualitative analysis.</p> <p>CO 4: Know the preparation of stereo models of various functional groups.</p> <p>CO 5: Know the laboratory skills to prepare the organic compounds.</p>
21.	<p style="text-align: center;"><b>BP209P</b> <b>Biochemistry</b></p>	<p>CO 1: Qualitatively analyze the normal and abnormal constituents of urine.</p> <p>CO 2: Quantitatively estimate the various constituents present in urine.</p> <p>CO 3: Study the factors affecting enzymatic activity.</p> <p>CO 4: Quantitatively estimate the various constituents in serum.</p> <p>CO 5: Qualitative analysis of carbohydrates and identification tests for proteins.</p>

22.	<b>BP210P Computer Applications in Pharmacy</b>	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.
<b>SEMESTER- III</b>		
23.	<b>BP301T Pharmaceutical Organic Chemistry-I</b>	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.	<b>BP302T Physical Pharmaceutics-I</b>	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.	<b>BP303T Pharmaceutical Microbiology</b>	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.	<p align="center"><b>BP304T</b> <b>Pharmaceutical Engineering</b></p>	<p>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</p>
27.	<p align="center"><b>BP305P</b> <b>Pharmaceutical organic chemistry-II</b></p>	<p>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.</p>
28.	<p align="center"><b>BP306P</b> <b>Physical Pharmaceutics-I</b></p>	<p>CO1: Able to determine the solubility of drugs.  CO2: To determine Partition co-efficient of benzoic acid in benzene and water  CO3: Understand the determination of % composition of NaCl in a solution using phenol-water system by CST method.  CO4: Determination of the particle size and size distribution by different methods like Sieving &amp; Microscopic methods.  CO5: Measurement of bulk density, true density, porosity &amp; Angle of repose of pharmaceutical powders</p>
29.	<p align="center"><b>BP307P</b> <b>Pharmaceutical Microbiology</b></p>	<p>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: Able to identify bacteria using different staining methods and biochemical tests and to perform Motility study of bacteria by Hanging drop method.  CO5: Microbiological assay of antibiotics</p>

30.	<p align="center"><b>BP308P</b> <b>Pharmaceutical Engineering</b></p>	<p>CO1: Carry out different unit operations in pharmaceutical industry</p> <p>CO2: Understand the factors influencing various unit operations like filtration, evaporation etc</p> <p>CO3: Know the principle, construction and working of various equipments used in different unit operations</p> <p>CO4: Determine the particle size and particle size distribution by different methods</p> <p>CO5: Determine the humidity of air by different methods</p>
<b>SEMESTER- IV</b>		
31.	<p align="center"><b>BP 401T</b> <b>Pharmaceutical Organic Chemistry-III</b></p>	<p>CO 1: Acquire knowledge about principles of heterocyclic chemistry.</p> <p>CO 2: Understand the synthesis and reactions of five membered and six membered heterocyclic compounds.</p> <p>CO 3: Knowledge about the detailed mechanisms for common name reactions.</p> <p>CO 4: Understand Stereochemical features conformation of isomers.</p> <p>CO 5: Knowledge about the stereochemistry of biphenyl compounds.</p>
32.	<p align="center"><b>BP402T</b> <b>Medicinal Chemistry I</b></p>	<p>CO1: Analyze the physicochemical and stereochemical properties of drugs in relation to their biological activity.</p> <p>CO2: Develop foundational skills to design, modify drug molecules for ANS disorders based on SAR and chemical structures.</p> <p>CO3: Develop foundational skills to design, modify drug molecules for CNS disorders based on SAR and chemical structures.</p> <p>CO4: Explain the synthetic pathways of selected drugs belonging to categories like anticonvulsants, general anesthetics, and analgesics.</p> <p>CO5: Apply knowledge of medicinal chemistry to predict the pharmacological activity based on functional groups and molecular modifications.</p>

33.	<p align="center"><b>BP403T</b> <b>Physical</b> <b>Pharmaceutics II</b></p>	<p>CO1: Know the principles of chemical kinetics &amp; to use them in assigning expiry date for formulation</p> <p>CO2: Understand the concepts of Rheology and Deformation of solids</p> <p>CO3: Formulation and evaluation of various dispersion systems like Suspensions &amp; Emulsions</p> <p>CO4: Describe the principles of adsorption, types of interfacial phenomenon</p> <p>CO5: Understand the types of colloidal systems and its applications in pharmacy</p>
34.	<p align="center"><b>BP404T</b> <b>Pharmacology I</b></p>	<p>CO1: Understand the pharmacological actions of different categories of drugs</p> <p>CO2: Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.</p> <p>CO3: Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.</p> <p>CO4: Observe the effect of drugs on animals by simulated experiments</p> <p>CO5: Appreciate correlation of pharmacology with other bio medical sciences</p>
35.	<p align="center"><b>BP405T</b> <b>Pharmacognosy</b> <b>and</b> <b>Phytochemistry-I</b></p>	<p>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</p> <p>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.</p> <p>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</p> <p>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.</p> <p>CO 5: Illustrate the role of phytochemical constituents in the medicinal value of natural drugs.</p>

36.	<p align="center"><b>BP406P</b> <b>Medicinal Chemistry-I</b></p>	<p>CO 1: Apply the basic knowledge in the synthesis of medicinal compounds.</p> <p>CO 2: Analyze the principles and mechanism of chemical reactions.</p> <p>CO 3: Know the concept of moles in calculating theoretical yield.</p> <p>CO 4: Understand the estimation of percentage purity of medicinal compounds.</p> <p>CO 5: Understand the principles of partition coefficient of drugs</p>
37.	<p align="center"><b>BP407P</b> <b>Physical Pharmaceutics-II</b></p>	<p>CO1: Able to determine the Surface tension of liquids by different methods.</p> <p>CO2: Determination of HLB number &amp; Critical micellar concentration of surfactants.</p> <p>CO3: Understand the concepts of Rheology and the ability to determine viscosity using Viscometers.</p> <p>CO 4: Analyze the settling behaviour in suspensions</p> <p>CO 5: Understand the principles of Chemical kinetics &amp; to determine reaction rate constant of First order and Second order.</p>
38.	<p align="center"><b>BP408P</b> <b>Pharmacology-I</b></p>	<p>CO1: To describe the principles of experimental pharmacology, commonly used laboratory instruments, and ethical considerations in research.</p> <p>CO2: Identify common lab animals, maintaining them under CPCSEA guidelines, and understanding the importance of humane treatment.</p> <p>CO3: To develop skills in blood withdrawal, serum/plasma separation, animal anesthesia, euthanasia, and administration of drugs through different routes in rats and mice.</p> <p>CO4: To perform in-vitro experiments using isolated tissues (e.g., chicken ileum), prepare physiological salt solutions, and construct/analyze dose–response curves for acetylcholine.</p> <p>CO5: To interpret the effects of spasmogens (e.g., physostigmine) and spasmolytics (e.g., atropine) on isolated tissues and correlate observations with pharmacodynamic principles.</p>
39.	<p align="center"><b>BP409P</b> <b>Pharmacognosy And Phytochemistry-I</b></p>	<p>CO1: Students will able perform and Identify the crude drugs by identifying the phytoconstituents of crude drugs using chemical tests.</p> <p>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.</p> <p>CO3: Students will able perform and identify the crude drugs by measuring fiber length, starch grain size shape and calcium</p>

		<p>oxalate crystals.as a unique identification parameter.</p> <p>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.</p>
<b>SEMESTER- V</b>		
40.	<b>BP501T Medicinal Chemistry-II</b>	<p>CO1:Describe the classification, structure, chemical name and synthesis of important drugs.</p> <p>CO2: Analyze the chemical structure of a drug and its Pharmacological activity.</p> <p>CO3: Explain the mechanism of action of different classes of medicinal compounds at the molecular level.</p> <p>CO 4: Identify the therapeutic applications and adverse effects of major drug classes.</p> <p>CO 5: Understand the step-by-step chemical synthesis of selected drugs from different therapeutic categories.</p>
41.	<b>BP502T Formulative Pharmacy</b>	<p>CO1: Appreciate the preformulation studies and their importance in formulation development</p> <p>CO2: Acquired knowledge of various pharmaceutical dosage forms and their manufacturing techniques.</p> <p>CO2: Learnt the concept, types, pharmacopeial specifications, techniques quality control used in different dosage forms.</p> <p>CO3: Able to discuss development, Pharmacopoeial evaluation and labelling of SVPs, LVPs, and ophthalmic formulation</p> <p>CO4: Have developed knowledge on concepts of controlled drug delivery system</p> <p>CO5: Acquired basic knowledge on cosmetics, aerosols and packaging with respect to formulation and manufacturing</p>
42.	<b>BP503T Pharmacology II</b>	<p>CO 1: Describe the hemodynamic, electrophysiological, and pathophysiological basis of cardiovascular and blood-related disorders and explain the pharmacology of drugs used in their management.</p> <p>CO 2: Explain the classification, mechanism of action, therapeutic uses, adverse effects, and contraindications of drugs acting on the cardiovascular system, blood, and urinary system.</p> <p>CO 3: Describe the role of autacoids and inflammatory mediators in physiological and pathological processes and explain the pharmacology of drugs used in inflammation,</p>

		<p>pain, gout, and rheumatic disorders.</p> <p>CO 4: Correlate pharmacological actions of drugs with clinical conditions, including drug toxicity and poisoning, and explain the management of aspirin and paracetamol poisoning</p> <p>CO 5: Explain the basic concepts of endocrine pharmacology and bioassay, including the principles, types, and applications of bioassay of selected drugs and biological products.</p>
43.	<p><b>BP504T</b></p> <p><b>Pharmacognosy and Phytochemistry-II</b></p>	<p>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.</p> <p>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</p> <p>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.</p> <p>CO 4: Students can gain knowledge on industrial production and applications of important phytochemicals.</p>
44.	<p><b>BP505T</b></p> <p><b>Pharmaceutical Jurisprudence</b></p>	<p>CO1: Pharmaceutical legislations and their implications in the development and marketing</p> <p>CO2: Various Indian pharmaceutical Acts and Laws</p> <p>CO3: The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals</p> <p>CO4: Detailed study of Schedules, Labelling and Packaging guidelines for drugs and cosmetics</p> <p>CO5: The code of ethics during the pharmaceutical practice Cosmetics sciences</p>

45.	<p align="center"><b>BP506P Formulative Pharmacy</b></p>	<p>CO1: Understand and apply the principles of preformulation studies to evaluate the physicochemical properties of drug substances for optimized formulation design.</p> <p>CO2: Demonstrate competency in the preparation and evaluation of solid dosage forms such as tablets, capsules, and coated tablets using standard techniques and protocols.</p> <p>CO3: Formulate and assess liquid and semi-solid dosage forms including creams, and parenteral preparations with emphasis on their physical stability and patient compliance.</p> <p>CO4: Prepare and evaluate sterile dosage forms such as injections and ophthalmic solutions following aseptic techniques and pharmacopeial standards.</p> <p>CO5: Analyze the packaging quality of pharmaceutical products, including the evaluation of glass containers, and correlate packaging with formulation stability and safety.</p>
46.	<p align="center"><b>BP507P Pharmacology II</b></p>	<p>CO1: To handle and use laboratory animals safely and responsibly for experiments.</p> <p>CO2: To demonstrate how different drugs affect organs and systems in animals and isolated tissues.</p> <p>CO3: Able to perform basic bioassays to estimate the strength of drugs like acetylcholine.</p> <p>CO4: To measure and record changes in body responses such as heart rate, blood pressure, motility, and sleeping time.</p> <p>CO5: To interpret experimental results and explain the pharmacological action of drugs studied.</p>
47.	<p align="center"><b>BP508P Pharmacognosy and Phytochemistry-III</b></p>	<p>CO1: student can be to Identify crude drugs using morphological, histological, and powder characteristics, which is only parameter to differentiate each species</p> <p>CO2: Student can be able to do the Isolate and detect active phytoconstituents from natural sources.</p> <p>CO3: Student can be able to Perform chromatographic techniques like paper chromatography and TLC for phytochemical analysis.</p> <p>CO4: Student can be able to do extract and analyze volatile oils using distillation and TLC methods.</p> <p>CO5: Student can be able to do conduct chemical tests to analyze and confirm the identity of selected crude drugs.</p>

<b>SEMESTER-VI</b>		
48.	<b>BP601T Medicinal Chemistry-III</b>	<p>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.</p> <p>CO2: Students will demonstrate an understanding of the chemistry and mechanism of action of drugs in relation to their biological activity and therapeutic effect.</p> <p>CO3: Students will analyse and interpret metabolic pathways, adverse effects, and therapeutic relevance of various drug classes for better clinical outcomes.</p> <p>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.</p> <p>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.</p>
49.	<b>BP602T Pharmacology-III</b>	<p>CO1: Classify, categorize and get in-depth knowledge about pharmacology of drugs used in respiratory and GIT disorders.</p> <p>CO2: Describe the pharmacological aspects of drugs and its relevance in treatment of different infectious diseases.</p> <p>CO3: Explain the details of immunomodulatory agents, monoclonal antibodies &amp; biosimilars</p> <p>CO4: Analyze the toxic clinical symptoms of drugs and discuss its treatment.</p> <p>CO5: Correlate the pharmacological studies with related medical sciences and concepts of gene therapy</p>

50.	<p style="text-align: center;"><b>BP603T</b> <b>Herbal Drug Technology</b></p>	<p>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</p> <p>CO2: Student can be able to know the application of WHO and ICH guidelines for evaluating the quality of herbal drugs.</p> <p>CO3: Student can be able to know the use of herbal cosmetics, nutraceuticals, and natural sweeteners in healthcare.</p> <p>CO4: Student can be able to know the Interpret regulatory guidelines and patent issues related to herbal drug manufacturing.</p> <p>CO5: Student can be able to know the Formulation and evaluation herbal preparations following GMP standards.</p>
51.	<p style="text-align: center;"><b>BP604T</b> <b>Biopharmaceutics and Pharmacokinetics</b></p>	<p>CO1: Understand the basic concept of biopharmaceutics and pharmacokinetics</p> <p>CO2: Derivation of pharmacokinetic parameters to describe the ADME of a drug</p> <p>CO3: Design of dosage regimen for a drug using pharmacokinetic and biopharmaceutics parameters</p> <p>CO4: Evaluation of drug product bio equivalency</p> <p>CO5: Solving the various clinical pharmacokinetic problems by the application of pharmacokinetic principles</p>
52.	<p style="text-align: center;"><b>BP605T</b> <b>Pharmaceutical Biotechnology</b></p>	<p>CO1: Understanding the importance of Immobilized enzymes in Pharmaceutical Industries</p> <p>CO2: Genetic engineering applications in relation to production of pharmaceuticals</p> <p>CO3: Importance of Monoclonal antibodies in Industries</p> <p>CO4: Appreciate the use of microorganisms in fermentation technology</p>
53.	<p style="text-align: center;"><b>BP606T</b> <b>Quality Assurance</b></p>	<p>CO1: To understand the CGMP aspects in a pharmaceutical industry</p> <p>CO2: To know the importance of documentation</p> <p>CO3: To understand the scope of quality certifications applicable to pharmaceutical industries</p> <p>CO4: understand the responsibilities of QA &amp; QC departments</p>

54.	<p style="text-align: center;"><b>BP607P Medicinal Chemistry-III</b></p>	<p>CO1: Demonstrate the ability to synthesize selected drugs and intermediates such as Sulphanilamide, Tolbutamide, and Hexamine through conventional and modern synthetic techniques.</p> <p>CO2: Perform qualitative and quantitative assays of essential pharmaceutical compounds including Isonicotinic acid hydrazide, Chloroquine, and Metronidazole using standard analytical procedures.</p> <p>CO3: Apply microwave irradiation techniques for the efficient preparation of medicinally important compounds with improved yield and reduced reaction time.</p> <p>CO4: Illustrate chemical structures, reaction mechanisms, and retrosynthetic pathways using Chemdraw® software, enhancing digital representation skills in medicinal chemistry.</p> <p>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</p>
55.	<p style="text-align: center;"><b>BP608P Pharmacology-III</b></p>	<p>CO1: Simulate and perform basic pharmacological experiments related to autonomic and central nervous systems using Ex-Pharm software.</p> <p>CO2: Evaluate the effects of drugs on isolated tissues and animal models using virtual simulations to understand pharmacodynamics responses.</p> <p>CO3: Interpret experimental data generated from simulated pharmacological studies and draw valid conclusions.</p> <p>CO4: Apply bio statistical tools for the analysis and interpretation of pharmacological data, including measures of central tendency, dispersion, and significance testing.</p> <p>CO5: Correlate theoretical pharmacological knowledge with virtual practical outcomes to enhance experimental reasoning and clinical relevance.</p>

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

59.	<p style="text-align: center;"><b>BP703T</b> <b>Pharmacy Practice</b></p>	<p>CO1: To understand the organisation , structures , legal aspects and functions of hospital , PTC and hospital and community pharmacy</p> <p>CO2: Summarize the drug distribution methods used in the hospital as part of drug store management and inventory control</p> <p>CO3: Analyse the drug related problems like ADR , DI and explain the concept of TDM and rational drug therapy</p> <p>CO4: Develop communication skill for inter departmental communication, community health education and counselling the patients</p> <p>CO5: Design hospital formulary , discuss interpretation of clinical laboratory tests and drug information services available to society</p>
60.	<p style="text-align: center;"><b>BP704T</b> <b>Novel Drug Delivery System</b></p>	<p>CO1: Understand and compare different approaches used in the design and development of controlled drug delivery systems, including the role of polymers and principles of cdd.</p> <p>CO2: Understand the techniques and applications of microencapsulation, and demonstrate knowledge about mucosal and implantable drug delivery systems, focusing on bio/mucoadhesion and implant technologies.</p> <p>CO3: Understand the formulation, function, and evaluation of transdermal, gastroretentive, and nasopulmonary drug delivery systems, including understanding of permeation principles and formulation challenges.</p> <p>CO4: Apply the concepts of nanotechnology in the formulation of targeted drug delivery systems using carriers such as liposomes, niosomes, nanoparticles, and monoclonal antibodies.</p> <p>CO5: Identify the barriers and formulate strategies for effective ocular drug delivery, including the design of ocuserts and overcoming intraocular barriers.</p>

61.	<p align="center"><b>BP705P</b></p> <p align="center"><b>Instrumental Methods of Analysis</b></p>	<p>CO1: Determine absorption maxima and evaluate the effect of different solvents on the absorption behavior of organic compounds using UV-Visible spectrophotometry.</p> <p>CO2: Perform quantitative estimations of pharmaceutical compounds such as dextrose, sulfanilamide, and paracetamol using colorimetry and UV spectrophotometry.</p> <p>CO3: Apply fluorescence spectroscopy and flame photometry techniques to estimate pharmaceutical substances like quinine sulfate, sodium, and potassium, including the study of fluorescence quenching.</p> <p>CO4: Analyze pharmaceutical samples for chloride and sulfate content using nephelometry and turbidometry with appropriate interpretation of results.</p> <p>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.</p>
62.	<p align="center"><b>BP706PS</b></p> <p align="center"><b>Practice School</b></p>	<p>CO1: Exposed to real life professional activities in industry / hospital / community pharmacy set up</p> <p>CO2: Observed various activities of industry / hospital / community pharmacy</p> <p>CO3: Obtained basic training in the day to day activities of industry / hospital / community pharmacy</p> <p>CO4: Got experience of documentation of observation and report writing</p> <p>CO5: Learnt work culture of industry / hospital / community pharmacy</p>
<b>SEMESTER-VIII</b>		
63.	<p align="center"><b>BP801T</b></p> <p align="center"><b>Biostatistics and Research Methodology</b></p>	<p>CO1: Understand the fundamentals of biostatistics and their applications in pharmacy.</p> <p>CO2: Apply statistical techniques in drug development and clinical research.</p> <p>CO3: Interpret research data using descriptive and inferential statistics.</p> <p>CO4: Design and evaluate research studies including sampling methods and hypothesis testing.</p> <p>CO5: Develop scientific reports and communicate research findings effectively.</p>

64.	<p align="center"><b>BP802T</b></p> <p align="center"><b>Social and Preventive Pharmacy</b></p>	<p>CO1: Apply the concept of social and health education for maintenance of health and hygiene</p> <p>CO2: Utilize various measures to prevent and control various communicable and non-communicable diseases</p> <p>CO3: Recommend relevant national health program by analysing health needs of society</p> <p>CO4: Explain objectives , components , strategies and outcome of different national health interventional program</p> <p>CO5: Illustrate the community services for rural, urban and school health promotion and development</p>
65.	<p align="center"><b>BP803ET</b></p> <p align="center"><b>Pharmaceutical Marketing</b></p>	<p>CO1: To provide an understanding of marketing concepts and techniques and the</p> <p>CO2: Application of the same in the pharmaceutical industry.</p>
66.	<p align="center"><b>BP804ET</b></p> <p align="center"><b>Pharmaceutical Regulatory Science</b></p>	<p>CO1: Know about the process of drug discovery and development</p> <p>CO2: Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals</p> <p>CO3: Know the regulatory approval process and their registration in Indian and international markets</p>
67.	<p align="center"><b>BP805ET</b></p> <p align="center"><b>Pharmacovigilance</b></p>	<p>CO1: Understand the principles and practices of pharmacovigilance</p> <p>CO2: Evaluate the causality of ADRs and assess their impact on patient safety</p> <p>CO3: Design and implement pharmacovigilance systems and processes</p> <p>CO4: Apply critical thinking skills to identify and mitigate safety risks</p> <p>CO5: Develop risk management plans and strategies to minimize drug-related risks.</p>

68.	<p style="text-align: center;"><b>BP806ET</b></p> <p style="text-align: center;"><b>Quality Control and Standardization of Herbals</b></p>	<p>CO1: Explain WHO, EU, and ICH guidelines for quality control of herbal drugs.</p> <p>CO2: Apply principles of cGMP, GAP, GMP, and GLP in the herbal drug industry.</p> <p>CO3: Evaluate herbal drugs using chromatographic and pharmacopoeial methods.</p> <p>CO4: Demonstrate understanding of regulatory requirements and documentation for herbal drug approval and export.</p> <p>CO5: Assess safety, stability, and efficacy of herbal medicines using standard protocols.</p>
69.	<p style="text-align: center;"><b>BP807ET</b></p> <p style="text-align: center;"><b>Computer Aided Drug Design</b></p>	<p>CO 1: Impart knowledge and skills necessary for computer applications in pharmaceutical research and development.</p> <p>CO 2: Acquire knowledge of computational modelling in preclinical and clinical development.</p> <p>CO 3: Understand the importance of Artificial intelligence.</p> <p>CO 4: Understand in silico drug design technology.</p> <p>CO 5: Analyze QSAR, structure activity relationship in drug development.</p>
70.	<p style="text-align: center;"><b>BP808ET</b></p> <p style="text-align: center;"><b>Cell and Molecular Biology</b></p>	<p>CO1: Summarize cell and molecular biology history.</p> <p>CO2: Summarize cellular functioning and composition.</p> <p>CO3: Describe the chemical foundations of cell biology.</p> <p>CO4: Summarize the DNA properties of cell biology.</p> <p>CO5: Describe protein structure and function, cellular membrane structure and function</p>
71.	<p style="text-align: center;"><b>BP809ET</b></p> <p style="text-align: center;"><b>Cosmetic Science</b></p>	<p>CO1: Know the cosmetic principles to address the needs of cosmetic industry.</p> <p>CO2: Understand formulation science and analytical techniques required to scientifically design and develop cosmetic products.</p> <p>CO3: Explain the scientific and technical aspects, high standards of practice and professional ethics within the cosmetic and toiletries industry</p> <p>CO4: Understand different cosmetics excipients in the development of cosmeceutical products</p> <p>CO5: Role of herbs in cosmetics</p>

72.	<p style="text-align: center;"><b>BP810ET</b> <b>Experimental Pharmacology</b></p>	<p>CO1: Demonstrate ethical handling of lab animals and conduct basic pharmacological experiments using in vivo, in vitro, and simulation models.</p> <p>CO2: Conduct and interpret CNS drug screening using appropriate experimental models.</p> <p>CO3: Evaluate effects of drugs on the autonomic and somatic nervous systems using preclinical techniques.</p> <p>CO4: Assess pharmacological actions of drugs on cardiovascular and other organ systems through experimental screening.</p> <p>CO5: Apply research methods and biostatistics in designing experiments and analyzing pharmacological data.</p>
73.	<p style="text-align: center;"><b>BP811ET</b> <b>Advanced Instrumentation Techniques</b></p>	<p>CO1: understand the advanced instruments used and its applications in drug analysis</p> <p>CO2: understand the chromatographic separation and analysis of drugs.</p> <p>CO3: understand the calibration of various analytical instruments know analysis of drugs using various analytical instruments.</p>
74	<p style="text-align: center;"><b>BP813PW</b> <b>Project Work</b></p>	<p>CO1: Know the source of literature and literature survey</p> <p>CO2: Able to design research protocol and carry out study as per design</p> <p>CO3: Can analyze and interpret research data using appropriate statistical tools</p> <p>CO4: Capable of writing scientific documents</p> <p>CO5: Develop tendency to work in group</p>



# MAR DIOSCORUS COLLEGE OF PHARMACY

(Owned & Managed by the Charitable & Educational Society of the Thiruvananthapuram Orthodox Diocese Reg. No. 977/91)

Hermongiri Vidyapeetam, Alathara, Sreekariyam  
Thiruvananthapuram - 695 017, Kerala, India.  
Email : gabrielmargregorios@gmail.com

## COURSE OUTCOME

### PROGRAMME: PHARM.D

Sl. No	Name of the Course	Course Outcome
<b>FIRST YEAR</b>		
1.	<b>1.1 Human Anatomy and Physiology</b>	<p>CO1: Explain the structure and functions of cells, tissues, organs, and major body systems using fundamental concepts of anatomy and physiology.</p> <p>CO2: Describe physiological processes such as homeostasis, nerve conduction, muscle contraction, blood circulation, respiration, digestion, and excretion.</p> <p>CO3: Correlate anatomical features with physiological functions to understand the basis of normal and abnormal body functions.</p> <p>CO4: Perform laboratory experiments and identify anatomical structures using models, charts, slides, and specimens with proper scientific skills.</p> <p>CO5: Apply knowledge of human anatomy and physiology to analyze simple clinical cases and understand their relevance to pharmacy practice.</p>
2.	<b>1.1 Human Anatomy and Physiology (Practical)</b>	<p>CO1: To understand the practical aspects in Practical physiology is complimentary to the theoretical discussions in physiology.</p> <p>CO2: Practical allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.</p> <p>CO3: This is helpful for developing an insight on the subject.</p>

3.	<b>1.2 Pharmaceutics</b>	<p>CO1: Know the formulation aspects of different dosage forms</p> <p>CO2: Know about basic components of Prescription and its handling procedure</p> <p>CO3: Know about the development of profession of pharmacy, pharmaceutical industry and Pharmacopoeias</p> <p>CO4: Appreciate the importance of good formulation for effectiveness</p> <p>CO5: Do different pharmaceutical calculation involved in formulation including dose calculations.</p>
4.	<b>1.2 Pharmaceutics (Practical)</b>	<p>CO1: Able to understand the procedures involved in the preparation of solid and semisolid dosage forms</p> <p>CO2: Able to understand the procedures involved in the preparation of liquid dosage forms</p> <p>CO3: Able to do dose calculation from given official quantity.</p> <p>CO4: Able to understand labelling procedure and packaging of different types of dosage forms</p> <p>CO5: Able to understand different types of incompatibilities in formulation</p>
5.	<b>1.3 Medicinal Biochemistry</b>	<p>CO 1: Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.</p> <p>CO: 2 Know the metabolic process of biomolecules in health and illness (metabolic disorders).</p> <p>CO: 3 Understand the genetic organization of mammalian genome , protein synthesis, replication, mutation and repair mechanism.</p> <p>CO:4 Understand the biochemical principles of organ function tests of kidney, liver and endocrine gland.</p> <p>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.</p>

6.	<p style="text-align: center;"><b>1.3 Medicinal Biochemistry (Practical)</b></p>	<p>CO 1: Qualitatively analyze the normal and abnormal constituents of urine.</p> <p>CO 2: Quantitatively estimate the various constituents present in urine.</p> <p>CO 3: Study the factors affecting enzymatic activity.</p> <p>CO 4: Quantitatively estimate the various constituents in serum.</p> <p>CO 5: Qualitative analysis of carbohydrates and identification tests for proteins.</p>
7.	<p style="text-align: center;"><b>1.4 Pharmaceutical Organic Chemistry</b></p>	<p>CO1: Demonstrate proficiency in IUPAC and common system nomenclature for various classes of organic compounds.</p> <p>CO2: Understand and explain the relationship between structure and physical properties of organic compounds.</p> <p>CO3: Describe and predict the mechanisms of free radical, nucleophilic, and electrophilic reactions, including substitution, addition, elimination, oxidation, and reduction processes.</p> <p>CO4: Assess the factors affecting the order of reactivity, orientation, and stability of organic compounds in different reactions.</p> <p>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.</p>
8.	<p style="text-align: center;"><b>1.4 Pharmaceutical Organic Chemistry (Practical)</b></p>	<p>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.</p> <p>CO2: Students will demonstrate the ability to identify unknown organic compounds through systematic qualitative analysis and confirmatory derivative formation.</p> <p>CO3: Students will effectively use molecular models to represent and distinguish stereoisomers like cis-trans alkenes, and understand molecular geometry and configuration changes.</p>

		<p>CO4: Students will apply laboratory techniques such as melting point determination, TLC, and solvent extraction for compound purification and analysis.</p> <p>CO5: Students will follow proper safety protocols and accurately document laboratory findings, preparing them for advanced research or industrial laboratory settings.</p>
9.	<p><b>1.5 Pharmaceutical Inorganic Chemistry</b></p>	<p>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.</p> <p>CO2: Can perform preparation and standardization of volumetric solution.</p> <p>CO3: Describe the sources of errors in pharmaceutical analysis and method of minimization errors.</p> <p>CO4: Explain the sources of impurities and methods to determination determine the impurities in inorganic substance and pharmaceuticals.</p> <p>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.</p>
10.	<p><b>1.5 Pharmaceutical Inorganic Chemistry (Practical)</b></p>	<p>CO1: To understand the detection of impurities in pharmaceutical inorganic compound</p> <p>CO2: To understand preparation and standardisation of volumetric solution and carry out the estimation of inorganic compounds</p> <p>CO3: To understand the tests for purity of compound</p> <p>CO4: To familiarize with preparation of inorganic compounds</p> <p>CO5: To understand identification of unknown compound</p>



		<p>CO5: Explain the pathophysiology of common systemic diseases, affecting the cardiovascular, nervous, endocrine, gastrointestinal, respiratory, renal and hepatic systems.</p> <p>CO6: Describe the pathophysiology of infectious, environmental and nutritional diseases including radiation effects, pollution related disorders, malnutrition, obesity and life style related diseases.</p> <p>CO7: Apply the pathophysiological knowledge to correlate disease mechanisms with clinical manifestations, complications and therapeutic rationale in pharmacy practice.</p>
14	<b>2.2 Pharmaceutical Microbiology (Theory)</b>	<p>CO1: Describe the fundamentals of microbiology, including classification, morphology, and general characteristics of bacteria, fungi, viruses, and other microorganisms.</p> <p>CO2: Explain the nutritional requirements, growth, cultivation, and maintenance of microbial cultures using appropriate media and laboratory techniques.</p> <p>CO3: Apply methods for isolation, identification, staining, counting, and sterilization of microorganisms relevant to pharmaceutical and clinical practices.</p> <p>CO4: Analyze the principles and applications of disinfection, immunology, diagnostic tests, and microbial sensitivity testing in disease prevention and treatment.</p> <p>CO5: Interpret microbiological assays, sterility testing, and infectious disease profiles with relevance to pharmaceutical products, vaccines, and public health.</p>
15	<b>2.2 Pharmaceutical Microbiology (Practical)</b>	<p>CO1: Identify and handle microbiological apparatus and perform sterilization of glassware, media preparation, and aseptic techniques safely.</p> <p>CO2: Perform staining techniques, motility studies, and enumeration methods to observe, differentiate, and quantify microorganisms.</p> <p>CO3: Isolate pure cultures and carry out biochemical tests for the identification of microorganisms.</p> <p>CO4: Conduct microbiological evaluations such as culture sensitivity testing, sterility testing, MIC determination, and diagnostic tests for common diseases.</p> <p>CO5: Execute microbiological assays of antibiotics and vitamins using standard methods and interpret experimental results accurately.</p>

16	<p align="center"><b>2.3 : Pharmacognosy and Phytopharmaceutics (Theory)</b></p>	<p>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</p> <p>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.</p> <p>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</p> <p>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.</p> <p>CO 5: Illustrate the role of phytochemical constituents in the medicinal value of natural drugs.</p>
17	<p align="center"><b>2.3 : Pharmacognosy and Phytopharmaceutics (Practical)</b></p>	<p>CO1: To identify crude drugs by morphology, histology, and powder analysis.</p> <p>CO2: To isolate and detect active principles from natural sources.</p> <p>CO3: To separate phytoconstituents using paper chromatography and TLC.</p> <p>CO4: To extract volatile oils and analyze them by TLC.</p> <p>CO5: To analyze crude drugs by chemical tests for major constituents</p>
18	<p align="center"><b>2.4 : Pharmacology I (Theory)</b></p>	<p>CO1: To understand fundamental principles of general pharmacology, including routes of drug administration, pharmacokinetics, pharmacodynamics etc.</p> <p>CO2: Describe the pharmacology of autonomic nervous system drugs, neuromuscular blockers, mydriatics/miotics and drugs used in myasthenia gravis and Parkinsonism.</p> <p>CO3: To understand the mechanism of action, therapeutic uses, adverse effects, and contraindications of cardiovascular drugs.</p> <p>CO4: Describe the pharmacology of drugs acting on central nervous system.</p> <p>CO5: To understand the mechanism of action and therapeutic applications of drugs acting on the respiratory</p>

		system, hormones and hormone antagonists and autocooids
19	<b>2.5 : Community Pharmacy</b>	<p>CO1: Explain the scope, roles, and professional responsibilities of a community pharmacist in the Indian healthcare system, with emphasis on pharmaceutical care and ethical practice.</p> <p>CO2: Apply principles of community pharmacy management including site selection, inventory control, legal requirements, record maintenance, and use of computer-based pharmacy software.</p> <p>CO3: Analyze prescriptions for completeness, legality, drug-related problems, and potential drug interactions, and recommend appropriate management strategies.</p> <p>CO4: Demonstrate effective patient counselling skills and perform basic health screening services such as blood pressure, blood glucose, lung function, and cholesterol monitoring.</p> <p>CO5: Provide rational drug therapy and evidence-based advice for minor ailments, OTC medication use, medication adherence, health education, and disease prevention at the community level.</p>
20	<b>2.6: Pharmacotherapeutics-1</b>	<p>CO1: Explain the pathophysiology of diseases affecting various body systems.</p> <p>CO2: Apply pharmacological principles to design individualized treatment plans.</p> <p>CO3: Evaluate evidence-based treatment options for specific diseases</p> <p>CO4: Develop care plans addressing patient-specific needs and monitoring parameters.</p> <p>CO5: Counsel patients on safe and effective medication use.</p>
21	<b>2.6: Pharmacotherapeutics-1 (Practical)</b>	<p>CO1: Apply SOAP framework</p> <p>CO2: Develop patient-centered pharmacotherapy plans</p> <p>CO3: Communicate effectively</p> <p>CO4: Integrate pharmacological knowledge</p> <p>CO5: Demonstrate clinical decision-making</p>



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Hermongiri Vidyapeetam, Alathara, Sreekariyam

Thiruvananthapuram - 695 017, Kerala, India.

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## COURSE OUTCOME

### PROGRAMME: M.PHARM -PHARMACEUTICS

No.	Name of the Course	Course Outcome
<b>SEMESTER-1</b>		
1.	<b>MPH101T Modern Pharmaceutical Analytical Techniques</b>	<p>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.</p> <p>CO2: Identify and characterize pharmaceutical substances and excipients using appropriate instrumental methods.</p> <p>CO3: Analyze drugs in both single and combination dosage forms with precision using advanced analytical instruments.</p> <p>CO4: Develop theoretical knowledge related to the working, calibration, and troubleshooting of modern analytical instruments.</p> <p>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.</p>
2.	<b>MPH102T Drug Delivery System</b>	<p>CO1: Understand the fundamental concepts and advantages of sustained release and controlled release drug delivery systems and to define personalized medicine and the role of pharmacogenetics in tailoring drug therapy for individual patient needs</p> <p>CO2: Explain the principles and fundamentals of rate-controlled drug delivery systems and their therapeutic advantages.</p> <p>CO3: Explain the principles and concepts behind gastro-retentive and buccal drug delivery systems.</p> <p>CO4: Discuss different formulation and technological strategies used to overcome ocular drug delivery barriers</p>

		CO5: Explain formulation strategies used in transdermal drug delivery, barriers associated with protein and peptide drug delivery & analyse the principles and limitations of mucosal and transdermal vaccine delivery routes.
3.	<b>MPH103T Modern Pharmaceutics</b>	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.	<b>MPH104T Regulatory Affairs</b>	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.	<b>MPH105P Pharmaceutics Practicals-I</b>	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.	<b>MPH201T Molecular Pharmaceutics</b>	<p>CO1: Understand the events, biological process and methods involved in tumor targeting and Brain specific delivery</p> <p>CO2: Analyze the advantages, limitations, and clinical relevance of nanoparticulate and liposomal drug delivery systems in targeted therapy</p> <p>CO3: Discuss therapeutic applications of monoclonal antibodies and stability concerns of different vesicular and particulate drug delivery systems</p> <p>CO4: Demonstrate preparation techniques and key formulation parameters influencing aerosol performance and nasal delivery systems.</p> <p>CO5: Evaluate current challenges, ethical concerns, and future prospects of nucleic acid-based drug delivery systems in clinical applications and the knowledge of therapeutic antisense molecules and aptamers as emerging platforms for targeted therapy.</p>
7.	<b>MPH202T Advanced Biopharmaceutics and Pharmacokinetics</b>	<p>CO1: Understanding the basic concepts in biopharmaceutics and pharmacokinetics.</p> <p>CO2: To describe the process of drug absorption, distribution, metabolism and elimination.</p> <p>CO3: Critical evaluation of biopharmaceutic studies involving drug product equivalency.</p> <p>CO4: Ability to design and evaluate the dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.</p> <p>CO5: Understanding the concepts of in -vitro in-vivo correlations.</p>

8.	<p style="text-align: center;"><b>MPH203T</b></p> <p style="text-align: center;"><b>Computer Aided Drug Delivery system</b></p>	<p>CO1: Describe the evolution and role of computer technologies in pharmaceutical research and development, from early systems to modern informatics.</p> <p>CO2: Apply computational modeling techniques for simulating drug disposition and predicting pharmacokinetic behavior in preclinical studies.</p> <p>CO3: Utilize computer-based tools and optimization techniques for pharmaceutical formulation and product development.</p> <p>CO4: Analyze the applications of computer systems in clinical development, market analysis, and regulatory data management.</p> <p>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.</p>
9.	<p style="text-align: center;"><b>MPH204T</b></p> <p style="text-align: center;"><b>Cosmetics and Cosmeceuticals</b></p>	<p>CO1: Knowledge on regulation of cosmetics</p> <p>CO2: Knowledge on biological aspects of cosmetics</p> <p>CO3: Knowledge on formulation Building blocks</p> <p>CO4: Knowledge on design of cosmeceutical products</p> <p>CO5: Knowledge on herbal Cosmetics</p>
10.	<p style="text-align: center;"><b>MPH205P</b></p> <p style="text-align: center;"><b>Pharmaceutics Practicals- II</b></p>	<p>CO1: Hands- on experience with advanced technologies like microencapsulation, controlled release formulations</p> <p>CO2: Understand the principle and methods of in-vitro and in-vivo evaluation</p> <p>CO3: Learn to design and conduct research experiments in pharmaceutics</p> <p>CO4: Learn to develop innovative pharmaceutical formulation</p> <p>CO5: Develop skill to determine the pharmacokinetic and pharmacodynamic parameters of drugs.</p>

<b>SEMESTER-III</b>		
11.	<b>MRM301T Research Methodology and Biostatistics</b>	<p>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.</p> <p>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.</p> <p>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.</p> <p>CO4: Demonstrate knowledge of CPCSEA guidelines for laboratory animal use, including facility management, animal care, record keeping, and personnel training.</p> <p>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.</p>
12.	<b>Journal Club</b>	<p>CO1: Able to collect relevant literature and critically evaluate them</p> <p>CO2: Learnt to make a PPT presentation scientifically and deliver the same</p> <p>CO3: Able to involve effectively in post presentation discussion</p>
13.	<b>Project Discussion/ Presentation</b>	<p>CO1: Able to select research topic through literature review</p> <p>CO2: Able to design research methodology</p> <p>CO3: Able to Present the selected research proposal convincingly</p>
14.	<b>Research Work</b>	<p>CO1: Able to carry out research work scientifically following research ethics</p> <p>CO2: Able to collect data, interpret them using appropriate statistical tools and arrive at conclusion scientifically</p> <p>CO3: Able to document the research work in the form of thesis in an acceptable format</p>

15.	<b>Pre submission Discussion/Presentation</b>	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
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