

## MNR COLLEGE OF PHARMACY

### PROGRAM OUTCOME - B PHARMACY

Based on the B Pharmacy program's educational objectives, students will achieve the following specific program outcomes.

**PO-01 Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**PO-02 Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**PO-03 Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**PO-04 Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**PO-05 Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**PO-06 Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**PO-07 Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**PO-08 Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**PO-09 The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

  
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PROGRESS REPORT - 2 PHARMACY

During the year 1970-71 the progress of the pharmacy program has been satisfactory and the following are the highlights:

The pharmacy program has been successful in providing the students with a solid foundation in the basic sciences and pharmacy. The students have been able to apply their knowledge in the laboratory and in the clinical setting.

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**PO-10 Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO-11 Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



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## MNR COLLEGE OF PHARMACY

### PROGRAM OUTCOME - M PHARMACY

Based on the M Pharmacy program's educational objectives, students will achieve the following specific program outcomes.

**PO-01 Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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MINUTES OF THE BOARD OF PHARMACY

PROCEEDINGS OF THE BOARD OF PHARMACY

That on the 15th day of January, 1904, the Board of Pharmacy met at the office of the Board of Pharmacy, and the following business was transacted:

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**PO-12 Expertise in subject:** M. Pharmacy program helps to develop expertise in particular subject in pharmacy profession. Pharmaceutics specialization helps to get expertise in formulation development, Pharmacology specialization makes student expert in understanding the mechanism of action of drugs and the various biological event occurring in body while Pharmaceutical Chemistry specialization helps to understand the concept of synthesis of drugs.

  
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## MNR COLLEGE OF PHARMACY

### PROGRAM OUTCOME - PHARM D

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Basalwadi, Sangareddy-502294  
Telangana, Ph: 08455-230690

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# MNR COLLEGE OF PHARMACY

## B. PHARMACY

### COURSE OUTCOMES

#### B PHARM - FIRST SEM

Course Name : Human Anatomy and Physiology I

Course Code : BP101T

CO1	Explain the cellular organization of the human body
CO2	Explain the gross morphology, structure and functions of various organs of the human body
CO3	Describe the various homeostatic mechanisms and their imbalances.
CO4	Identify the various tissues and organs of different systems of human body.
CO5	Appreciate coordinated working pattern of different organs of each system

Course Name : Pharmaceutical Analysis I

Course Code : BP102T

CO1	Explain the basic concepts of quantitative and qualitative analysis.
CO2	Explain principles and applications of aqueous, non-aqueous titrimetric methods to evaluate purity of drugs
CO3	Describe principles and applications of volumetric and electro chemical analysis methods to evaluate purity of drugs
CO4	Explain principles and applications of redox titrations involved in the quantitative analysis of drugs.
CO5	Describe principles and applications of complexometric and precipitation titrations to evaluate purity of drugs

Course Name : Pharmaceutics I

Course Code : BP103T

CO1	Describe the history and development of pharmacy profession
CO2	Explain the concepts of posology, pharmaceutical incompatibilities and pharmaceutical calculations
CO3	Describe the parts of prescriptions and handling of prescriptions.

  
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CO4	Explain the method of preparations and stability studies of monophasic and biphasic liquid dosage forms
CO5	Explain the method of preparations and evaluation studies of semisolid dosage forms

Course Name : Pharmaceutical Inorganic Chemistry

Course Code : BP104T

CO1	Explain the sources of impurities and quality control tests to determine the impurities in drugs and pharmaceuticals
CO2	Describe the medicinal and pharmaceutical importance of inorganic compounds
CO3	Acquire knowledge on different types of diagnostic agents, dialysis fluids and dental products
CO4	Describe the definitions, preparations and assay procedures of gastrointestinal agents, expectorants, haematinics, astringents and antidotes
CO5	Explain the measurement, storage and pharmaceutical applications of radiopharmaceuticals

Course Name : Communicative English

Course Code : BP105T

CO1	Explain the importance, barrier and perspectives of communication for a pharmacist to function effectively
CO2	Describe the elements (verbal and non-verbal) and styles of communication for a pharmacist to function effectively.
CO3	Explain the concepts of interview skills and presentation skills
CO4	Explain about the leadership qualities and essentials
CO5	Explain about the importance and elements of group discussion

Course Name : Remedial Mathematics

Course Code : BP106RMT

CO1	Explain the application aspects of partial fraction in chemical kinetics and pharmacokinetics
CO2	Explain the application of logarithm to solve pharmaceutical problems
CO3	Describe about the matrices and their application in solving pharmacokinetic equations



CO4	Explain the different elements of differentiation, differential equations and Laplace transform and their pharmacokinetics applications
CO5	Describe about the analytical geometry and pharmacokinetic application

Course Name : Remedial Biology

Course Code : BP106RBT

CO1	Explain about the kingdom living organisms and salient features
CO2	Explain about the morphology and general anatomy of the flowering plants
CO3	Describe the concepts of plant and mineral nutrition
CO4	Explain the plant tissues, respiration and photosynthesis
CO5	Describe the digestive, respiratory, excretory and reproductive systems of humans

Course Name : Human Anatomy and Physiology I

Course Code : BP107P

CO1	To learn about the various experimental techniques related to physiology
CO2	Understand the construction, working, care and handling of instruments, Glassware and equipment's required for practical
CO3	To understand basic knowledge of microscope
CO4	Knowledge of mechanism of differential blood cell count and reticulocyte count of blood sample
CO5	Demonstration of human axial and appendicular skeletal system with the help of bones
CO6	Knowledge of construction and working of spirometer for the measurement of lung volume and capacities

Course Name : Pharmaceutical Analysis I

Course Code : BP108P

CO1	Well, acquainted with the principles and adjudge the levels of specific impurities in the given inorganic compounds by performing different limit tests.
CO2	Learn the expression of various concentrations and able to prepare and standardize solutions.

  
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CO3	Determine percentage purity of given pharmaceutical drugs by titrimetric analysis.
CO4	Understand the principles of volumetric and electrochemical analysis
CO5	To carryout various volumetric and electrochemical titrations and develop analytical skills

Course Name : Pharmaceutics I

Course Code : BP109P

CO1	Knowledge on basic calculation on formulating dose as per patients' requirements
CO2	Specific formulating skills of making powder dosage forms and analytical as per regulatory guidelines and also students know how to trouble shoot to cater to patient needs.
CO3	Student will be able to have relevant formulating skills to operate in sterile conditions as per regulatory guidelines and know how to troubleshoot in formulation of liquid dosage form
CO4	Knowledge on formulating suppositories.
CO5	Students will able to formulate semisolid dosage forms including cosmetics as per regulatory requirements to suit clinical requirements

Course Name : Pharmaceutical Inorganic Chemistry

Course Code : BP110P

CO1	Know the source of impurities and determine impurities in inorganic compounds.
CO2	Know the identification test of few inorganic compounds.
CO3	To test the purity of some inorganic compounds.
CO4	To know preparation of inorganic pharmaceuticals.

Course Name : Communication skills

Course Code : BP111P

CO1	To understand various learning modules using English language lab software.
CO2	To improve their writing, communication and presentation skills



Course Name : Remedial Biology

Course Code : BP112RBP

CO1	To understand the practical aspects in plant biology including cutting, staining and permanent slide preparations
CO2	Determine blood group, blood pressure and tidal volume of humans.

**B PHARM - SECOND SEM**

Course Name : Human Anatomy and Physiology II

Course Code : BP201T

CO1	Explain the anatomy and physiology of central nervous system, Nerve tracts, reflex action.
CO2	Knowing the gastrointestinal tract functions, secretions, digestion and absorption of nutrients and its disorders, role of ATP, Creatinine and BMR.
CO3	Understand the lung functions, mechanism of respiration, Resuscitation techniques and methods.
CO4	Appreciate the urinary system and its functions, formation of urine, Role of RAS in kidney and its disorders.
CO5	Understand the reproductive system of male and female, formation of sperm and ovum, menstrual cycle, pregnancy, chromosomes, DNA and protein synthesis, pattern of inheritance.
CO6	Knowing the various endocrine glands, its secretions, functions, Hypo & hypersecretions, its disorders.

Course Name : Pharmaceutical Organic chemistry –I

Course Code : BP202T

CO1	To emphasize on definition, classification and to write the structure, name and the type of isomerism of the organic compound
CO2	To write the reaction, name the reaction and orientation of reactions
CO3	Account for reactivity/mechanism and stability of compounds
CO4	To study preparation and reaction of hydrocarbons
CO5	Identify /confirm the identification of organic compounds

  
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Course Name : Biochemistry

Course Code : BP203T

CO1	To understand the bioenergetics value for all biochemical compounds.
CO2	To understand the metabolism of biomolecules in physiological and pathological conditions
CO3	To understand the biochemical role of hormones in human physiology.
CO4	To understand the genetic organization of mammalian genome and functions of DNA in synthesis of proteins.
CO5	To study about mineral metabolism and nutritive values of bio-molecules.

Course Name : Pathophysiology

Course Code : BP204T

CO1	Describe the etiology and pathogenesis of the selected disease state
CO2	Knowledge of signs and symptoms of the diseases
CO3	Identify the complications of the diseases.
CO4	Know most commonly encountered pathophysiological state(s) or disease mechanism(s), as well as any clinical testing requirements

Course Name : Computer Applications in Pharmacy

Course Code : BP205T

CO1	Know the various types of applications of computers in pharmacy
CO2	Know the various types of databases.
CO3	Know the various applications of databases in pharmacy
CO4	Know the web-based tools for pharmacy practice
CO5	Apply the knowledge to design and develop digital tools for pharmaceutical applications.

Course Name : Environmental Sciences

Course Code : BP206T

CO1	Create the awareness about environmental problems among learners.
CO2	Impart basic knowledge about the environment and its allied problems.



CO3	Develop an attitude of concern for the environment.
CO4	Motivate learn ergo participate in environment protection and environment improvement.
CO5	Acquire skills to help the concerned individuals in identifying and solving environmental problems.

Course Name : Human Anatomy and Physiology II

Course Code : BP207P

CO1	To learn about the various experimental techniques related to physiology
CO2	Understand the construction, working, care and handling of instruments, Glassware and equipment's required for practical
CO3	To understand basic knowledge of microscope
CO4	Knowledge of mechanism of differential blood cell count and reticulocyte count of blood sample
CO5	Demonstration of human axial and appendicular skeletal system with the help of bones
CO6	Knowledge of construction and working of spirometer for the measurement of lung volume and capacities

Course Name : Pharmaceutical Organic chemistry –I

Course Code : BP208P

CO1	Identify the unknown sample of organic compounds by qualitative analysis methods
CO2	Determine the melting point and boiling point of various organic compounds
CO3	Preparation of the organic compounds by various procedures

Course Name : Biochemistry

Course Code : BP209P

CO1	Able to carry out the qualitative analysis of different nutrients such as carbohydrates, proteins and lipids.
CO2	Know to find out the concentration or percentage of different biomolecules present in blood or urine sample
CO3	Able to carry our urine analysis and find out the normal and abnormal constituent's present in it.
CO4	Know to prepare and check the pH buffers.
CO5	Able to analyze the factors such as temperature, concentration and time affect enzyme activity.

  
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Course Name : Computer Applications in Pharmacy

Course Code : BP210P

CO1	Retrieve the information of a drug and its adverse effects using online tools
CO2	Able to acquire knowledge of computer application in clinical studies and use of database
CO3	Work with MS access
CO4	Exporting tables, Queries, Forms and reports to web pages and HTML
CO5	Creating labels, databases regarding patient information

### **B PHARM - THIRD SEM**

Course Name : Pharmaceutical Organic chemistry –II

Course Code : BP301T

CO1	Explain the reactivity and stability of benzene and its derivatives
CO2	Explain the acidity of phenols and acids, and basicity of amines
CO3	Explain the significance of determination of analytical constants such as Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meisel (RM) value
CO4	Explain the synthesis and reactions of polynuclear hydrocarbons
CO5	Describe the stability of cycloalkanes through Baeyer's strain theory, Coulson and Moffitt's modification and Sachse Mohr's theory

Course Name : Physical Pharmaceutics-I

Course Code : BP302T

CO1	Explain the solubility behaviour of drugs and the laws explaining them
CO2	Explain the physical states of matter/molecules and determinization of their properties
CO3	Describe the importance of surface and interfacial phenomenon in the pharmaceutical formulations
CO4	Explain the process of complexation and protein binding
CO5	Describe the role of buffers in pharmaceutical and biological systems



Course Name : Pharmaceutical Microbiology

Course Code : BP303T

CO1	To study of all categories of microorganisms especially for the production of alcohol antibiotics, vaccines, vitamins enzymes etc..
CO2	To understand methods of identification, cultivation and preservation of various microorganisms
CO3	To understand the importance and implementation of sterilization in pharmaceutical processing and industry
CO4	To learn sterility testing of pharmaceutical products.
CO5	To Carry out microbiological standardization of Pharmaceuticals.
CO6	To understand the cell culture technology and its applications in pharmaceutical industries.

Course Name : Pharmaceutical Engineering

Course Code : BP304T

CO1	Understand the basic principles and pharmaceutical applications of size reduction and size separation
CO2	Explain the basic principles, methodology and applications of heat transfer, evaporation and distillation in pharmaceutical preparations
CO3	Develop an attitude of concern for the environment.
CO4	Motivate learn ergo participate in environment protection and environment improvement.
CO5	Acquire skills to help the concerned individuals in identifying and solving environmental problems.

Course Name : Pharmaceutical Organic chemistry –II

Course Code : BP305P

CO1	To perform experimental techniques like Recrystallization and Distillation
CO2	Determine the saponification value, acid values for unknown fats and oils
CO3	Able to prepare the organic compounds by various methods involving different types of reactions

Course Name : Physical Pharmaceutics-I

Course Code : BP306P

CO1	Understand the mechanisms of solute solvent interactions, Study the limitations and applications of Distribution law.
CO2	Explain the influence molecular association, molecular dissociation and complexation on partition coefficient and Differentiate between ideal and

  
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	non-ideal solutions
CO3	Learn the steps involved in the preparation of pharmaceutical buffers and its importance
CO4	Study the use of physicochemical properties in formulation research and development
CO5	Acquire skills and working knowledge of the principles and concepts of surface tension and its measurement; Study the role of surfactants in various drug delivery applications
CO6	Understand the various intermolecular forces involved in the formation of complexes and its applications.
CO7	Understand the pharmaceutical applications of various techniques like lyophilization
CO8	Buffer equations for an acid and base, the principle and experimental procedure for the determination of pH by electrometric method.

Course Name : Pharmaceutical Microbiology

Course Code : BP307P

CO1	Understand and explain basic principles and different kinds of microscope
CO2	Explain the process of different staining techniques, Understand and compare various types of stains and dyes, Perform the staining technique of various bacteria
CO3	Analyze the determination of specific nutrients by bacteria, Enumerate bacterial load in the food sample in quality unit
CO4	cultivate bacteria in the lab by using aerobic & anaerobic techniques, Prepare various nutrients media for cultivating microbes in laboratory
CO5	Understand working and mechanism of different equipments and tools used in microbiology, Design an experiment to isolate specific bacteria in pure form from sample
CO6	Microbial physiology and Understand Determine the sensitivity of specific bacteria to given antibiotics Course
CO7	Understand the basic nutritional requirements of bacteria, Describe various types of nutrient media for cultivation and isolation of bacteria, Explain typical growth curve of bacteria, Understand the factors that are responsible for bacterial growth

Course Name : Pharmaceutical Engineering

Course Code : BP308P

CO1	Know various unit operations used in pharmaceutical industries.
CO2	Understand the various laws, mechanisms of unit operations.



CO3	Learn the various processes involved in pharmaceutical manufacturing process.
CO4	Understand the material handling techniques.
CO5	Know the principle, construction, working, uses, advantages and disadvantages of pharmaceutical equipment's used for various unit operations.
CO6	Understand significance of plant layout design for optimum use of resources.
CO7	Know various preventive methods used for corrosion control in pharmaceutical industries.
CO8	Understand the concepts of heat transfer and fluid flow.

### B PHARM - FORTH SEM

Course Name : Pharmaceutical Organic Chemistry -III

Course Code : BP401T

CO1	To emphasize on definition, types, mechanisms, examples, uses/applications.
CO2	To understand the Stereo isomerism and their methods of determination of configurations.
CO3	To understand the methods of preparation and properties of organic compounds.
CO4	To explain the stereo chemical aspects of organic compounds and stereo chemical reactions.
CO5	To know the medicinal uses and other applications of organic compounds.

Course Name : Medicinal Chemistry-I

Course Code : BP402T

CO1	To understand the chemistry of drugs with respect to their pharmacological activity
CO2	Understand the drug metabolic pathways, adverse effect and therapeutic value of Drugs.
CO3	Know the Structural Activity Relationship (SAR) of different class of drugs
CO4	To write the chemical synthesis of some drugs.

  
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Course Name : Physical pharmaceutics-II

Course Code : BP403T

CO1	Learn the formulation concepts of pharmaceutical suspensions and emulsions and their stability problems.
CO2	Understand various physicochemical properties of drug molecules in the designing the dosage form.
CO3	Know the principles of chemical kinetics & to use them in assigning expiry date for formulation.
CO4	Demonstrate use of physicochemical properties in evaluation of dosage forms.
CO5	Appreciate physicochemical properties of drug molecules in formulation research and development.

Course Name : Pharmacology- I

Course Code : BP404T

CO1	Understand the pharmacological actions of different categories of drugs.
CO2	Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
CO3	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
CO4	Observe the effect of drugs on animals by stimulated experiments.
CO5	Appreciate correlation of pharmacology with other bio medical sciences.

Course Name :Pharmacognosy and Phytochemistry-I

Course Code : BP405T

CO1	To know the techniques in the cultivation and production of crude drugs.
CO2	To know the crude drugs there uses and chemical nature.
CO3	To know the evaluation of crude drugs.
CO4	To know the importance of traditional medicinal system.
CO5	To understand the natural fibres, natural allergens, edible vaccines of natural origin.



Course Name : Medicinal Chemistry-I

Course Code : BP406P

CO1	To provide the knowledge of preparation of medicinal important compounds
CO2	To provide the knowledge about the assay of various important drugs
CO3	To understand the determination of partition coefficient of drugs.

~~Course Name : Physical pharmaceutics-II~~

~~Course Code : BP409P~~

CO1	To understand the application of quantitative and theoretical principles of the physical characters of matter in the practice of pharmacy.
CO2	Aids the pharmacists in their attempt to predict the solubility, compatibility and biological activity of drug products, as a result of this knowledge it will help in the development of new drugs and dosage forms as well as in improvement of various modes of administration.
CO3	To understand complexation, classification of complexes, methods of analysis, thermodynamic treatment of stability constants. Kinetics, rate and orders of reactions, influence of temperature and other factors on reactions rate, decomposition of medicinal agents and accelerated stability analysis.
CO4	Acquire skills in Interfacial phenomena, liquid interfaces, surface free energy, measurement of interfacial tension, spreading coefficient, surface active agents and wetting phenomena.
CO5	Understand Colloids, dispersed system and its pharmaceutical application, types of colloidal systems, kinetic properties, diffusion, zeta potential, solubilization.
CO6	Study the role of Micrometrics, particle size, methods of determining particle size, particle shape and surface area, porosity, density.
CO7	Acquire knowledge in Rheology, Newtonian systems, thixotropy measurement, negative thixotropy, determination of thixotropy. Polymer science, definitions pharmaceutical applications, molecular weight averages.

Course Name : Pharmacology- I

~~Course Code~~ ~~BP408P~~

CO1	Proficient in handling common laboratory animals used in Pharmacological testing.
CO2	Capable of performing common methods of euthanasia and anesthesia

  
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CO3	Experienced in withdrawing blood and administration of drugs via different routes.
CO4	Capable to stimulate and evaluate the effect of drugs on gastrointestinal tract using computation soft Design experiments to test the safety and efficacy of ware Ex-Pharma
CO5	Qualified to stimulate and evaluate the effect of drug acting on CNS and CVS using computation software Ex-Pharma

Course Name :Pharmacognosy and Phytochemistry-I

Course Code : BP409P

CO1	To carry out Pharmacognostic study of crude drugs
CO2	To analyse drug by mean of chemical test
CO3	To know identification methods of herbals
CO4	To carry out physicochemical analysis of crude drugs.

#### B PHARM - FIFTH SEM

Course Name : Medicinal Chemistry- I

Course Code : BP501T

CO1	Explain the chemical classes, synthesis and structure-activity relationship of anticancer agents
CO2	Describe the histaminergic transmission, chemical classes, synthesis and structure-activity relationship of antihistamines
CO3	Describe the chemical classes, synthesis and structure-activity relationship of cardiovascular agents
CO4	Explain the chemical classes, synthesis and structure-activity relationship of local anesthetics, antidiabetic drugs and thyroid agents
CO5	Outline the structure, physiological role of drugs acting on endocrine system

Course Name : Industrial Pharmacy- I

Course Code : BP502T

CO1	Describe the various aspects of preformulation studies and their impact in the stability of dosage form
CO2	Explain the techniques, quality control tests and stability testing of tablets and capsules



CO3	Describe the production procedure, aseptic processing and evaluation of parenteral and ophthalmic preparations
CO4	Describe the formulation aspects of cosmetic products such as lipsticks, shampoos, cold cream and vanishing cream
CO5	Explain the packaging of pharmaceutical products, legal and official requirements for containers, stability aspects of packaging materials

Course Name : Pharmacology - II

Course Code : BP503T

CO1	Explain the pharmacology and mechanism of action of drugs acting on cardiovascular system
CO2	Explain the pharmacology and mechanism of action of drugs acting on urinary system
CO3	Describe the pharmacology and mechanism of action of autocooids and related drugs
CO4	Describe the basic concepts in endocrine pharmacology and pharmacology of analogues and inhibitors
CO5	Explain the principles and applications of bioassay.

Course Name : Pharmacognosy and Phytochemistry-I

Course Code : BP504T

CO1	Metabolic pathways of higher plants
CO2	Explain the phytochemistry and application of secondary metabolites of plants.
CO3	Explain the isolation and analysis of secondary metabolites
CO4	Explain the industrial production, estimation and utilization of natural drugs
CO5	Explain the principles and application of extraction techniques used in the analysis and isolation of phytoconstituents

Course Name : Pharmaceutical Jurisprudence

Course Code : BP505T

CO1	Explain and implement the objectives, import and manufacture requirements of drugs as per Drugs and Cosmetics Act, 1940 and its rules 1945
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CO2	Explain and implement the objectives and requirements of sale, labeling & packing of drugs and administration of drugs as per Drugs and Cosmetics Act, 1940 and its rules 1945
CO3	Explain and implement the objectives and requirements of Pharmacy Act –1948, Medicinal and Toilet Preparation Act –1955, Narcotic Drugs and Psychotropic substances Act-1985 and Rule
CO4	Explain and implement the objectives and requirements of Drugs and Magic Remedies Act and its Rules, Prevention of Cruelty to animals Act-1960, and National Pharmaceutical Pricing Authority
CO5	Describe the importance of Medical Termination of Pregnancy Act, Right to Information Act and Intellectual Property Rights (IPR)

Course Name : Industrial Pharmacy- I

Course Code : BP506P

CO1	To know the various pharmaceutical dosage forms and their manufacturing techniques
CO2	Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
CO3	Know various considerations in development of pharmaceutical dosage forms

Course Name : Pharmacology - II

Course Code : BP507P

CO1	Qualified to design and perform Pharmacological experiments using isolated tissues preparation and setting up in-vitro experiments.
CO2	Quantitative estimation of biological samples using isolated tissues preparations, their interpretation and efficacy assessment.
CO3	Capable to understand receptor mediated responses and to determine EC50 of agonist & antagonist through graphical representation.
CO4	Good to screen the drugs for CNS mediated actions & diuretic properties and able to apply proper methods to calculate effective dose.
CO5	Students were competent to design and perform pharmacological experiment using isolated tissue preparation and setting up in-vitro experiments.

Course Name : Pharmacognosy and Phytochemistry-II

Course Code : BP508P

CO1	To carry out Pharmacognostic study of crude drugs
CO2	To know the various methods of isolation of phytoconstituents.



CO3	To analyse crude drugs by means of chemical tests.
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### B PHARM - SIXTH SEM

Course Name : Medicinal Chemistry-III

Course Code : BP601T

CO1	To develop an understanding of the physicochemical properties of drugs.
CO2	To understand how current drugs were developed by using pharmacophore modeling and docking technique
CO3	To acquire knowledge in the chemotherapy for cancer and microbial diseases and different anti-viral agents
CO4	To acquire knowledge about the mechanism pathways of different class of medicinal compounds.
CO5	To have been introduced to a variety of drug classes and some pharmacological properties and acquire knowledge on thrust areas for further research.

Course Name : Pharmacology- III

Course Code : BP602T

CO1	Students would have studied elaborately on mechanism of drug action and its relevance in the treatment of different infectious diseases
CO2	They comprehended the principles of toxicology and treatment of various poisonings
CO3	They came across the methods of toxicity studies
CO4	They studied about symptoms and treatment of several diseases/poisonings
CO5	Students understood the toxicity profile of each drug

Course Name : Herbal Drug Technology

Course Code : BP603T

CO1	Understand raw material as source of herbal drugs from cultivation to herbal drug product.
CO2	Know the WHO and ICH guidelines for evaluation of herbal drugs.

  
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CO3	Know the herbal drugs used in various herbal cosmetics
CO4	Know the herbal drugs used as nutraceuticals.
CO5	Appreciate patenting of herbal drugs, GMP.

Course Name: Biopharmaceutics and Pharmacokinetics

Course Code: BP604T

CO1	To understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
CO2	To use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
CO3	To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
CO4	To understand various pharmacokinetics, compartmental models and pharmacokinetic parameters, their significance & applications.
CO5	To understand various Nonlinear Pharmacokinetics and Factors causing non-linearity.

Course Name : Pharmaceutical Biotechnology

Course Code : BP605T

CO1	Understand the importance of microbes in enzyme biotechnology, protein engineering and biosensor application
CO2	Apply the Genetic engineering Knowledge for the production of rDNA products
CO3	Understand the immune mechanism and employ it for the production of new immunological products
CO4	Recognize the importance of microbial genetics and its application in biotechnology
CO5	Sketch Various process involved in the fermentation technology and apply them in the production of pharmaceutical products

Course Name : Quality Assurance

Course Code : BP606T

CO1	The students understand the importance of quality in pharmaceutical products
CO2	The students are explored into importance of good practices such as GMP, GLP ect. and factors affecting the quality of pharmaceutical is explored.
CO3	He understands the regulatory aspects of pharmaceutical taught to the student.
CO4	The process involved in manufacturing of pharmaceuticals different section/department and activity is learnt



CO5	The various documentation process is highlighted to the student
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Course Name : Medicinal Chemistry-III

Course Code : BP607P

CO1	To provide the knowledge of preparation of medicinal important compounds
CO2	To provide the knowledge about the assay of various important drugs
CO3	Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening

Course Name : Pharmacology- III

Course Code : BP608P

CO1	Qualified to calculate the dose for pharmacological experiments and translate to human dose using standard calculation methods.
CO2	Screening the drugs for gastrointestinal efficacy, hypoglycemic effects & anti-allergic and able to correlate clinical, biochemical parameters with disease.
CO3	Capable to understand OECD guidelines and interpret the acute toxicity and other related acute studies for safety evaluation and able to interpret the pharmacokinetic profile of the given drug.
CO4	Good to apply proper biostatistical method for data interpretation and calculations.
CO5	Students were competent to calculate the dose for pharmacological experiments and translate to human dose using standard calculation methods.

Course Name : Herbal Drug Technology

Course Code : BP609P

CO1	Understand raw material as source of herbal drugs from cultivation to herbal drug product.
CO2	To gain knowledge of Preparation of Ayurvedic formulations
CO3	To understand preparation of herbal cosmetics.
CO4	To know the evaluation test for the crude drugs.
CO5	To study determination of secondary metabolites in the lab.

  
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**B PHARM - SEVENTH SEM**

Course Name : Instrumental Methods of Analysis

Course Code : BP701T

CO1	Explain the principle, instrumentation and pharmaceutical applications of interactions of electromagnetic radiations with drugs
CO2	Explain the principle, instrumentation and applications of vibrational spectrophotometric drug analysis
CO3	Explain the principle and applications of chromatographic separation in drug analysis
CO4	Describe the principle, instruments and applications of gas and liquid chromatographic separation in drug analysis
CO5	Describe the principle and applications of electrophoretic techniques

Course Name : Industrial Pharmacy II

Course Code : BP702T

CO1	Describe the pilot plant scale up requirements, SUPAC guidelines, and platform technology
CO2	Explain about the importance of WHO guidelines for Technology Transfer and technology transfer agencies in India
CO3	Describe about the historical overview and responsibility of regulatory affairs department
CO4	Explain the concepts of quality control, Quality by Design (QbD), ISO quality systems standards
CO5	Explain the organization, responsibilities and certification of Central Drug Standard Control Organization and State Licensing Authorities

Course Name : Pharmacy Practice

Course Code : BP703T

CO1	Describe the organizational set up of hospital, hospital pharmacy, community pharmacy and drug store inventory control
CO2	Explain the process of monitoring, detecting and reporting adverse drug reactions
CO3	Describe the functions of drug distribution system, therapeutic drug monitoring system and pharmacy and therapeutic committee
CO4	Explain the importance of patient counselling and education and training program for pharmacists
CO5	Perform interpretation of clinical laboratory tests



Course Name : Novel Drug Delivery System

Course Code : BP704T

CO1	Explain the strategies for the development of controlled approaches, mucosal and implantable drug delivery approaches
CO2	Describe the role of microencapsulation in the drug development
CO3	Explain the strategies and applications of Transdermal, gastroretentive, ocular and nasopulmonary drug delivery approaches
CO4	Explain the concepts and applications of liposomes, niosomes, nanoparticles, monoclonal antibodies for the targeted delivery
CO5	Describe the development and applications of intra uterine devices (IUDs) and applications

Course Name : Instrumental Methods of Analysis

Course Code : BP705P


CO1	The students will learn about the absorption maxima and effect of solvents
CO2	The students will estimate the percentage of few bulk drugs by Colorimetry
CO3	The students will learn about Assay of any two bulk drugs by UV-Spectrophotometry
CO4	The students will learn about quenching effect in fluorescence drugs and determine the electrolytes by using Flame Photometry and Nepheloturbidity meter.
CO5	The students will learn about the different chromatographic development techniques like TLC, Column and paper Chromatography
CO6	The students will appreciate and demonstrate the various chromatographic techniques like Gas Chromatography and HPLC.

#### **B PHARM - EIGHTH SEM**

Course Name : Biostatistics and Research Methodology

Course Code : BP801T

CO1	To understand how to select research in his/her areas of interest.
CO2	The fundamental of collecting, analyzing and interpreting the relevant data.
CO3	Different computational methods and software's facilitating research.
CO4	Know the various statistical methods to solve different types of problems.
CO5	Operate various statistical software packages.
CO6	Appreciate the statistical technique in solving the pharmaceutical problem

  
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Course Name : Social and Preventive Pharmacy

Course Code : BP802T

CO1	Recognize the concepts and evaluation of public health.
CO2	Relate food to nutrition health, balanced diet, deficiencies and its prevention
CO3	Illustrate sociocultural factors and its relation with health.
CO4	Identify avoidable habits for personal hygiene and health.
CO5	Explain the principles on the prevention and control of communicable and non-communicable diseases.
CO6	Identify National health programs its objectives functioning and outcomes. Recognize the community services in rural, urban and school health.

Course Name : Computer Aided Drug Design

Course Code : BP807ET

CO1	To impart a knowledge about Design and discovery of lead molecules
CO2	To understand the role of drug design in drug discovery
CO3	To understand the concept of QSAR and docking
CO4	To provide complete knowledge about various strategies to develop new drug like molecules.
CO5	To design of new drug molecules using molecular modeling software

Course Name : Cosmetic Science

Course Code : BP809ET

CO1	To Know the cosmetic principle to address the needs of cosmetic industry.
CO2	Understand formulation science and analytical techniques required to scientifically design and develop cosmetic products.
CO3	Explain the scientific and technical aspects, high standards of practice and professional ethics within the cosmetic and toiletries industry
CO4	To Know the cosmetic formulation to address the needs of cosmetic industry.
CO5	To Know the cosmetic products to address the needs of cosmetic industry.

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**MNR COLLEGE OF PHARMACY**  
**M. PHARMACY (PHARMACEUTICAL CHEMISTRY)**

**COURSE OUTCOMES**

**M PHARM - FIRST SEM**

Course Name : Modern Pharmaceutical Analytical Techniques

Course Code : MPC101T

CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments
CO2	To develop basic practical skills using instrumentation techniques
CO3	Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
CO4	To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
CO5	To apply the knowledge, learn in developing new procedures of their own design
CO6	Comparing various methods of analysis and their outcomes

Course Name : Advanced Organic Chemistry- I

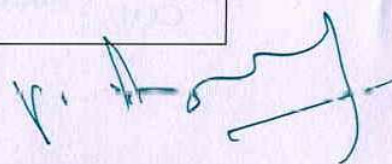
Course Code : MPC102T

CO1	To give knowledge about basic concept of organic reactions
CO2	To understand the mechanism & applications of various named reactions
CO3	To know the techniques to develop synthetic routes for small target molecule
CO4	About chemistry of heterocyclic compounds
CO5	Knowledge about principles and applications of retrosynthesis

Course Name : Advanced Medicinal Chemistry

Course Code : MPC103T

CO1	To understand about stages involved in drug discovery
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CO2	Knowledge on prodrug design and analogs design
CO3	To know about recent advances in the field of medicinal chemistry
CO4	To know the various strategies to design and develop new drug like molecules
CO5	Understand the different techniques for drug discovery

Course Name : Chemistry of Natural Products

Course Code : MPC104T

CO1	Different types of natural compounds and their chemistry and medicinal importance.
CO2	The importance of natural compounds as lead molecules for new drug discovery.
CO3	The concept of rDNA technology tool for new drug discovery.
CO4	General methods of structural elucidation of compounds of natural origin.
CO5	Isolation, purification & characterization of simple chemical constituents from natural sources.

Course Name : Pharmaceutical Chemistry Practical I

Course Code : MPC105P

CO1	Students will be able to synthesize simple organic compounds and their derivatives
CO2	Learn synthesis of medicinally important compounds
CO3	Understand the procedures for preparation of medicinal and organic compounds

#### M PHARM - SECOND SEM

Course Name : Advanced Spectral Analysis

Course Code : MPC201T

CO1	Analyse data from UV & IR spectra of various organic compounds
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CO2	Understanding the principle and working of Mass Spectroscopy
CO3	Develop skill of Interpretation of the NMR spectroscopy
CO4	Learn the various hyphenated analytical instrumental techniques
CO5	Identify organic compounds through thermal methods of analysis

Course Name : Advanced Organic Chemistry II

Course Code : MPC202T

CO1	To utilize green chemistry concepts and to be the effective substitute for conventional chemistry.
CO2	To apply all the catalysis in single & multistep process in manufacturing of drugs and drug intermediates
CO3	To synthesize novel peptidomimetics using peptide chemistry
CO4	Stereo-chemical features including conformation and stereo electronic effects; reaction dynamics, and photochemical reactions
CO5	To acquire knowledge in the field of sonochemistry and to apply a detailed organic structure analysis

Course Name : Advanced Organic Chemistry II

Course Code : MPC202T

CO1	To utilize green chemistry concepts and to be the effective substitute for conventional chemistry.
CO2	To apply all the catalysis in single & multistep process in manufacturing of drugs and drug intermediates
CO3	To synthesize novel peptidomimetics using peptide chemistry
CO4	Stereo-chemical features including conformation and stereo electronic effects; reaction dynamics, and photochemical reactions
CO5	To acquire knowledge in the field of sonochemistry and to apply a detailed organic structure analysis

Course Name : Computer Aided Drug Design

Course Code : MPC203T

  
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CO1	To utilize various molecular modeling softwares in the design of novel drug-like molecules.
CO2	To apply the various softwares for physico-chemical property prediction.
CO3	To understand how current drugs were developed by using pharmacophores modeling and docking technique.

Course Name : Pharmaceutical Process Chemistry

Course Code : MPC204T

CO1	To develop synthetic routes that is safe, cost-effective, environmentally friendly, and efficient.
CO2	To impart knowledge on the development and optimization of a synthetic route/s.
CO3	The pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients and new chemical entities for the drug development phase.
CO4	To predict the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism.
CO5	The principles and applications of modern chemical instrumentation, experimental design, and data analysis.

Course Name : Pharmaceutical Chemistry Practical I

Course Code : MPC205P

CO1	Synthesis of organic compounds by adopting nitration, oxidation, reduction
CO2	Interpretation of organic compounds by FT-IR, NMR, MS.
CO3	To perform 2D-QSAR based experiments, 3D-QSAR based experiments, docking
CO4	Study-based experiment, Virtual screening-based experiment.

  
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**MNR COLLEGE OF PHARMACY**  
**M. PHARMACY (PHARMACOLOGY)**

**COURSE OUTCOMES**

**M PHARM - FIRST SEM**

Course Name : Modern Pharmaceutical Analytical Techniques

Course Code : MPC101T

CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments
CO2	To develop basic practical skills using instrumentation techniques
CO3	Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
CO4	To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
CO5	To apply the knowledge, learn in developing new procedures of their own design
CO6	Comparing various methods of analysis and their outcomes

Course Name : Advanced Pharmacology I

Course Code : MPL102T

CO1	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
CO2	Explain the mechanism of drug action at the organ system / subcellular/macromolecular and molecular levels.
CO3	Understand the pharmacological actions, mechanism of drug action and its relevance in the treatment of different diseases in different categories of drugs
CO4	Be aware about the pathophysiology and pharmacotherapy of certain diseases
CO5	Comprehend the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.

  
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Course Name : Pharmacological and Toxicological Screening Methods- I

Course Code : MPL103T

CO1	Students will be able to appraise the regulations and ethical requirement for the usage of experimental animals
CO2	Students will be able to describe the various animals used in the drug discovery process
CO3	Students will be able to describe good laboratory practices in maintenance and handling of experimental animals
CO4	Students will be able to describe the various newer pre-clinical screening methods involved in the drug discovery process
CO5	Students will be able to appreciate and correlate the preclinical data to humans

Course Name : Cellular and Molecular Pharmacology

Course Code : MPL104T

CO1	Explain various cellular events, functions, pathways and transduction mechanisms and how a gene is expressed
CO2	Cell signalling pathways based on receptors and second messengers in the cell
CO3	Principles and applications of genomic, proteomic tools, gene therapy and rDNA technology
CO4	Immunotherapeutic and application of omics in clinical practice
CO5	Principles and applications of various assays, biosimilars, cell culture techniques, application of flowcytometry

Course Name : Pharmacology Practical I

Course Code : MPL105P

CO1	Qualified to design and analyze the given sample of drugs using spectroscopic, chromatographic, fluorimetry and flame photometry.
CO2	Students were able to perform experiments with rodents for CNS related activities, diuretics and GI effects
CO3	Capable to administer drugs in the animals, withdraw blood samples and assess the efficacy & safety of the given unknown compound.
CO4	Capable to handle molecular techniques to understand molecular biology in in-vitro culture techniques.
CO5	Students were competent to assess the genetic alterations using molecular techniques.

#### **M PHARM - SECOND SEM**

Course Name : Advanced Pharmacology II

Course Code : MPL201T

CO1	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
CO2	Explain the mechanism of drug action at the organ system / subcellular/macromolecular and molecular levels.
CO3	Understand the pharmacological actions, mechanism of drug action and its relevance in the treatment of different diseases in different categories of drugs
CO4	Be aware about the pathophysiology and pharmacotherapy of certain diseases
CO5	Comprehend the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases.

  
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Course Name : Pharmacological and Toxicological Screening Methods- I

Course Code : MPL202T

CO1	able to appraise the regulations and ethical requirement for the usage of experimental animals
CO2	describe the various animals used in the drug discovery process
CO3	describe good laboratory practices in maintenance and handling of experimental animals
CO4	describe the various newer pre-clinical screening methods involved in the drug discovery process
CO5	able to appreciate and correlate the preclinical data to humans

Course Name : Principles of Drug Discovery

Course Code : MPL203T

CO1	understand Drug discovery process and stages in the drug discovery programme
CO2	Explain the basics of Targets, its identification, validation, protein structures & its modification in drug discovery approach.
CO3	Develop leads and protocol to identify leads, its optimization procedures and its sources and able to differentiate lead and hits.
CO4	Drug designing protocols, application of QSAR in drug discovery and lead developments, its statistical methodology to validate QSAR equations
CO5	Rational drug discovery, pharmacophore identification, in silico drug synthesis using softwares programmes and significance of prodrug concepts

Course Name : Clinical Research and Pharmacovigilance


Course Code : MPL203T

CO1	Capable of explaining the regulatory requirement for conducting clinical trial
CO2	Demonstrate the type of clinical trial design
CO3	Understand the responsibilities of key players in clinical trials
CO4	Understand principles of pharmacovigilance and safety monitoring systems
CO5	Understand Pharmcoepidemiology & economics

Course Name : Pharmacology Practical II

Course Code : MPL205P

CO1	capable to design and perform in-vitro pharmacological experiments using isolated tissue preparation
CO2	able to quantitatively estimate the biological samples using isolated tissue preparations and interpret to calculate the PD <sub>2</sub> & PA <sub>2</sub> values
CO3	understand cardiovascular responses using proper experimental techniques, drug efficacy and able to design & conduct clinical trials and ADR monitoring.
CO4	understand the OECD guidelines and perform acute toxicity studies for safety evaluations and able to interpret the pharmacokinetic profile of the given drug.
CO5	understanding the drug discovery process and able to develop a new drug through in- Silico.

  
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1. The purpose of this study is to determine the effect of the concentration of the solution on the rate of reaction.

2. The reaction studied is the reaction between potassium dichromate and potassium iodide in the presence of hydrochloric acid.

3. The rate of reaction is determined by measuring the time taken for the solution to turn from orange to green.

4. The concentration of the potassium dichromate solution is varied while the concentration of the potassium iodide solution and the volume of the hydrochloric acid are kept constant.

5. The results show that the rate of reaction increases as the concentration of the potassium dichromate solution increases.

6. The rate of reaction is directly proportional to the concentration of the potassium dichromate solution.

7. The reaction is first order with respect to the potassium dichromate.

8. The overall order of the reaction is one.

9. The rate constant,  $k$ , is determined from the slope of the graph of  $\log \text{rate}$  against  $\log \text{concentration}$ .

10. The value of  $k$  is  $0.001 \text{ s}^{-1}$ .

11. The activation energy,  $E_a$ , is determined from the slope of the graph of  $\log k$  against  $1/T$ .

12. The value of  $E_a$  is  $50 \text{ kJ mol}^{-1}$ .

13. The reaction is exothermic.

14. The reaction is reversible.

15. The reaction is catalyzed by the hydrochloric acid.

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**M. PHARMACY (PHARMACEUTICS)**

**COURSE OUTCOMES**

**M PHARM - FIRST SEM**

Course Name : Modern Pharmaceutical Analytical Techniques

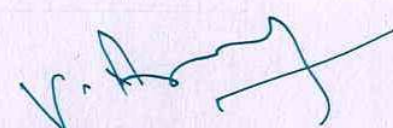
Course Code : MPC101T

CO1	To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments
CO2	To develop basic practical skills using instrumentation techniques
CO3	Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals.
CO4	To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances
CO5	To apply the knowledge, learn in developing new procedures of their own design
CO6	Comparing various methods of analysis and their outcomes

Course Name : Drug Delivery System

Course Code : MPH102T

CO1	Knowledge on SR & CR formulations and their factors. Different polymers & their properties also personalized medicines, bioelectronic medicines, 3D Printing, tele pharmacy.
CO2	Knowledge on design and study on GRDDS & Mucosal DDS.
CO3	Knowledge on barriers for ocular drug delivery & its overcome methods & Knowledge on transdermal drug delivery systems.
CO4	Knowledge on barriers, formulation & evaluation of protein drug delivery.
CO5	Knowledge on vaccine drug delivery systems.

  
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Course Name : Modern Pharmaceutics

Course Code : MPH103T

CO1	Knowledge on preformulating concepts and optimization techniques
CO2	Knowledge on pharmaceutical validation
CO3	Knowledge on cGMP & Industrial Management
CO4	Knowledge on compression and compaction
CO5	Knowledge on consolidation parameters

Course Name : Regulatory Affairs

Course Code : MPH104T

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

Course Name : Pharmaceutics Practical 1

Course Code : MPH105

CO1	To recall the basic principles of analytical techniques and their instrumentation used for drug analysis
CO2	To summarize the pre formulation studies and basic excipients used for various controlled/sustained drug delivery systems
CO3	To make use of various analytical instruments for estimation of drugs in various formulations

CO4	To simplify the formulation techniques, prepare matrix tablets, floating tablets and cosmetics
CO5	To assess the drug release from sustained and controlled drug delivery systems
CO6	To evaluate the dosage forms, construct kinetic plots and determine similarity factor

### **M PHARM - SECOND SEM**

Course Name : Molecular Pharmaceutics

Course Code : MPH201T

CO1	Understanding on the various approaches for development of novel drug delivery systems.
CO2	Knowledge on selection of drugs and polymers for the development of Novel and Targeted Drug Delivery Systems
CO3	Ability to formulate and evaluate novel drug delivery systems.
CO4	Skill and knowledge to develop delivery systems for specific site of action
CO5	Understanding of the kinetics and scope of developing drug delivery systems and gene expression systems.

Course Name : Advanced Biopharmaceutics & Pharmacokinetics

Course Code : MPH202T

CO1	Broader understanding about the concepts of biopharmaceutics and pharmacokinetics.
CO2	Ability to design drug product by considering various biopharmaceutical factor
CO3	Ability to select proper pharmacokinetic model based on plasma level or urinary excretion data that best describes the process of drug absorption, distribution, metabolism and elimination (ADME)
CO4	Ability to design a basic protocol for the conduct of BA/BE study and the interpretation of the BA/BE data

  
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CO5	Ability to design dosage regimens for patients based on calculated pharmacokinetic parameters.
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Course Name : Computer Aided Drug Delivery System

Course Code : MPH203T

CO1	To study the role of computers and quality by design concepts in pharmaceutical research and formulation development
CO2	To learn computational modeling techniques of drug disposition
CO3	To inculcate the knowledge of innovative uses of computer in formulation development and market analysis
CO4	To interpret computer aided biopharmaceutical characterization using computer simulations during clinical development.
CO5	To apprehend the importance of artificial intelligence, robotics and computational fluid dynamics in pharmaceutical automation.

Course Name : Cosmetics and Cosmeceuticals


Course Code : MPH204T

CO1	Key ingredients used in cosmetics and cosmeceuticals
CO2	Key building blocks for various formulations
CO3	Current technologies in the market
CO4	Various key ingredients and basic science to develop cosmetics and cosmeceuticals
CO5	Scientific knowledge to develop cosmetics and cosmeceuticals with desired safety, stability and efficacy

Course Name : Pharmaceutics Practical II

Course Code : MPH205P

CO1	To recall the basic techniques for preparation of microspheres, liposomes, niosomes and solid dispersions.
CO2	To compare the dissolution studies of various marketed products
CO3	To develop various novel drug delivery systems.
CO4	To test for drug binding characteristics, cell permeation and bioavailability of the formulations
CO5	To evaluate the novel drug delivery systems.
CO6	To design formulations by QbD concept, use simulations for estimation of pharmacokinetics and pharmacodynamics

  
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Pharmaceuticals Partnership

General Manager

MEMPHIS

General Office

In reply, the Board of Directors requests an immediate response.

Very truly yours,

The Board of Directors

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MEMPHIS  
NINE COLLEGE OF PHARMACY  
Memphis, Tennessee 38152  
Telephone: 941-2300

## MNR COLLEGE OF PHARMACY

### PHARM D COURSE OUTCOMES

#### PHARM D - FIRST YEAR

Course Name : Human Anatomy and Physiology

Course Code : 1.1

CO1	Study of structure of cell and its function, elementary tissues of human body, homeostasis mechanisms.
CO2	Types of movements of joints and disorders of joints, blood, lymphatic system.
CO3	Anatomy physiology of Cardiovascular system, sense organs, physiology of muscle contraction.
CO4	Anatomy physiology of Respiratory system, Digestive system, Endocrine system.
CO5	Anatomy physiology of Nervous system, Urinary system, Reproductive system, sports and physiology.

Course Name : Pharmaceutics

Course Code : 1.2

CO1	Understand the professional way of handling the prescription.
CO2	Know the history of profession of pharmacy.
CO3	Understand the basics of different dosage forms.
CO4	Knowledge on preparation of various conventional dosage forms
CO5	Understand pharmaceutical incompatibilities and pharmaceutical calculations.

Course Name : Medicinal Biochemistry

Course Code : 1.3

CO1	To understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.
CO2	To know the metabolic process of biomolecules in health and illness (metabolic disorders).
CO3	To understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism.
CO4	To know the biochemical principles of organ function tests of kidney, liver and endocrine gland.

  
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CO5	To do the qualitative analysis and determination of biomolecules in the body.
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Course Name : Pharmaceutical Organic Chemistry

Course Code : 1.4

CO1	Nomenclature (IUPAC/Common), physical properties of various classes of organic compounds which impart a foundation for the study of various medicinal compounds and their nature of reactivity.
CO2	Concepts & basic mechanisms for the synthetic tools in generating newer products can be correlated with novel drug design & development in future.
CO3	The order of reactivity, orientation, & stability of compounds attribute to the influence towards predicting the prognosis of series of reactions.
CO4	The mode of quality control procedures & applications of numerous reactions & their mechanisms help to adapt the students to focus on purity parameters pertaining to the drugs of choice.
CO5	The practical knowledge from the laboratory, synthesis of medicinally important organic compounds & their qualitative analysis that support to interpret & develop to valid conclusions.

Course Name : Pharmaceutical Inorganic Chemistry

Course Code : 1.5

CO1	To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.
CO2	Well acquainted with the principles of limit tests.
CO3	To understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.
CO4	To know the analysis of the inorganic pharmaceuticals their applications.
CO5	To appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

Course Name : Remedial Mathematics

Course Code : 1.6

CO1	To know Trigonometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform & their applications.
CO2	To solve the problems of different types by applying theory.
CO3	To appreciate the important applications of mathematics in pharmacy.



CO4	Motivate learner to think logically.
CO5	Acquire theory to help the concerned individuals in pharmacy.

Course Name : Remedial Biology

Course Code : 1.6

CO1	Explain about the kingdom living organisms and salient features
CO2	Explain about the morphology and general anatomy of the flowering plants
CO3	Describe the concepts of plant and mineral nutrition.
CO4	Explain the plant tissues, respiration and photosynthesis
CO5	Describe the digestive, respiratory, excretory and reproductive systems of humans

Course Name : Human Anatomy and Physiology

Course Code : 1.1 (Practical)

CO1	To impart a fundamental knowledge on the structure (gross and histology) and functions of various organs of the human body
CO2	It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs
CO3	It helps in understanding the various tissues and organs of the different systems of the human body.
CO4	Provides knowledge in performing the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes.
CO5	To appreciate coordinated working pattern of different organs of each system and the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Course Name : Pharmaceutics

Course Code : 1.2 (Practical)

CO1	Classify various conventional dosage forms in professional way and can able to handle the prescription and identify sources of errors in prescription. Gain skill in the operation of common pharmaceutical measuring, weighing and compounding devices. And can able to understand pharmaceutical terminology, abbreviations and symbols
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	commonly used in the prescribing, dispensing, and charting of medications in the pharmacy.
CO2	Prepare various powders like Eutectic powder, Explosive powder, Dusting powder and Insufflations and can know about the advantage of solid dosage forms over other formulations
CO3	Formulate monophasic liquid dosage forms like syrups, elixirs, linctus's, solutions
CO4	Formulate biphasic liquid dosage forms like emulsions and suspensions.
CO5	Calculate displacement value and prepare suppositories
CO6	Identify the type of incompatibility and preparing the formulation overcoming these incompatibilities

Course Name : Medicinal Biochemistry

Course Code : 1.3 (Practical)

CO1	To perform qualitative analysis and determination of biomolecules in the body fluids.
CO2	To perform quantitative analysis and determination of electrolytes.
CO3	To estimate SGOT, SGPT, Urea & protein in serum
CO4	To study factors affecting enzyme activity and preparation, pH measurement of standard buffer solution functional groups.

Course Name : Pharmaceutical Organic Chemistry

Course Code : 1.4 (Practical)

CO1	To learn about the determination of the physical properties of the Organic compounds such as melting point, boiling point, etc
CO2	Qualitative analysis of organic sample
CO3	To provide the knowledge about the various simple mechanism involved in the synthesis of organic medicinal compounds.

Course Name : Pharmaceutical Inorganic Chemistry

Course Code : 1.5 (Practical)

CO1	Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals
CO2	Knowing the analysis of the inorganic pharmaceuticals their applications
CO3	Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease



CO4	Knowing the method of preparations of different inorganic compounds
CO5	Understand about the purity of the compounds

Course Name : Remedial Biology

Course Code : 1.6 (Practical)

CO1	Know about the kingdoms of plants, basic concepts and components of animal with reference to human and know about the basic concept, history and background with pharmacognosy
CO2	Recognize about the different cell inclusions, cell wall components and some secondary metabolite
CO3	To know anatomy and physiology of animals in reference to human beings
CO4	Distinguish about the different methods of adulteration of crude drugs
CO5	Perform hematological tests and also record BP, heart rate & pulse

#### PHARM D SECOND YEAR

Course Name : Pathophysiology

Course Code : 2.1

CO1	To understand the basic principles involved in cell injury and adaptation.
CO2	To apprehend the pathogenesis of inflammation and wound healing.
CO3	To understand the fundamental aspects of immunity and relate it to diseases of immunity.
CO4	To know the pathogenesis of cancer.
CO5	To know the pathogenesis, signs and symptoms and complications of common diseases and infections.

Course Name : Pharmaceutical Microbiology

Course Code : 2.2

CO1	Understanding at an advanced level of microbial virulence mechanisms and host response to infection; application of molecular techniques to medical microbiology; microbial susceptibility and resistance to antimicrobial agents; replication of viruses, viral immunology and pathogenesis, detection of viruses
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CO2	Students can able to get idea of various infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify a unknown organisms in clinical samples, and describe the pathogenesis of important pathogens
CO3	Demonstrate a basic understanding of the pathogenesis of some important fungal infections of humans, and be able to identify and isolate them from clinical samples
CO4	Assess and interpret scientific literature
CO5	Analyze and report on complex research questions, and solve problems, plan a work program or diagnostic strategy and learn independently
CO6	Demonstrate safe working practices in microbiology.

Course Name : Pharmacognosy and Phytopharmaceuticals

Course Code : 2.3

CO1	Understand the, basic principles of cultivation collection and storage of crude drugs.
CO2	Know the source, active constituents, identification tests and uses of crude drugs.
CO3	To gain the applications of primary and secondary metabolites of the plant.
CO4	To identify the plants from adulteration.
CO5	To identify the different cells, cell inclusions and cell organelles of crude drugs

Course Name : Pharmacology- I

Course Code : 2.4

CO1	To study scope of pharmacology, dose, route of administration, precautions, and contraindications, appreciate the importance of drug discovery by preclinical and clinical trials.
CO2	Justify action of different classes of drugs acting on Central & Autonomic nervous system
CO3	Classify and elaborate action of drugs on major body systems like CVS, respiratory system.



CO4	Describe effect of medicine on Endocrine and Exocrine system.
CO5	To study pharmacology of autocoids.

Course Name : Community Pharmacy

Course Code : 2.5

CO1	Know pharmaceutical care services
CO2	Do patient counselling and provide health screening services to public in community pharmacy
CO3	Respond to minor ailments and provide appropriate medication
CO4	Show empathy and sympathy to patients
CO5	Appreciate the concept of Rational drug therapy

Course Name : Pharmacotherapeutics- I

Course Code : 2.6

CO1	The pathophysiology of selected disease states and the rationale for drug therapy.
CO2	The therapeutic approach to management of these diseases.
CO3	The controversies in drug therapy.
CO4	The importance of preparation of individualized therapeutic plans based on diagnosis.

Course Name : Pharmaceutical Microbiology

Course Code : 2.2 (Practical)

CO1	Understand and explain basic principles and different kinds of microscope
CO2	Explain the process of different staining techniques, Understand and compare various types of stains and dyes, Perform the staining technique of various bacteria
CO3	Analyze the determination of specific nutrients by bacteria, Enumerate bacterial load in the food sample in quality unit
CO4	cultivate bacteria in the lab by using aerobic & anaerobic techniques, Prepare various nutrients media for cultivating microbes in laboratory
CO5	Understand working and mechanism of different equipments and tools used in microbiology, Design an experiment to isolate specific bacteria in pure form from sample

  
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CO6	Microbial physiology and Understand Determine the sensitivity of specific bacteria to given antibiotics Course
CO7	Understand the basic nutritional requirements of bacteria, Describe various types of nutrient media for cultivation and isolation of bacteria, Explain typical growth curve of bacteria, Understand the factors that are responsible for bacterial growth

Course Name : Pharmacognosy and Phytopharmaceuticals

Course Code : 2.3 (Practical)

CO1	To carry out pharmacognostic study of crude drugs
CO2	To analyse drugs by means of chemical test.
CO3	By means of chemical test to know identification methods of herbals.
CO4	To carry out physicochemical analysis of crude drugs.

Course Name : Pharmacotherapeutics- I

Course Code : 2.6 (Practical)

CO1	Describe the pathophysiology and management of cardiovascular, respiratory and endocrine diseases
CO2	Develop the patient case-based assessment Skills
CO3	Describe the quality use of medicines issues surrounding the therapeutic agents in the treatment of these diseases
CO4	Develop clinical skills in the therapeutic management of these conditions
CO5	Students will provide patient – centered care to diverse patients using the evidence-based medicine

### PHARM D - THIRD YEAR

Course Name : Pharmacology- II

Course Code : 3.1

CO1	Understand the pharmacological aspects of drugs falling under the above-mentioned chapters.
CO2	Carry out the animal experiments confidently.
CO3	Appreciate the importance of pharmacology subject as a basis of therapeutics.



CO4	Correlate and apply the knowledge therapeutically.
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Course Name : Pharmaceutical Analysis

Course Code : 3.2

CO1	To understand validation of analytical instruments & methods as per ICH/ USP guidelines, concept of quality assurance and quality control techniques
CO2	To understand principles, instrumentation and application of various chromatographic techniques employed for the analysis of APIs and formulation.
CO3	To understand principle, instrumentation and application of various Electrometric methods.
CO4	To Understand principle, instrumentation and application of UV-Vis, Atomic Absorption and Emission Spectroscopy, Flame Photometry, NMR, Mass spectroscopy, Fluorimetry, Thermal, X ray diffraction techniques

Course Name : Pharmacotherapeutics- II

Course Code : 3.3

CO1	To understand the importance of Antibiotic usage in different infectious conditions and preventive measures needed to minimize exposure to infections.
CO2	To apprehend the pathophysiology and treatment options for Musculo-skeletal disorders.
CO3	To be able to comprehend guidelines used for the management of renal conditions.
CO4	To relate various concepts needed to work with chemotherapeutic agents indifferent types of cancers and to learn their managements.
CO5	To comprehend the importance of both Pharmacological and Non-pharmacological treatment in dermatology.

Course Name : Pharmaceutical Jurisprudence

Course Code : 3.4

CO1	Understand the various concepts of the pharmaceutical legislation in India and know about the Pharmacy Act, its regulations.
CO2	Appreciate practice of the Professional ethics and understand about the Drugs and Magic remedies Act.
CO3	Medicinal and Toilet preparation Act, Narcotic Drugs and Psychotropic Substances Act, Prevention of cruelty to animals Act.
CO4	Understand the salient features of pricing policy and the concepts DPCO, Patent act, Prescription and Non-Prescription medications.

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CO5	Know the authorities, regulations of Drugs and Cosmetics Act and understand the schedules and the labelling requirements for drugs and cosmetics.
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Course Name : Medicinal Chemistry

Course Code : 3.5

CO1	To know the modern concept of rational drug design.
CO2	To understand the Qualitative structural activity relationship (QSAR).
CO3	Study of prodrug, combinatorial chemistry and computer aided drug design
CO4	To study Chemical nomenclature of various drugs.
CO5	Structural activity relationship, Mechanism of action, Synthesis of drugs various classes.

Course Name : Pharmaceutical Formulations

Course Code : 3.6

CO1	Understanding the principle involved in formulation of various pharmaceutical dosage forms.
CO2	Knowledge on various pharmaceutical formulations.
CO3	Ability to perform evaluation of pharmaceutical dosage forms.
CO4	Comprehend manufacturing practices and quality processes.
CO5	Basic understanding on advanced and controlled drug delivery systems.

Course Name : Pharmacology- II

Course Code : 3.1 (Practical)

CO1	Define the basic concepts of experimental pharmacology
CO2	Identify the commonly used laboratory animals and apparatus in pharmacology
CO3	Calculate the dose and decide the route of administration of drugs
CO4	Design experiments to test the safety and efficacy of experimental drugs
CO5	Design and execute a bioassay to determine the potency of experimental drugs.



Course Name : Pharmaceutical Analysis

Course Code : 3.2 (Practical)

CO1	Perform IR, Paper and Thin layer chromatographic experiments and gain the knowledge on interpretation of data obtained after the experiment to conclude the results.
CO2	Handle different instruments like spectrophotometers, flame photometer, HPLC and GC to analyze the pharmaceutical compounds.
CO3	Have ability to develop basic practical skills using instrumental techniques
CO4	Ascertain the knowledge about assay of pharmaceutical substances
CO5	The students will appreciate and demonstrate the various chromatographic techniques like HPTLC, GC-MS, Gas Chromatography, DSC and HPLC.

Course Name : Pharmacotherapeutics- II

Course Code : 3.3 (Practical)

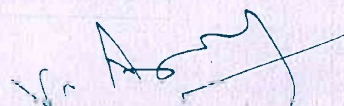
CO1	Writing the SOAP Note (Subjective, Objective, Assessment, Plan) for the given case
CO2	Preparing Treatment Chart Review to ensure the appropriateness of medication orders.
CO3	Applying the Pharmacotherapeutic Treatment Guideline and its related knowledge to evaluate the health outcomes of treatment plan and services
CO4	Critically evaluating and identifying the Drug Related Problems/ Adverse Drug Reactions and making appropriate therapeutic interventions
CO5	Providing systematic Patient Education to the patient/caregivers on drug, disease and lifestyle related information's.

Course Name : Medicinal Chemistry

Course Code : 3.5 (Practical)

CO1	To provide the knowledge of preparation of medicinal important compounds
CO2	To provide the knowledge about the assay of various important drugs
CO3	To understand the monograph analysis of important drugs and determination of partition coefficient.

Course Name : Pharmaceutical Formulations

  
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Course Code : 3.6 (Practical)

CO1	Prepare and evaluate various solid and liquid dosage forms and demonstration of tablet coating
CO2	Prepare parental formulations
CO3	Formulate and evaluate semisolid dosage forms
CO4	Prepare various cosmetic preparations.

#### PHARM D - FORTH YEAR

Course Name : Pharmacotherapeutics- III

Course Code : 4.1

CO1	The therapeutic approach/ algorithms to management of the diseases in syllabus. The controversies in the drug therapy-adrs, interactions, contraindications, precautions.
CO2	Understand the pathophysiology of selected disease states and explain the rationale for drug therapy.
CO3	To understand the clinical presentation of diseases and apply the knowledge of drug therapy and effectiveness to the same diseases.
CO4	To have basic knowledge on correlating disease, drugs and laboratory investigations during ward rounds.
CO5	To understand evidence-based medicine and apply the same knowledge for screening or checking rationality of drug prescriptions during patient care.

Course Name : Hospital Pharmacy

Course Code : 4.2

CO1	Knowledge on hospital pharmacy, drug committees & policies of hospital
CO2	To know the various inventory control techniques & drug distribution methods
CO3	To know the manufacturing practices of pharmaceutical formulations in hospital set up and handling Radiopharmaceuticals
CO4	To know the professional practice management skills of hospital pharmacists
CO5	Understand role of pharmacist in education & training programs



Course Name : Clinical Pharmacy

Course Code : .3

CO1	Monitor drug therapy of patient through Medication chart review and Clinical review
CO2	Obtain medication history review and counsel the patients
CO3	Identify and resolve drug related problems
CO4	Detect, assess and monitor Adverse drug reaction
CO5	Interpret selected laboratory results of specific disease states and analyze, interpret and formulate drug information

Course Name : Biostatistics and Research Methodology

Course Code : 4.4

CO1	Types of clinical study designs, case studies, observation and studies, interventional studies
CO2	Designing the methodology, sample size determination, power of a study, determination of sample size for simple and comparative experiments
CO3	Determination of sample size to obtain a confidence interval of specified width, power of study
CO4	To understand and construct data graphics-pie charts, histograms, scatter plots, etc. for statistical analysis
CO5	To understand how to apply various methods of testing hypothesis and computer applications in pharmacy

Course Name: Biopharmaceutics and Pharmacokinetics

Course Code: 4.5

CO1	Introduction to Biopharmaceutics and concept of Absorption, distribution, elimination and Pharmacokinetics introduction
CO2	Knowledge on Pharmacokinetic Models and one compartment model
CO3	Knowledge on Two compartment open model and Multiple Dosage regimens
CO4	To understand Nonlinear Pharmacokinetics and Non-Compartment Pharmacokinetics
CO5	To understand Bioavailability and Bioequivalence studies

Course Name

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Clinical Toxicology

  
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Course Code : 4.6

CO1	General principles involved in the management of poisoning
CO2	Antidotes and the clinical applications
CO3	Supportive care in clinical toxicology
CO4	Gut decontamination
CO5	Substance Abuse

Course Name : Pharmacotherapeutics- III

Course Code : 4.1 (Practical)

CO1	Describe the pathophysiology and management of cardiovascular, respiratory and endocrine diseases
CO2	Develop the patient case-based assessment Skills
CO3	Describe the quality use of medicines issues surrounding the therapeutic agents in the treatment of diseases
CO4	Develop clinical skills in the therapeutic management of these conditions
CO5	Students will provide patient – centered care to diverse patients using the evidence-based medicine

Course Name : Hospital Pharmacy

Course Code : 4.2 (Practical)

CO1	Analyze prescriptions for drug interaction
CO2	Formulate and prepare Parenteral formulations and powders
CO3	Perform inventory analysis
CO4	Answer drug information queries through literature search
CO5	Conduct planned experiments and prepare laboratory report in a standard format

Course Name : Clinical Pharmacy

Course Code : 4.3 (Practical)



CO1	Define the role of clinical pharmacist at various healthcare settings
CO2	Monitor drug therapy of the patient through medication chart review and clinical review
CO3	Conduct the medication history interview and counsel the patients
CO4	Detect, assess and monitor adverse drug reactions (ADR)
CO5	Interpret selected laboratory results (as monitoring parameters) of specific disease States
CO6	Provide drug / poison information services by retrieving, analyzing, interpreting and formulate drug and medicine information by utilizing various databases and softwares.

Course Name: Biopharmaceutics and Pharmacokinetics

Course Code: 4.5 (Practical)

CO1	Broader understanding about the concepts of biopharmaceutics and pharmacokinetics
CO2	Ability to calculate the various pharmacokinetic parameters by using various mathematical models.
CO3	Ability to design a basic protocol for the conduct of BA/BE study and the interpretation of the BA/BE data
CO4	Preparedness to use the concepts of pharmacokinetic principles in the clinical contexts.
CO5	Ability to design and perform in-vitro dissolution studies for various drugs as per the standards of official monographs
CO6	Basic understanding about the concepts of in-vitro - in-vivo correlations (IVIVC)

  
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## PHARM D - FIFTH YEAR

Course Name : Clinical Research

Course Code : 5.1

CO1	To understand various approaches to drug discovery
CO2	To describe in detail various phases and types of clinical trial designs and to describe the documentation requirements for Clinical trials and ICF process
CO3	Explain the responsibilities of key players involved in clinical trials
CO4	To describe basic concepts, and establishment of GCP, ICH and CDSCO guidelines and challenges in implementation of guidelines
CO5	Explain the regulatory requirements for conducting clinical trial and explain safety monitoring and data management

Course Name : Pharmacoepidemiology & Pharmacoeconomics

Course Code : 5.2


CO1	Origin and evaluation of pharmacoepidemiology, need for pharmacoepidemiology.
CO2	Measurement of outcomes in pharmacoepidemiology & Concept of risk in pharmacoepidemiology
CO3	Evaluation of Pharmacoepidemiologic methods
CO4	History, needs of pharmacoeconomic evaluations & Pharmacoeconomic evaluation
CO5	Applications of Pharmacoeconomics

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**Course Name: Clinical Pharmacokinetics and Pharmacotherapeutic Drug Monitoring**

**Course Code : 5.3**

CO1	Learn to apply Nomograms and Tabulations in designing dosage regimen.
CO2	Perform Conversion of a drug from intravenous to oral dosing and determination of dose and dosing intervals, Drug dosing in the elderly, paediatrics and obese patients using applicable calculations.
CO3	Understand the basic knowledge of therapeutic drug monitoring for drugs and application in clinical settings.
CO4	Increase and implement the knowledge of dosage adjustment for hepatic and renal impaired patients.
CO5	Identify and manage potential drug interactions as part of pharmaceutical care to patient.

  
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