

Vidarbha Youth Welfare Society's
INSTITUTE OF PHARMACEUTICAL EDUCATION AND RESEARCH
Borgaon (Meghe), Wardha (M.S.)

Course Outcomes (COs)

B. Pharm and M. Pharm

B. Pharm

Course	Course Code	Course Outcome Number	Course Outcome
Human Anatomy and Physiology I	BP101T		Upon completion of the course student will be able to
		1	Explain the gross morphology, structure and functions of various organs of the human body
		2	Describe the various homeostatic mechanisms and their imbalances.
		3	Identify the various tissues and organs of different systems of human body
		4	Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume
		5	Understand the coordinated working pattern of different organs of each system
		6	Relate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Analysis I	BP102T		Upon completion of the course student will be able to
		1	Understand the concept of accuracy, precision, significant figure and apply the knowledge gained to prepare and standardize solutions of different strength.
		2	Identify the sources of errors and apply measures to minimize them
		3	Understand basic principles involved in various titrations like acid base, non-aqueous, precipitation, gravimetric and redox.
		4	Know electrochemical methods of analysis and operate potentiometer and conductivity meter.
		5	Illustrate theoretical and practical concepts and applications of various volumetric and electrochemical analysis.
		6	Compose analytical observations and results for various analytical experiments.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutics I	BP103T		Upon completion of the course student will be able to
		1	Know history of development of pharmacy profession and industry in India and role of pharmacist in society.
		2	Understand the basics of compounding and dispensing of liquid dosage forms.
		3	Acquire the basic skill and confidence in preparing quality dosage formulations of various types.
		4	Apply the concept of pharmaceutical calculations for dose calculation and preparing isotonic solution.
		5	Identify incompatibilities in prescription and understand the professional way of handling the prescription.
		6	Defend the challenges in practicing dispensing pharmacy profession
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Inorganic Chemistry	BP104T		Upon completion of the course student will be able to
		1	Analyse and evaluate the sources of impurities and employ methods to determine the impurities.
		2	Understand the medicinal and pharmaceutical importance of inorganic compounds.
		3	Explain the concept of acids, bases and buffers.
		4	State major extra and intracellular electrolytes
		5	Understand dentifrices and role of fluoride in the treatment of dental caries.
		6	Describe the gastrointestinal agents and acidifiers.
Course	Course Code	Course Outcome Number	Course Outcome
Communication Skill	BP105T		Upon completion of the course student will be able to
		1	Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
		2	Communicate effectively (Verbal and Non Verbal)
		3	Effectively manage the team as a team player
		4	Develop interview skills
		5	Develop Leadership qualities and essentials
		6	Employ knowledge of general communication, business letters, summarizing and abstracting, expressing ideas in restricted word limit, paragraph division, spellings, punctuation etc.

Course	Course Code	Course Outcome Number	Course Outcome
Remedial Biology	BP106RBT		Upon completion of the course student will be able to
		1	Understand the characters of living organisms and classification of kingdoms
		2	Demonstrate morphology and functions of various plant parts such as root, stem, leaf, flower, fruit and seed.
		3	Explain the functions of the cardiovascular, digestive and respiratory systems of human body
		4	Illustrate the physiology of brain and spinal cord, and role of kidney in regulation of body fluid.
		5	Describe the role of hormones in regulation of organ function in the body and process of oogenesis and spermatogenesis
		6	Elaborate the physiology, and nutrient requirements for plants.
Course	Course Code	Course Outcome Number	Course Outcome
Remedial Mathematics	BP106RMT		Upon completion of the course student will be able to
		1	Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.
		2	Create, use and analyse mathematical representations and mathematical relationships, also communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy
		3	Perform abstract mathematical reasoning and describe the concept of matrix. Definite and indefinite integral and its application in pharmacy
		4	Explain the basic concept of graphical representation and diagrammatic representation of data.
		5	Demonstrate the law of regression, standard deviation and correlation and apply the principle of probability, t-test and f-test in solving the numerical problems.
		6	Develop the numerical skills.
Course	Course Code	Course Outcome Number	Course Outcome
Human Anatomy and Physiology I	BP107P		Upon completion of the course student will be able to
		1	Demonstrate skills for handling equipments required for understanding the practical.
		2	Understand the features of skeletal system
		3	Perform the various experiments related to special senses and nervous system.
		4	Explain the precautions to be followed while doing the experiments in the laboratory.
		5	Clarify significance of bleeding time, clotting time, blood group detection, haemoglobin detection, W.B.C. count, R.B.C. count of blood sample and blood pressure determination.
		6	Demonstrate the simple laboratory techniques
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Analysis I	BP108P		Upon completion of the course student will be able to
		1	Develop analytical skills by applying theoretical knowledge of various titrations
		2	Understand the calibration of various apparatus and instruments.
		3	demonstrate standardization of solutions of different strengths
		4	Determine percentage purity of pharmaceutical compounds by volumetric analysis.
		5	Examine normality of acid mixtures by electro-analytical methods
		6	Analyze using gravimetric analytical techniques
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutics I	BP109P		Upon completion of the course student will be able to
		1	Understand the principles used in the preparation of solid, liquid and semi solid dosage forms.
		2	Formulate and label syrups, elixirs and semisolid dosage forms.
		3	Perform pharmaceutical calculations to determine parameters like density, viscosity, specific gravity.
		4	Design powders and granules and describe use of ingredients in formulations.
		5	Compare and develop various liquid dosage form preparations depending upon their formulation.
		6	Select suitable packaging material(container-closure)for suppositories and other formulations.
Course	Course Code	Course Outcome Number	Course Outcome

Pharmaceutical Inorganic Chemistry	BP110P		Upon completion of the course student will be able to
		1	Able to perform limit tests for qualitative analysis.
		2	Demonstrate the preparation of inorganic pharmaceuticals.
		3	Apply knowledge to perform modified limit tests.
		4	Analyze various inorganic pharmaceutical compounds
		5	Able to perform neutralizing capacity of antacid formulation.
		6	Perform the identification tests prescribed by pharmacopeia .
Course	Course Code	Course Outcome Number	Course Outcome
Communication Skill	BP111P		Upon completion of the course student will be able to
		1	Understand Basic communication skills and interviewing skills.
		2	Learn about Making Friends, Do's and Dont's during communication.
		3	Employ correct pronunciation of consonant sounds and vowel sounds.
		4	Understand about Advanced Learning, Listening Comprehension / Direct and Indirect Speech.
		5	Recall Figures of Speech for effective communication.
		6	Develop Effective Writing and Interview Handling Skills.
Course	Course Code	Course Outcome Number	Course Outcome
Remedial Biology	BP112RBP		Upon completion of the course student will be able to
		1	Describe the different types of human bones.
		2	Identify a given plant part based on its macroscopic and microscopic characteristics.
		3	Explain the various systems of frog using computer models.
		4	Explain the various technique for blood groups, blood pressure and tidal volume.
		5	Describe the techniques of section cutting, mounting and staining.
		6	Recognize the different cell inclusions and cell wall components.
Course	Course Code	Course Outcome Number	Course Outcome
Human Anatomy and Physiology II	BP201T		Upon completion of the course student will be able to
		1	Explain the gross morphology, structure and functions of various organs of the human body
		2	Describe the various homeostatic mechanisms and their imbalances.
		3	Identify the various tissues and organs of different systems of human body
		4	Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume
		5	Illustrate coordinated working pattern of different organs of each system
		6	Explain the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Organic Chemistry I	BP202T		Upon completion of the course student will be able to
		1	Write the structure, name and the type of isomerism of the organic compound.
		2	Write the reaction, name the reaction and orientation of reactions
		3	Discuss the reactivity and stability of compounds
		4	Identify and confirm the organic compounds.
		5	Understand the principle of E1, E2, SN1 and SN2 reactions
		6	Analyse and evaluate qualitative tests, structure and uses of organic compound.
Course	Course Code	Course Outcome Number	Course Outcome
Biochemistry	BP203T		Upon completion of the course student will be able to
		1	Describe the concepts of biological oxidation and bioenergetics.
		2	Understand and explain metabolism of carbohydrate by various catalytic and anabolic pathways.
		3	Explain the metabolic mechanism of lipid and protein, disorders of lipid and protein metabolism.
		4	Know the genetic organization of living system, types, functions of DNA & RNA
		5	Distinguish the process of DNA replication, transcription and translation.
		6	Illustrate the catalytic role of enzymes, types and importance of enzyme inhibitors, therapeutic and diagnostic applications of enzymes.
Course	Course Code	Course Outcome Number	Course Outcome
			Upon completion of the course student will be able to
		1	Describe the etiology and pathogenesis of the selected disease states

Pathophysiology	BP204T	2	Identify the signs and symptoms of the diseases
		3	Explain the complications of the diseases
		4	Understand the basic pathophysiological mechanisms
		5	Acquire the knowledge of pathology of various disease conditions
		6	Acquire the basic knowledge required to practice medicine
Course	Course Code	Course Outcome Number	Course Outcome
Computer Applications in Pharmacy	BP205T		Upon completion of the course student will be able to
		1	Understand and describe the various types of applications of computers in pharmacy.
		2	Analyze and explain the different types of databases and different stages of development in programming databases.
		3	Identify and explain the role of computers databases analysis in the field of preclinical development.
		4	Explain and describe the different types of programming languages and handling of program
		5	Explain and describe the bio-informatics use in vaccine discovery and role of computer and different types of software use in bio-informatics.
		6	know about creating and operating different types of data bases using MS-Access, SQL.
Course	Course Code	Course Outcome Number	Course Outcome
Environmental Science	BP206T		Upon completion of the course student will be able to
		1	Understand multidisciplinary nature of environmental studies, Natural Resources, Renewable and non-renewable resources, and associated problems
		2	Understand the basics of environment like ecology, ecosystem, food chain, food web and ecological pyramids.
		3	Get acquainted with the different natural sources and their conservation to save the environment
		4	Know the current problems of environment and how to solve them, Role of individual in conservation of environment and natural resources.
		5	Understand the different factors of environmental pollution and measures to minimize them.
		6	Acquire skills to help the concerned individuals in identifying and solving environmental problems.
Course	Course Code	Course Outcome Number	Course Outcome
Human Anatomy and Physiology II	BP207P		Upon completion of the course student will be able to
		1	Explain the gross morphology, structure and functions of various organs of the human body
		2	Describe the various homeostatic mechanisms and their imbalances.
		3	Identify the various tissues and organs of different systems of human body
		4	Perform the hematological tests like blood cell counts, tidal volume, vital capacity, and also record blood pressure.
		5	Illustrate coordinated working pattern of different organs of each system
		6	Compare the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Organic Chemistry I	BP208P		Upon completion of the course student will be able to
		1	Perform the qualitative analysis for pharmaceutical organic compounds.
		2	Identify the extra elements present in the pharmaceutical organic compounds.
		3	Find the presence of several functional groups in pharmaceutical compounds.
		4	Appraise the rules concerned with reactivity and orientation of organic compounds.
		5	Analyse unknown pharmaceutical organic compounds by determining their melting point/boiling point
		6	Prepare and characterize the derivatives of organic compounds.
Course	Course Code	Course Outcome Number	Course Outcome
Biochemistry	BP209P		Upon completion of the course student will be able to
		1	Detect and identify proteins, amino acids and carbohydrates by various qualitative tests.
		2	Estimate reducing sugars and proteins by quantitative analysis.
		3	Identify normal and abnormal biochemical constituents of urine.
		4	Determine blood creatinine, sugar and serum cholesterol by various analytical methods
		5	Analyze and determine the factors affecting enzyme activity.
6	Demonstrate action of salivary amylase on starch.		

Course	Course Code	Course Outcome Number	Course Outcome
Computer Applications in Pharmacy	BP210P		Upon completion of the course student will be able to
		1	Understand and create questionnaires and other documentation related to pharmacy by using MS Word package.
		2	Create data base, HTML WEB pages and modifying data by using CSS.
		3	Understand the use of online tools for searching information and data storage for retrieval.
		4	Understand, create and explain use of MS-Access to modify the data bases created HTML and XML pages.
		5	Create and generate report; and work on with queries on MS-Access.
		6	Understand, create and explain use of MS-Access to modify the patient's data by using DBMS base System and create patients' history data for hospital management.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Organic Chemistry II	BP301T		Upon completion of the course student will be able to
		1	Draw, Identify, classify, organize and analyze the stability of structures of organic molecules
		2	Integrate many skills and principles for synthesis of organic compounds, identification of starting materials and prediction of products
		3	Distinguish between aromatic and antiaromatic compounds, concept of induction and resonance and effect of activating and deactivating groups on aromatic ring
		4	Understand methods available for estimation of various analytical constants used for determination of purity of oil samples.
		5	Predict the structure and understand the chemistry of some polynuclear aromatic hydrocarbons during structure elucidation
		6	Identify, create and write the mechanism of chemical reactions
Course	Course Code	Course Outcome Number	Course Outcome
Physical Pharmaceutics I	BP302T		Upon completion of the course student will be able to
		1	Understand and analyze various concepts of solubility.
		2	Recognize and understand various states and properties of matter, and the physicochemical properties of drug molecules.
		3	Learn various aspects of surface and interfacial phenomenon, adsorption at solid and liquid interfaces and HLB scale
		4	Describe various types of complexes.
		5	Understand the properties and different methods of analysis of complexes, protein binding, and involvement of complexes in drug action.
		6	Gain knowledge about pH and its determination, buffers, their application, buffer capacity, buffer equation, and concept of isotonicity.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Microbiology	BP303T		Upon completion of the course student will be able to
		1	Understand microscopic techniques, and illustrate bacterial structure, growth, isolation, preservation and measurement
		2	Identify bacteria on the basis of staining and biochemical tests, and discuss sterilization methods with its evaluation and sterility indicators
		3	Understand viruses and fungi with respect to Morphological characteristics, Cultivation and reproduction
		4	Classify disinfectants, explain mode of action, factors influencing, evaluation of disinfectant and test for sterility
		5	Identify and explain sources of contamination and its prevention. Describe microbiological assay, Standardization and assessment of antibiotics, vitamins and amino acid
		6	Explain the preservation of pharmaceutical products and their microbial stability.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Engineering	BP304T		Upon completion of the course student will be able to
		1	Explain various types of manometers and demonstrate understanding of Reynold's number and explain its significance.
		2	Explain fundamental aspects of fluid flow behaviour based on fluid mechanics and Develop steady state mechanical energy balance equation for fluid flow systems.
		3	Illustrate factors affecting size reduction, and describe principle, construction, working, advantages and disadvantages of equipment's used for size reduction and size separation.
		4	Explain types of sources of heat used for industrial scale operations, and significance of heat transfer processes in designing the pharmaceutical unit.

		5	Describe principle, construction, working, advantages and disadvantages of equipments used for evaporation, distillation, drying process, mixing process, centrifugation and filtration.
		6	Demonstrate the material handling techniques. Describe preventive methods used for corrosion control in Pharmaceutical industries.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Organic Chemistry II	BP305P		Upon completion of the course student will be able to
		1	Understand the laboratory techniques required in performing the experiments e.g. distillation, recrystallization etc
		2	Know the synthetic procedures, purification of compounds and their characterization.
		3	Distinguish the adulterants / impurities present in the marketed oil sample on the basis of chemical constants determination
		4	Determine the starting materials required for synthesis and will be able to optimize the reaction conditions
		5	Judge the mechanisms of synthetic procedures
		6	Understand the procedures and principle involved in the determination of chemical constants.
Course	Course Code	Course Outcome Number	Course Outcome
Physical Pharmaceutics I	BP306P		Upon completion of the course student will be able to
		1	Determine solubility at room temperature.
		2	Determine partition coefficient
		3	Apply the phase rule and determine composition of sodium chloride in phenol water system by critical solution temperature.
		4	Determine surface tension of liquids
		5	Estimate critical micelle concentration and HLB value of surfactant.
		6	Determine Freundlich and Langmuir constants using activated char coal
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Microbiology	BP307P		Upon completion of the course student will be able to
		1	Know the use and standard operating procedure of different equipment's like BOD incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator and microscopes use in experimental microscopy.
		2	Understand the sterilization technique of glassware and different culture media.
		3	Understand the subculturing technique of bacteria and fungus. Know the technique of preparation of nutrient stabs and slant preparation.
		4	Discuss the principle with demonstration of different staining methods and Understand different biochemical tests for identification of different bacteria.
		5	Isolate pure culture of different microorganism and study motility of bacteria by hanging drop method
		6	Assess microbiological assay of antibiotics and sterility testing of pharmaceuticals
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Engineering	BP308P		Upon completion of the course student will be able to
		1	Perform the determination of radiation constant of brass, iron, unpainted and painted glass.
		2	Evaluate and calculate the efficiency of steam distillation and determine the overall heat transfer coefficient by heat exchanger.
		3	Determine moisture content and loss on drying and construct drying curves.
		4	Demonstrate construction, working and application of various pharmaceutical machineries and determine of humidity of air from wet and dry bulb temperatures.
		5	Perform and verify the laws of size reduction using ball mill and Perform and explain the factors affecting Rate of Filtration and Evaporation.
		6	Analyze effect of time on the Rate of Crystallization and Calculate the uniformity Index for given sample by using Double Cone Blender.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Organic Chemistry III	BP401T		Upon completion of the course student will be able to
		1	Define the concepts of stereoisomerism, identify the reactions of chiral molecules and their synthesis.
		2	Understand and relate the concept of DS and RS system of nomenclature, racemic modification and its resolution
		3	Determine the geometrical isomers, atropisomers and will be able to draw, analyze and differentiate conformational isomers of open chain and cyclic compounds
		4	Distinguish heterocyclic compounds on basis of their chemistry and will be able to correlate the structure with its properties

		5	Predict the mechanisms of named reactions and will be able to apply it for similar type of reactions.
		6	Synthesize asymmetric compounds by applying the knowledge of stereochemistry.
Course	Course Code	Course Outcome Number	Course Outcome
Medicinal Chemistry I	BP402T		Upon completion of the course student will be able to
		1	Know the physicochemical properties in relation to biological action and the principles and factors affecting metabolism.
		2	Understand the concept of A.N.S., neurotransmitters and receptor involved in adrenergic system and the chemistry of sympathomimetic and adrenergic blocking agents with respect to their pharmacological activity.
		3	Know the concept of neurotransmitters, receptor involved in cholinergic system and to understand the chemistry of parasympathomimetic and cholinergic blocking agents with respect to their pharmacological activity.
		4	Understand the drugs affecting central nervous system and to know their structure activity relationship, mode of action, and toxic effects.
		5	Know the chemistry, structure activity relationship, mode of action and side effects of general anesthetic, narcotic analgesic and anti-inflammatory agents.
		6	Know the reaction mechanism and synthetic route of selected drugs mentioned in Indian Pharmacopoeia.
Course	Course Code	Course Outcome Number	Course Outcome
Physical Pharmaceutics II	BP403T		Upon completion of the course student will be able to
		1	Recognize and understand colloidal dispersion and its types, and various properties of colloidal systems - optical, kinetic & electrical properties
		2	Understand and apply the concept of rheology, Newtonian and Non-Newtonian fluids, types of viscometers, and plastic and elastic deformation of solids.
		3	Learn and explore various aspects of coarse dispersions – suspensions and emulsions, including flocculated and deflocculated suspensions,
		4	Understand and explore various theories of emulsification, methods of formulation of emulsions by HLB method, and their stability aspects.
		5	Apply various fundamental and derived properties of powders to characterize them.
		6	Know and describe the principles of chemical kinetics & to use them for stability testing and, understand the determination of expiry date of pharmaceutical formulations.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology I	BP404T		Upon completion of the course student will be able to
		1	Understand the pharmacological actions of different categories of drugs
		2	Understand in detailed about mechanism of drug action at organ system/sub cellular/ macromolecular levels.
		3	Understand the application of basic pharmacological knowledge in the prevention and treatment of various diseases.
		4	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
		5	Correlate pharmacology with other bio medical sciences.
		6	Understand the signal transduction mechanism of various receptors.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacognosy I	BP405T		Upon completion of the course student will be able to
		1	Provide an overview of alternative system of medicines and Recall the knowledge about modern concept and scope of Pharmacognosy.
		2	Systematically classify crude drugs from natural source and Describe the plant kingdom, classification, source of crude drugs, taxonomy of medicinal plants and medicinal plant families.
		3	Understand the cultivation, collection and post harvesting technology of crude drugs and Knowledge on crude drug adulteration and its evaluation.
		4	Describe the fundamental principles on cultivation, collection processing and evaluation of medicinal plants and an overview on secondary metabolites.
		5	Understand the primary metabolites including occurrence, chemistry, properties and estimation of carbohydrates, proteins, lipids etc. with various examples and study natural fibers used in surgical dressing.
		6	Discuss the phyto-chemical screening techniques and able to identify the phyto-constitutes of plants.
Course	Course Code	Course Outcome Number	Course Outcome

Medicinal Chemistry I	BP406P		Upon completion of the course student will be able to
		1	Recognize the starting materials and reaction mechanism involved in preparation of drugs/intermediates.
		2	Calculate molecular weight, theoretical yield and practical yield.
		3	Understand the principal involved in pharmacopoeial assay of different drugs.
		4	Calculate dilution factor and percentage purity
		5	Determine of partition coefficient of drugs.
		6	Predict the solvents used for recrystallization of prepared compound
Course	Course Code	Course Outcome Number	Course Outcome
Physical Pharmaceutics II	BP407P		Upon completion of the course student will be able to
		1	Determine particle size, particle size distribution using sieving method.
		2	Determine particle size, particle size distribution by microscopic method.
		3	Determine bulk density, true density, porosity and angle of repose and explain their importance.
		4	Determine viscosity of liquid using Ostwald's viscometer and Brookfield viscometer.
		5	Determine reaction rate constant for first and second order reaction.
		6	Understand methodology for conducting accelerated stability studies.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology I	BP408P		Upon completion of the course student will be able to
		1	Identify the appliances used in experimental pharmacology
		2	Understand drug effects using computer models.
		3	Perform experiments on isolated tissue preparation and in vivo studies.
		4	Handle animals and carry out the animal experiments.
		5	Observe and analyze the effect of drugs on animals by simulated experiments.
		6	Practice common laboratory techniques in animals
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacognosy I	BP409P		Upon completion of the course student will be able to
		1	Know the techniques in the cultivation and production of crude drugs.
		2	Understand and explain the crude drugs, their morphological characters, uses and chemical nature
		3	Evaluate and identify techniques of herbal drugs for understanding the quality and purity of crude drugs and also develop quality control methods for standardization of herbal drugs.
		4	Carry out the microscopic and morphological evaluation of crude drugs.
		5	Explain and perform chemical identification test to identify unorganized crude drugs.
		6	Understand and Explain handling of lab instrument by using proper parameter and technique.
Course	Course Code	Course Outcome Number	Course Outcome
Medicinal Chemistry II	BP501T		Upon completion of the course student will be able to
		1	Understand the chemistry, mode of action and side effects of antihistaminic and antineoplastic agents.
		2	Elucidate the structure activity relationship, mechanism of action and side effects of antianginal, diuretics and antihypertensive agents.
		3	Illustrate the fundamental knowledge on the chemistry of anti-arrhythmic, antihyperlipidemic, coagulant, anticoagulant and drugs used in congestive heart failure with respect to their pharmacological activity.
		4	Understand the nomenclature, stereochemistry, structure activity relationship and metabolism of steroids, chemistry, mode of action and side effects of thyroid hormones and antithyroid drugs.
		5	Recognize the chemistry of antidiabetic and local anesthetic agents, study their mechanism of action and side effects.
		6	Know the reaction mechanism and synthetic route of selected drugs mentioned in Indian Pharmacopeia.
Course	Course Code	Course Outcome Number	Course Outcome
			Upon completion of the course student will be able to
		1	Understand the importance and role preformulation studies in designing a robust formulation.
		2	Interrelate formulation and process variables during tablet manufacturing on the processing problems and quality of tablet.
		3	Develop and evaluate various liquid dosage forms such as syrups, elixirs, suspensions and emulsions.

Industrial Pharmacy I	BP502T	4	Formulate and evaluate dosage forms such as capsules, pellets, Aerosols, Parenterals and ophthalmic products.
		5	Outline classification of cosmetics and will be made aware of formulation of various cosmetic formulations.
		6	Identify and understand various materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials and quality control tests.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology II	BP503T		Upon completion of the course student will be able to
		1	Understand the mechanism of drug action and its relevance in the treatment of different diseases
		2	Understand the various clinical uses of drugs
		3	Recognize the adverse effects and contraindications of drugs
		4	Explain the Pharmacology of drugs acting on cardiovascular and urinary system
		5	Explain the basic concepts in endocrine pharmacology and the drugs used in endocrine disorders
		6	Understand the principles and applications of bioassay
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacognosy II	BP504T		Upon completion of the course student will be able to
		1	Understand basic metabolic pathways in plants and formation of different secondary metabolites through these pathways.
		2	Know the utilization of radioactive isotopes in the investigation of biogenetic studies.
		3	Gain the advanced knowledge of secondary plant metabolites like alkaloids, glycosides, tannins, terpenoids, resins etc.
		4	Understand advanced techniques of isolation, identification & analysis of phytoconstituents for the search of new drugs from natural sources.
		5	Understand utilization of various phytoconstituents in industrial production and their subsequent estimation.
		6	Know various modern methods of extraction, application of Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Jurisprudence	BP505T		Upon completion of the course student will be able to
		1	Understand the concepts of the pharmaceutical legislation in India and role of ethics in pharmacy profession while dealing with patients, public, fellow pharmacist and members of medical profession.
		2	Apply the knowledge on schedules pertaining to Drugs and cosmetics act 1940 and its rules 1945 and also administration of the act and rules in import, manufacture, sale of pharmaceuticals.
		3	Explain the importance of medicinal and toilet preparations act and identify potential fraud & abuse and legal issues of Narcotic & Psychotropic substance.
		4	Understand the functions of pharmacy councils and implementation of Education Regulations in pharmacy.
		5	Describe DPCO, IPR, and Right to information act, Drugs and Magic Remedies act and patent act.
		6	Know about animal cruelty act and medical termination of pregnancy act and apply their knowledge in saving animals' life and preventing termination of pregnancy
Course	Course Code	Course Outcome Number	Course Outcome
Industrial Pharmacy I	BP506P		Upon completion of the course student will be able to
		1	Know how solubility, particle size, particle shape, crystallinity, amorphous structure of pure drug as preformulation parameters plays a major role in developing the dosage form.
		2	Utilize the formulation and manufacturing procedures of tablet and capsule dosage forms and also able to understand the evaluation parameters for accessing their quality.
		3	Know the procedure of tablet coating and also make them analyze the reasons behind the defects in tablet coating.
		4	Get the knowledge of formulating and evaluating the parenteral as well as ophthalmic dosage forms.
		5	Evaluate materials used for packaging such as glass / plastic / rubber
		6	Formulate some of the cosmetics preparations and perform evaluation of the same

Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology II	BP507P		Upon completion of the course student will be able to
		1	Prepare and choose physiological salt solutions for isolated tissue preparations.
		2	Understand drug effects using computer models.
		3	Perform experiments on isolated tissue preparation and in vivo studies.
		4	Interpret the effect of spasmogens and spasmolytics on suitable tissue preparations
		5	Utilize principles of bioassay to construct the bioassay methods of various compounds
		6	Interpret the effect of spasmogens and spasmolytics on suitable tissue preparations.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacognosy II	BP508P		Upon completion of the course student will be able to
		1	Perform morphological, microscopical & powder characteristics studies of crude drugs.
		2	Utilize various extraction techniques in their practical work.
		3	Perform separation of sugars by paper chromatography.
		4	Analyse volatile oils from crude materials by Clavenger apparatus.
		5	Describe and perform thin layer chromatography of various extracts.
		6	Understand and perform isolation of various phytoactives by using various modern isolation techniques.
Course	Course Code	Course Outcome Number	Course Outcome
Medicinal Chemistry III	BP601T		Upon completion of the course student will be able to
		1	Understand the mode of action, nomenclature, metabolism, stereochemistry and structure activity relationship of beta lactamase, aminoglycoside and tetracycline antibiotics.
		2	Know the mode of action, nomenclature, metabolism, stereochemistry and structure activity relationship of macrolide antibiotics and antimalarial agents. Understand the concept of prodrug formulation.
		3	Explain fundamental knowledge on chemistry, mechanism of action, side effects and metabolism of antitubercular, urinary anti-infective and antiviral agents
		4	Know the chemistry, metabolism, side effects and mode of action of antifungal, antiprotozoal, anthelmintic and sulphonamide agents.
		5	Understand the importance, different approaches and docking techniques used in drug designing. Know the different physicochemical parameters used in QSAR study. Understand the concept of combinatorial chemistry.
		6	Know the reaction mechanism and synthetic route of selected drugs mentioned in Indian Pharmacopeia.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology III	BP602T		Upon completion of the course student will be able to
		1	Understand the mechanism of drug action in the treatment of different infectious diseases
		2	Explain its relevance in the treatment of different infectious diseases
		3	Describe the general treatment of poisoning
		4	Understand the principles of toxicology
		5	Understand treatment and Management of various poisonings
		6	Relate pharmacology with related medical sciences
Course	Course Code	Course Outcome Number	Course Outcome
Herbal Drug Technology	BP603T		Upon completion of the course student will be able to
		1	Understand the basics of raw material selection
		2	Know the good agricultural practices, adopt and explain basic principles of Indian systems of medicine emphasizing on preparation and standardization of Ayurvedic formulations.
		3	Describe benefits of various plants used in ailments as nutraceuticals and understand herb-drug and herb-food interactions.
		4	Select various raw materials used in herbal cosmetics to formulate herbal cosmetic products.
		5	Know the WHO & ICH stability guidelines for herbal drugs and to understand the process of patenting and IPR.
		6	Gain the knowledge of CGMP in herbal drug industry.
Course	Course Code	Course Outcome Number	Course Outcome

Biopharmaceutics and Pharmacokinetics	BP604T		Upon completion of the course student will be able to
		1	Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
		2	Recognize the factors affecting absorption, distribution, metabolism and elimination of drugs.
		3	Interpret the effect of drug-protein binding on distribution, pharmacological effect and elimination
		4	Draw scheme, write mathematical equations for various compartment models and apply these equations to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption and elimination.
		5	Predict the factors affecting bioavailability, design bioavailability and bioequivalence study for drug products and assess the bioavailability of drugs.
		6	Identify the reasons for non-linear kinetics and utilize the concept to determine Michaelis-Menton constant.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Biotechnology	BP605T		Upon completion of the course student will be able to
		1	Define basic concepts of enzyme biotechnology and protein engineering, explain various techniques for enzyme immobilization and understand different applications of biosensors in pharmaceutical industries.
		2	Understand the basic concepts of genetic engineering applications of rDNA technology in medicine.
		3	Distinguish between types of immunities, types of hypersensitivity reactions and compare different types of vaccines. Understand the general method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative as well as Storage conditions and stability of official vaccines.
		4	Understand the production, purification and applications of monoclonal antibodies.
		5	Describe Immune blotting techniques, Microbial genetics, Mutations and differentiation between genetic organization of Eukaryotes and Prokaryotes and will Identify various applications of microbial biotransformation.
		6	Classify types and methods of fermentation process and recall the fermented products. Appreciate the use of microorganisms in fermentation technology and summarize various blood and related products.
Course	Course Code	Course Outcome Number	Course Outcome
Quality Assurance	BP606T		Upon completion of the course student will be able to
		1	Understand the cGMP aspects, Concept of TQM in a pharmaceutical industry and importance of quality in pharmaceutical products.
		2	Appreciate the importance of documentation in a pharmaceutical industry
		3	Recognize the factors affecting the quality of pharmaceutical is explored.
		4	Understand the scope of quality certifications applicable to pharmaceutical industries and the regulatory aspects of pharmaceutical taught to the student.
		5	Understand the responsibilities of QA & QC departments.
		6	Explore into importance of QBD, ICH Guidelines, NABL accreditation etc.
Course	Course Code	Course Outcome Number	Course Outcome
Medicinal Chemistry III	BP607P		Upon completion of the course student will be able to
		1	Select the starting materials and reaction mechanism involved in preparation of drugs/intermediates.
		2	Recognize the principal of pharmacopeial assay of different drugs.
		3	Understand the concept of preparation of intermediates/drugs by microwave irradiation technique.
		4	Calculate molecular weight, theoretical yield, practical yield, dilution factor and percentage purity.
		5	Handle Chem draw software for drawing the structures and reaction mechanism.
		6	Determine different physicochemical properties of drugs by using drug design software.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology III	BP608P		Upon completion of the course student will be able to
		1	Outline basic principles of bioassay, types of bio assay along with advantages and disadvantages.
		2	Understand performance of isolated experiments using various isolated preparation and the effect of different drugs on it
		3	Study the preclinical screening of various drugs
		4	Describe dose calculation for pharmacological experiments
		5	Explain to estimate serum biochemical parameters
		6	Perform toxicity studies using standard guidelines

Course	Course Code	Course Outcome Number	Course Outcome
Herbal Drug Technology	BP609P		Upon completion of the course student will be able to
		1	Perform preliminary phytochemical screening of phytoconstituents
		2	Prepare various herbal formulations like mixture, cold cream, lotions, shampoo and syrup.
		3	Formulate some Ayurvedic formulations like asava & arishta.
		4	Evaluate chemically various herbal excipients.
		5	Determine the cineole content, citral content.
		6	Calculate the total phenol content & total alkaloid content.
Course	Course Code	Course Outcome Number	Course Outcome
Instrumental Methods of Analysis	BP701T		Upon completion of the course student will be able to
		1	Recall, Employ and Apply the Basic and Core knowledge of UV, IR, Fluorimetry & Flame Photometry to analysis of drugs.
		2	Evaluate the results obtained from the data generated after qualitative and quantitative applications of spectroscopic techniques
		3	Understand and describe basic principles involved in various chromatographic separation techniques
		4	Apply the various development techniques involved in TLC, Paper Chromatography, and Column Chromatography for qualitative analysis of drugs.
		5	Analyse the data obtained from various chromatographic techniques, viz. GC, HPLC, qualitatively as well as quantitatively
		6	Able to select appropriate electrophoretic, ion-exchange, gel and affinity chromatographic technique for separation and identification of macromolecules
Course	Course Code	Course Outcome Number	Course Outcome
Industrial Pharmacy	BP702T		Upon completion of the course student will be able to
		1	Employ the knowledge to design the pilot plant scale up studies of pharmaceutical dosage forms like tablets, liquids, semisolid and injectables.
		2	Understand the process of technology transfer between different organizations including industries, Government labs and academia.
		3	Know about the role played by different technology transfer agencies.
		4	Comprehend Laws and Acts that regulate pharmaceutical industry and different regulatory bodies.
		5	Explain the drug development process, approval process and regulatory requirements for new drugs.
		6	Illustrate the quality principles and apply Quality by design and six-sigma concept in maintaining quality.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacy Practice	BP703T		Upon completion of the course student will be able to
		1	Demonstrate principles of therapeutics, quality improvement, communication, economics, health behavior, social and administrative aspects, health policy and legal issues in the practice of pharmacy.
		2	Use knowledge of drug distribution methods in hospital and apply it in the practice of pharmacy.
		3	Apply principles of drug store management and inventory control to medication use.
		4	Provide patient-centered care to diverse patients using the best available evidence and monitor drug therapy of patient through medication chart review, obtain medication history interview and counsel the patients, identify drug related problems.
		5	Engage in innovative activities by making use of the knowledge of clinical trials.
		6	Exhibit professional ethics by producing safe and appropriate medication use throughout society.
Course	Course Code	Course Outcome Number	Course Outcome
Novel Drug Delivery System	BP704T		Upon completion of the course student will be able to
		1	Reproduce the concept of sustained/controlled drug delivery systems.
		2	Explain the type of polymers, their properties and role of polymers in development of different types of drug delivery systems.
		3	Demonstrate insight of novel drug delivery system with respect to fundamental concepts, formulation components and strategies
		4	Assess and evaluate different types of drug delivery systems
		5	Analyse recent development in drug delivery system
		6	Design new approaches for drug delivery in the treatment of various diseases

Course	Course Code	Course Outcome Number	Course Outcome
Instrumental Methods of Analysis	BP705P		Upon completion of the course student will be able to
		1	Estimate absorption maxima and effect of solvents on absorption maxima of organic compounds.
		2	Analyse estimation of Dextrose and Sulphanilamide by Colorimetry
		3	Perform separation of various mixture by different Chromatographic techniques.
		4	Perform determination of different elements by flame photometry.
		5	Analyse various drugs by using UV- Spectrophotometry and fluorimetry, nephelo turbidometry.
		6	Demonstrate Gas chromatography and High performance liquid chromatography.
Course	Course Code	Course Outcome Number	Course Outcome
Practice School	BP706PS		Upon completion of the course student will be able to
		1	Take up small industry related task
		2	Apply theoretical knowledge to solve practical problems
		3	Hypothesize and plan experimental protocols
		4	Develop interpersonal skills and capability to work in team
		5	Apply ideas/skill sets to devise an innovative work
		6	Compile a project report
Course	Course Code	Course Outcome Number	Course Outcome
Biostatistics and Research Methodology	BP801T		Upon completion of the course student will be able to
		1	Compute mean, median, mode, dispersion and standard deviation for experimental data
		2	Understand probability and interpolate the probability distribution with reference to pharmaceutical examples
		3	Relate and apply parametric test and non-parametric test for two or more groups of experimental data. Estimate the significant level for parametric test
		4	Operate the MS-excel, MINITAB to perform statistical analysis
		5	Apply DOE methods in optimization of pharmaceutical product
		6	Understand a research design and develop appropriate research hypothesis for a research project.
Course	Course Code	Course Outcome Number	Course Outcome
Social and Preventive Pharmacy	BP802T		Upon completion of the course student will be able to
		1	Understand and acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
		2	Recognize the concepts and evaluation of public health
		3	Relate food to nutrition health, balanced diet, deficiencies and its prevention and to identify avoidable habits for personal hygiene and health
		4	Apply and design a plan for prevention and control of communicable and non-communicable diseases.
		5	Explain National health programs its objectives functioning and outcomes
		6	Describe the community services in rural, urban and school health
Course	Course Code	Course Outcome Number	Course Outcome
Pharma Marketing Management	BP803ET		Upon completion of the course student will be able to
		1	Recall the general concept of marketing
		2	Understand management of product in pharmaceutical industry and its promotion.
		3	Analyse the concept of marketing channels, management of marketing channel and the pricing of product by an organization.
		4	Apply concepts of marketing like vertical marketing, horizontal marketing, global marketing, industrial marketing etc. in pharmaceutical industry.
		5	Assess marketing environment and challenges marketers have to deal with.
		6	Plan new marketing strategies.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacovigilance	BP805ET		Upon completion of the course student will be able to
		1	Understand the historical development and describe the national and international scenario of pharmacovigilance.
		2	Understand drug disease classification, coding and terminologies used in pharmacovigilance.
		3	Detect, assess and manage the adverse drug reactions.
		4	Understand safety surveillance, pharmacogenomics, ICH guidelines and CIOMS.
5	Assess the methods to generate safety data during post approval phases of the drug.		

		6	Describe drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation.
Course	Course Code	Course Outcome Number	Course Outcome
Cosmetic Science	BP809ET		Upon completion of the course student will be able to
		1	Classify and define cosmetics and cosmeceuticals as per Indian and EU regulations
		2	Describe the role of building blocks in the formulation of cosmetics
		3	Understand the structure of the skin, hair, teeth and gums and basics of designing cosmetics formulations for overcoming problems with skin, hairs and oral cavity.
		4	Understand the fundamentals of sun protection and apply the knowledge gained to formulate the Sunscreens, antiperspirants and deodorants.
		5	Identify and apply role of herbal ingredients in skin care, hair care and oral care
		6	Evaluate cosmetics for various physico-chemical properties and quality.
Course	Course Code	Course Outcome Number	Course Outcome
Advanced Instrumentation Techniques	BP811ET		Upon completion of the course student will be able to
		1	Recall, Employ and Apply the Basic and Core knowledge of NMR Spectroscopy and Mass Spectrometry in structure elucidation
		2	Understand the techniques for solid state analysis like Various Thermal Methods and X-ray crystallography.
		3	Select various parameters for calibration qualification of new equipment as per ICH and USFDA guidelines.
		4	Describe General Principles and Procedures involved in the extraction techniques and RIA.
		5	Learn basic instrumentation and applications of hyphenated techniques
		6	Evaluate the results obtained from analysis of drug using advanced analytical techniques
Course	Course Code	Course Outcome Number	Course Outcome
Project Work	BP812PW		Upon completion of the course student will be able to
		1	Work in a team and undertake a project in the area of Pharmaceutical Sciences
		2	Apply concepts of pharmaceutical sciences for executing the project
		3	Apply appropriate research methodology while formulating a project
		4	Generate specifications, design, develop, analyse, and compile a project
		5	Make a presentation and defend the project
		6	Compile the project work

COURSE OUTCOMES: M. Pharm

Course	Course Code	Course Outcome Number	Course Outcome
Modern Pharmaceutical Analytical Technique	MPH101T		Upon completion of the course student will be able to
		1	Recognize and appreciate the importance of modern sophisticated instruments in the quality control and research and also able to recall and reproduce the fundamental principles, instrumentation and applications of various spectroscopic techniques, viz. UV-Visible, IR, Flame emission, Atomic absorption, Photoluminescence and NMR.
		2	Highlight the principle, theory, instrumentation of Mass Spectrometry and illustrate fragmentation rules useful for structure elucidation.
		3	Acquire expertise in summarizing the separation techniques, viz. chromatographic and electrophoretic theoretically and able to use them as analytical tools in selected specializations.
		4	Explain and employ non-invasive tool, viz., X-ray diffractometry for solid state analysis.
		5	Imbibe the theoretical and practical knowledge about immunological assays viz., radio immuno-assay, enzyme-linked immunoassay and bioluminescence
		6	Evaluate the results obtained from the data generated after qualitative and quantitative applications.
Course	Course Code	Course Outcome Number	Course Outcome
			Upon completion of the course student will be able to
		1	Understand different kinds of modified release formulations
		2	Identify the important drug related factors in designing of sustained release formulations.

Drug Delivery System	MPH102T	3	Determine the release kinetics and predict the mechanism of drug release.
		4	Design formulations like gastroretentive, transdermal and ocular and evaluate them.
		5	Recognize the challenges in protein and peptide delivery and apply strategies for their successful delivery.
		6	Gain proficiency in the interpretation of the software generated data and its mathematical treatment for quantitative analysis
Course	Course Code	Course Outcome Number	Course Outcome
Modern Pharmaceutics	MPH103T		Upon completion of the course student will be able to
		1	Outline preformulation concept and formulation considerations in development of formulations.
		2	Understand optimization concepts and techniques used in development of formulations.
		3	Apply validation practices, recent principles of validation, government regulation and practices in the pharmaceutical industry.
		4	Analyze concepts of CGMP, production management, Sales forecasting, budgeting, cost control, industrial relationship, personal relationship and total quality management in pharmaceutical industry
		5	Judge the phenomenon of compression and compaction in development of novel solid dosage form.
		6	Predict drug release kinetics, release mechanism, and apply mathematical modeling and statistic concepts to newer formulation.
Course	Course Code	Course Outcome Number	Course Outcome
Regulatory Affair	MPH104T		Upon completion of the course student will be able to
		1	Understand and interpret the concepts of innovator and generic drugs, drug development process
		2	Recognize and understand the regulatory guidance's and guidelines for filing and approval process.
		3	Learn, apply and justify preparation of dossiers and their submission to regulatory agencies in different countries.
		4	understand and describe post-approval regulatory requirements for actives and drug products.
		5	Understand and apply the submission of global documents in CTD/ eCTD formats.
6	Gain in-depth knowledge about Clinical trials requirements for approvals for conducting clinical trials, and pharmacovigilence and process of monitoring in clinical trials.		
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutics Practical I	MPH105P		Upon completion of the course student will be able to
		1	Analyse various pharmacopoeial compounds in different formulations by UV-Visible spectroscopy and HPLC methods.
		2	Carry out simultaneous estimation of multi component containing formulations by UV-Vis spectrophotometry.
		3	Understand the principle of Gas chromatography, flame photometry and fluorimetry and analyse drugs using these techniques.
		4	Formulate and evaluate various novel drug delivery systems like sustained osmotically controlled DDS, Floating DDS, Mucoadhesive tablets and transdermal patches.
		5	Recognize the importance of preformulation studies and the way to carry out these studies.
6	Understand the kinetics of drug release, compare the dissolution profiles using f2 factor, calculate different dissolution parameters and predict the mechanism of drug release using different kinetic equations.		
Course	Course Code	Course Outcome Number	Course Outcome
Modern Pharmaceutical Analytical Technique	MQA101T		Upon completion of the course student will be able to
		1	Recognize and appreciate the importance of modern sophisticated instruments in the quality control and research and also able to recall and reproduce the fundamental principles, instrumentation and applications of various spectroscopic techniques, viz. UV-Visible, IR, Flame emission, Atomic absorption, Photoluminescence and NMR.
		2	Highlight the principle, theory, instrumentation of Mass Spectrometry and illustrate fragmentation rules useful for structure elucidation.
		3	Acquire expertise in summarizing the separation techniques, viz. chromatographic and electrophoretic theoretically and able to use them as analytical tools in selected specializations
4	Explain and employ non-invasive tool, viz., X-ray diffractometry for solid state analysis.		

		5	Imbibe the theoretical and practical knowledge about group of sophisticated thermo-analytical techniques for investigating temperature dependent properties of various materials.
		6	Gain proficiency in the interpretation of the software generated data and its mathematical treatment for quantitative analysis.
Course	Course Code	Course Outcome Number	Course Outcome
Quality Management System	MQA102T		Upon completion of the course student will be able to
		1	Gain fundamental knowledge and concepts about various quality management principles.
		2	Understand importance of quality and ISO management systems.
		3	Gain knowledge of strategic planning and implementation.
		4	Recognize principle of customer and customer focus.
		5	Understand the cost of quality and categories of cost of quality.
		6	Apply concept statistical approaches for quality.
Course	Course Code	Course Outcome Number	Course Outcome
Quality Control and Quality Assurance	MQA103T		Upon completion of the course student will be able to
		1	Recognize the knowledge of the GMP, GLP and ICH Guidelines relates to pharmaceutical industry.
		2	Know cGMP guidelines, CPCSEA guidelines, organization and personnel responsibilities in maintenance of sterile areas and Good Warehousing Practice.
		3	Understand the importance and processes of IPQC of formulations and Quality control test for containers and closures.
		4	Explain the importance of documentation in pharmaceutical industry
		5	Create Common Technical Document.
		6	Know and understand the responsibilities of QA & QC departments in manufacturing operations and controls.
Course	Course Code	Course Outcome Number	Course Outcome
Product Development and Technology Transfer	MQA104T		Upon completion of the course student will be able to
		1	Understand the new product development process and the role of regulatory authority involved in it at every stage of product development
		2	Explore the methods used for the determination of properties of drugs and excipients and their stability during product development
		3	Establish the process of pilot plant scale up of pharmaceutical dosage forms
		4	Recognize the basic concept of fundamental packaging, their significance, quality control, evaluation and their selection.
		5	Develop and design the technology transfer for manufacturing of products between R & D and pilot scale
		6	Apply the concept for selection of raw materials and suitable pack, on the basis of properties of API leading to the development of new dosage form
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Quality Assurance Practical I	MQA105P		Upon completion of the course student will be able to
		1	Analyse Pharmaceutical compounds in bulk and formulations by UV Visible spectrophotometer.
		2	Estimate the content of different drugs and various elements by fluorimetry and flame photometry or AAS respectively.
		3	Analyse case studies on Total Quality Management, Six Sigma, Change Management/ Change control, deviations, Out of Specifications (OOS), Out of Trend (OOT) Corrective & Preventive Actions (CAPA).
		4	Create Stability study protocol and accelerated stability studies protocol of different Pharmaceutical compounds by using different analytical and chromatographic techniques
		5	Perform in process and finished product quality control tests for solid and semisolid dosage forms.
		6	Evaluate different techniques for improvement of solubility of drugs using surfactant systems and co-solvency method.
Course	Course Code	Course Outcome Number	Course Outcome
Modern			Upon completion of the course student will be able to
		1	Recognize and appreciate the importance of modern sophisticated instruments in the quality control and research and also able to recall and reproduce the fundamental principles, instrumentation and applications of various spectroscopic techniques, viz. UV-Visible, IR, Flame emission, Atomic absorption, Photoluminescence and NMR.
		2	Highlight the principle, theory, instrumentation of Mass Spectrometry and illustrate fragmentation rules useful for structure elucidation.

Pharmaceutical Analytical Technique	MPL101T	3	Acquire expertise in summarizing the separation techniques, viz. chromatographic and electrophoretic theoretically and able to use them as analytical tools in selected specializations.
		4	Explain and employ non-invasive tool, viz., X-ray diffractometry for solid state analysis.
		5	Imbibe the theoretical and practical knowledge about group of sophisticated thermo-analytical techniques for investigating temperature dependent properties of various materials
		6	Investigate the structure of new organic compounds using spectroscopic tools.
Course	Course Code	Course Outcome Number	Course Outcome
Advanced Pharmacology I	MPL102T		Upon completion of the course student will be able to
		1	Discuss the Pathophysiology and Pharmacotherapy of certain diseases
		2	Explain the mechanism of drug action at cellular and molecular level
		3	Understand and justify the various clinical uses of drugs
		4	Understand the adverse effects and contraindication of drugs
		5	Explain the pharmacokinetics of drugs
6	Gain proficiency in the interpretation of the software generated data and its mathematical treatment for quantitative analysis		
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacological and Toxicological Screening Methods	MPL103T		Upon completion of the course student will be able to
		1	Explain preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development
		2	Understand maintenance of laboratory animals as per the guidelines, basic knowledge of various <i>in-vitro</i> and <i>in-vivo</i> preclinical evaluation processes.
		3	Describe the regulations and ethical requirement for the usage of experimental animals
		4	Understand the knowledge on various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals.
		5	Explain the various screening methods involved in the drug discovery process.
6	Correlate the preclinical data to humans.		
Course	Course Code	Course Outcome Number	Course Outcome
Cellular and Molecular Pharmacology	MPL104T		Upon completion of the course student will be able to
		1	Understand the fundamental knowledge on the structure and functions of cellular components
		2	Predict the interaction of cellular components with drugs. This would enable them to apply the knowledge in drug discovery process.
		3	Summarize the receptor signal transduction processes
		4	Explain the molecular pathways affected by drugs.
		5	Differentiate the effect of genetic variability on drug action
6	Describe applicability of biotechnological techniques in molecular pharmacology		
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology Practical I	MPL105P		Upon completion of the course student will be able to
		1	Understand the concept and methodology of basic bio analysis using sophisticated instruments
		2	Understand the requirements of the animal study for the drug development
		3	Calculate the dose and dose frequency of drugs.
		4	Describe various routes for administration of drug and techniques of anaesthesia and euthanasia in experimental animals
		5	Understand Pharmacokinetic studies and data analysis of drugs given by different routes of administration using software's
6	Assess behavioural experiments in animals		
Course	Course Code	Course Outcome Number	Course Outcome
Molecular Pharmaceutics	MPH201T		Upon completion of the course student will be able to
		1	Understand the molecular concepts of drug targeting.
		2	Apply the principles of drug targeting to cancer and brain
		3	Employ methods, process controls and formulation strategies for preparation of nanocarriers, microcapsules, monoclonal antibodies etc. and methods to evaluate them.
4	Recognize critical factors in designing pulmonary and intranasal drug delivery systems and apply concepts to develop advanced drug delivery systems by these routes.		

		5	Recognize critical factors in designing pulmonary and intranasal drug delivery systems and apply concepts to develop advanced drug delivery systems by these routes.
		6	Design non-viral vectors like lipid nanoparticles and characterize them
Course	Course Code	Course Outcome Number	Course Outcome
Advanced Biopharmaceutics and Pharmacokinetics	MPH202T		Upon completion of the course student will be able to
		1	Recall the basic concepts in biopharmaceutics and pharmacokinetics, and explain the effect of different parameters on the absorption of drug.
		2	Understand the principle of biopharmaceutical considerations in design of dosage form
		3	Apply concept of pharmacokinetic parameters and drug interactions considerations in calculation of dose.
		4	Assess and evaluate bioavailability study data in development of dosage form
		5	Apply knowledge of bioequivalence study data for submission of ANDA
		6	Create concept of pharmacokinetics of novel drug delivery system and newer biologics.
Course	Course Code	Course Outcome Number	Course Outcome
Computer Aided Drug Delivery System	MPH203T		Upon completion of the course student will be able to
		1	Understand and remember the history of computers in pharmaceutical research and development
		2	Understand and apply the concept of computational modeling of drug disposition, and computers in preclinical development.
		3	Learn, explore and describe optimization techniques in pharmaceutical formulation
		4	Understand and explore the use of computers in market analysis.
		5	Understand and apply utility of computers in clinical development.
		6	Describe and apply the principles of Artificial Intelligence (AI) and Robotics Computational fluid dynamics (CFD).
Course	Course Code	Course Outcome Number	Course Outcome
Cosmetics and cosmeceuticals	MPH204T		Upon completion of the course student will be able to
		1	Understand regulatory provisions for labelling, manufacturing and sale and import of cosmetics.
		2	Explain structure, function of the skin, hair, teeth and gums and designing of cosmetic formulation for skin care, hair care and oral care.
		3	Understand the key ingredients and basic science in development of cosmetics and cosmeceuticals.
		4	Describe the fundamentals of sun protection and the formulation of Sunscreens, antiperspirants and deodorants.
		5	Identify various skin problems and how to overcome these problems through cosmetics preparations.
		6	Demonstrate application of soaps, syndetbars and perfumes in cosmeceuticals
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutics Practical II	MPH205P		Upon completion of the course student will be able to
		1	Prepare microspheres by appropriately selecting polymers and method and evaluate them with respect to different characteristics.
		2	Prepare and evaluate beads, gelatin/albumin microspheres, liposomes, solid dispersions and various cosmetics.
		3	Understand the factors affecting protein binding and significance of protein binding.
		4	Carry out bioavailability testing and use the software to calculate various pharmacokinetic parameters.
		5	Learn the use of software in designing various formulations and optimizing the formulations by applying constraints.
		6	Develop clinical data collection manual.
Course	Course Code	Course Outcome Number	Course Outcome
Seminar/Assignment			Upon completion of the course student will be able to
		1	Develop capability to deliver seminar
		2	Learn speech development for seminars and conferences
		3	Learn deeply through critical thinking
		4	Learn an art of crisp editing
		5	Enhances typographic skills
		6	Learn to prepare different topics from the course.

Course	Course Code	Course Outcome Number	Course Outcome
Hazards and Safety Management	MQA201T		Upon completion of the course student will be able to
		1	Retrieve the knowledge of environment and identify the associated environmental problems.
		2	Interpret the issues related to different kinds of hazard
		3	Implement the methodology of hazard assessment and procedure for providing safe industrial atmosphere.
		4	Integrate the proficiency to handle emergency situation in the pharmaceutical product development process and provides the principle based approach to solve the complex tribulations
		5	Predict safety protective measures to be taken at the workplace.
		6	Illustrate ideas to clear mechanism and management in different kinds of hazard management system
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Validation	MQA202T		Upon completion of the course student will be able to
		1	Understand, Explain and Employ the concepts of calibration, qualification and validation.
		2	Apply the knowledge of calibration and validation to instruments, equipment and gain expertise in analysing the data and computing the results.
		3	Develop an expertise in the Process validation of different dosage form, qualification of various utility services and Establish protocol for analytical method validation of drugs.
		4	Carry out validation of various manufacturing processes involved in sterile and non-sterile plant, computerized system and possess knowledge of 21 CFR Part 11
		5	Develop robust model of cleaning validation of equipment and facilities employed in the manufacture of pharmaceuticals.
		6	Know how to apply and employ the knowledge of intellectual property rights and the patent filing procedures.
Course	Course Code	Course Outcome Number	Course Outcome
Audit and Regulatory Compliance	MQA203T		Upon completion of the course student will be able to
		1	Understand the importance of auditing.
		2	Illustrate the principle and methodology of auditing
		3	prepare the auditing report.
		4	Prepare the check list for auditing
		5	Understand the concept of bulk pharmaceutical chemicals and packaging material vendor audit.
		6	Gain knowledge of auditing the manufacturing process
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Manufacturing Technology	MQA204T		Upon completion of the course student will be able to
		1	Understand the importance of Licenses for API, formulation industry and factors related to plant layout and production planning in pharmaceutical industry development.
		2	Understand the principles and practices of aseptic process technology for sterile dosage forms and advanced sterile product manufacturing technology.
		3	Recognize the principles and practices of non-sterile manufacturing process technology of solid dosage forms and demonstrate coating technology.
		4	Know the types and quality control tests of containers and closures used in pharmaceuticals industry.
		5	Elucidate the principles of Quality by design (QbD).
		6	Understand the process analytical technology (PAT) in pharmaceutical manufacturing.
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical Quality Assurance Practical II	MQA205P		Upon completion of the course student will be able to
		1	Estimates organic and metallic contaminants by HPLC and Flame photometry respectively.
		2	Perform the case study on application of QbD and PAT.
		3	Evaluate Bioautography, sampling and analysis of SO ₂ , H ₂ S, and Chlorine in Working Environment.
		4	Qualify various Pharmaceuticals equipments.
		5	Perform analytical method validation for processing area and cleaning validation.
		6	Prepare check list for, API and Excipients used in solid dosage forms, Sterile production area, Water for injection

Course	Course Code	Course Outcome Number	Course Outcome
Advanced Pharmacology II	MPL201T		Upon completion of the course student will be able to
		1	Discuss the pathophysiology and Pharmacotherapy of certain diseases
		2	Explain the molecular and cellular mechanism of actions of hormones
		3	Understand the Pharmacology drugs used in different microbial diseases
		4	Understand the application of chronotherapy in various diseases
		5	Explain the role of free radicals in etiopathology of various diseases
		6	Know in detail the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases
Course	Course Code	Course Outcome Number	Course Outcome
Pharmaceutical and Toxicological Screening Methods II	MPL202T		Upon completion of the course student will be able to
		1	Understand the knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity.
		2	Explain the regulatory aspects for the toxicological evaluation of drugs and chemicals.
		3	Describe the various types of toxicity studies and their procedure.
		4	Understand appreciate the importance of ethical and regulatory requirements for toxicity studies.
		5	Get practical skills required to conduct the preclinical toxicity studies.
		6	Understand the use of experimental animals for the different toxicological studies.
Course	Course Code	Course Outcome Number	Course Outcome
Principals of Drug Discovery	MPL203T		Upon completion of the course student will be able to
		1	Describe in detail about various stages involved in modern drug discovery process
		2	Explain the role of genomics, proteomics and bioinformatics in drug discovery
		3	Explain various lead seeking method and lead optimization
		4	Describe in detail about the concept of Rational Drug Design and molecular docking with its application
		5	Explain the concept of QSAR and QSAR statistical methods
		6	Recognize the importance of prodrug design and practical consideration of prodrug design
Course	Course Code	Course Outcome Number	Course Outcome
Clinical Research and Pharmacovigilance	MPL204T		Upon completion of the course student will be able to
		1	Explain the regulatory requirements for conducting clinical trial
		2	Demonstrate the types of clinical trial designs
		3	Explain the responsibilities of key players involved in clinical trials Execute safety monitoring, reporting and close-out activities
		4	Explain the principles of Pharmacovigilance and systems of communication in Pharmacovigilance
		5	Assessment the Perform of the adverse drug reaction
		6	Detection and reporting of adverse drug reaction
Course	Course Code	Course Outcome Number	Course Outcome
Pharmacology Practical II	MPL205P		Upon completion of the course student will be able to
		1	Describe OECD guidelines for acute oral toxicity studies
		2	Plot the dose response curve of agonist using suitable isolated tissue preparation
		3	Report the adverse drug reaction
		4	Understand basic principles of bioassay, types of bio assay along with advantages and disadvantages
		5	Understand performance of isolated experiments using various isolated preparation and the effect of different drugs on it
		6	Understand various techniques for recording rat BP, heart rate and ECG.
Course	Course Code	Course Outcome Number	Course Outcome
			Upon completion of the course student will be able to
		1	Understand the fundamental methodology to carry our research, to learn about experimental design and its importance in addition to identifying a research problem stated in a study.
		2	Compare the primary characteristics of quantitative and qualitative research and to identify the overall process of designing a research study from its inception to its report and ethical issues in educational research

Research Methodology and Biostatistics	MRM301T	3	Know the various statistical techniques to solve problems and to understand and apply various concepts of statistics for solving the statistical problems related to these concepts.
		4	Summarize and explain various concepts of medical research such as medical ethics, beneficence, non-maleficence, autonomy, informed consent, functions of ethics committee etc.
		5	Get the knowledge of the guidelines for developing animal facilities and will come to know about the guidelines for the experimentation on animals.
		6	Understand and recall the genesis of bioethics with special reference to Helsinki declaration.

Course	Course Code	Course Outcome Number	Course Outcome
Journal Club			Upon completion of the course student will be able to
		1	Select scientific articles from reputed journals.
		2	Use search engines to select scientific articles
		3	Develop appraisal skills
		4	Gain sound knowledge and awareness of literature through group discussion
		5	Present concisely and clearly the critically appraised article during Journal Club Meeting
		6	Critically analyze and interpret research data

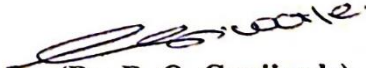
Course	Course Code	Course Outcome Number	Course Outcome
Pre-synopsis Presentation Sem III			Upon completion of the course student will be able to
		1	Identify the research problem
		2	Perform Scientifically the Literature review
		3	Discuss research problem with supervisor and peers for clarity/ solution
		4	Develop a protocol report on the critically appraised research problem
		5	Present the critically appraised research problem during pre-synopsis presentation.
		6	Defend the identified research problem during Q & A session.

Course	Course Code	Course Outcome Number	Course Outcome
Research Work Sem III			Upon completion of the course student will be able to
		1	Review scholarly literature collected from various sources critically for the project and understand and explain with clarity the formulated research problem
		2	Prepare and present a research presentation
		3	Conduct research to achieve research objectives
		4	Propose new methodologies or procedures for further improvement of the research problem
		5	Create research document of the findings
		6	Defend the research findings in front of scholarly audience

Course	Course Code	Course Outcome Number	Course Outcome
Discussion/ Final Presentation			Upon completion of the course student will be able to
		1	Analyze and discuss results and compile the research executed.
		2	Present identified research problem eloquently.
		3	Discuss research problem with team and peers.
		4	Strongly defend research problem during Q & A.
		5	Develop a bound protocol report on the critically appraised research problem
		6	Present the critically appraised research problem during external evaluation.

Course	Course Code	Course Outcome Number	Course Outcome
Seminar / Assignment			Upon completion of the course student will be able to
		1	Develop capability to deliver seminar
		2	Learn speech development for seminars and conferences
		3	Learn deeply through critical thinking
		4	Learn an art of crisp editing
		5	Enhances typographic skills
		6	Learn to prepare different topics from the course.




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