COURSE OUTCOME

I/IV B.PHARMACY 1ST AND 2ND SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
101 A	Mathematics (Bridge Course) Theory		This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform. Upon completion of the course the student shall be able to:
		CO1	1.Know the theory and their applications in Pharmacy
		CO2	2. Solve different types of problems by applying theory
		CO3	3. Appreciate the important applications of mathematics in Pharmacy.
		CO4	4. Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.
101B & 101 C	Biology (Theory & Practicals)		To learn and understand the components of living world, structure and functional system of plant and animal kingdom. Upon completion of the course, the student shall be able to know:
		CO1	The classification and salient features of five kingdoms of life
		CO2	Understand the basic components of anatomy & physiology of plant.
		CO3	Know & understand the basic components of anatomy & physiology of animals with special reference to human beings.

		CO4	Make aware the students to understand and learn about :various tissue systems and organ systems in plants and animals .
102 & 103	Phramaceutical Chemistry–I (Organic-I) (Theory & Practicals)	CO1 CO2 CO3 CO4	This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions. Upon completion of the course the student shall 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. Account for reactivity/stability of compounds, 4. Identify/confirm the identification of organic compound.
104 & 105	Physical Pharmacy-I (Theory & Practical)	CO1 CO2	The course deals with the various physical, physicochemical properties and principle involved in dosage form formulations. Theory and practical components of the subject help the student to get a better insight in to various areas of formulation research and development and stability studies of pharmaceuticals. Upon the completion of the course student shall be able to : 1. Understand various physicochemical properties of drug molecules in the designing the dosage form 2. Know the principles of chemical kinetics & to use them in assigning expiry date for formulation

		CO3 CO4	3. Demonstrate use of physicochemical properties in evaluation of dosage forms. 4. Appreciate physicochemical properties of drug molecules in formulation research and development.
106	Computer Applications and Statistical Methods (Theory & Practical)	CO1 CO2 CO3	This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases. Upon completion of the course the student shall be able to : 1. Know the various types of application of computers in pharmacy 2. Know various types of databases 3. Know various applications of databases in Pharmacy
201 & 202	Pharmaceutics - I (Theory & Practical)	CO1 CO2 CO3 CO4	This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing different conventional dosage forms. Upon completion of this course the student should be able to: Know the history of profession of pharmacy Understand the basics of different dosage forms, pharmaceutical incompatibilities and Pharmaceutical calculations Understand the professional way of handling the prescription Preparation of various conventional dosage forms.

203 & 204	Pharmaceutical Analysis-I (Theory & Practical)		This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs. Upon completion of the course student shall be able to understand: • The principles of volumetric and electro chemical analysis • Carryout various volumetric and electrochemical titrations • Develop analytical skills This subject deals with the monographs of inorganic drugs and pharmaceuticals. Upon completion of course student shall be able to know: • The sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals. • Understand the medicinal and pharmaceutical importance of inorganic compounds.
205	Environmental Studies (Theory)	CO1 CO2 CO3 CO4 CO5 CO6	Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment. Upon completion of the course the student shall be able to: 1. Create the awareness about environmental problems among learners. 2. Impart basic knowledge about the environment and its allied problems. 3. Develop an attitude of concern for the environment. 4. Motivate learner to participate in environment protection and environment improvement. 5. Acquire skills to help the concerned individuals in identifying and solving environmental problems. 6. Strive to attain harmony with Nature.

II/IV B.PHARMACY 3RD & 4TH SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
301 & 302	Pharmaceutical Chemistry –II (Organic-II) (Theory & Practical)	CO1 CO2 CO3 CO4	This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions. Upon completion of the course the student shall 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. Account for reactivity/stability of compounds 4. Identify/confirm the identification of organic compound
303	Pharmaceutical Engineering-I (Theory)	CO1 CO2 CO3 CO4	This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry. Upon completion of the course student shall be able: 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process.

		CO5 CO6	4. To carry out various test to prevent environmental pollution. 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources. 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
304 & 305	Pharmaceutical Microbilogy (Theory & Practical)		Microbiology is the study of all organisms that are invisible to the naked eye- that is the study of microorganisms. Microorganisms are necessary for the production of bread, cheese, beer, antibiotics, vaccines, vitamins, enzymes etc. Microbiology has an impact on medicine, agriculture, food science, ecology, genetics, biochemistry, immunology etc. Upon completion of the subject student shall be able to: 1. Understand methods of identification, cultivation and preservation of various microorganisms 2. Importance of sterilization in microbiology. and pharmaceutical industry 3. Learn sterility testing of pharmaceutical products. 4. Microbiological standardization of Pharmaceuticals. 5. Understand the cell culture technology and its applications in pharmaceutical industries.
306 & 307	Anatomy and Physiology (Theory & Practical)		Upon completion of this course the student should 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 various experiments related to special senses and nervous system. 5. Appreciate coordinated working pattern of different organs of each system
401	Pharmaceutical Chemistry–III (Medicinal-I) (Theory)		This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class. Upon completion of the course the student shall be able to 1. understand the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. know the Structural Activity Relationship (SAR) of different class of drugs 4. write the chemical synthesis of some drugs
402 & 403	Physical Pharmacy-II (Theory & Practical)		The course deals with the various physical, physicochemical properties and principle involved in dosage forms, formulations. Theory and practical components of the subject help the student to get a better insight in to various areas of formulation research and development and stability studies of pharmaceuticals. Upon the completion of the course student shall be able to : 1. Understand various physicochemical

			properties of drug molecules in the designing the dosage form 2. Know the principles of chemical kinetics & to use them in assigning expiry date for Formulation 3. Demonstrate use of physicochemical properties in evaluation of dosage forms. 4. Appreciate physicochemical properties of drug molecules in formulation research and Development.
404 & 405	Applied Bio Chemistry & Clinical Pathology (Theory & Practicals)		Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA. Upon completion of course student shell able to : 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
406	Forensic Pharmacy (Theory)		This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India.

			Upon completion of the course, the student shall be able to understand: 1. The Pharmaceutical legislations and their implications in the development and marketing 2. Various Indian pharmaceutical Acts and Laws 3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals 4. The code of ethics during the pharmaceutical practice
407	English & Communication Skills		This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business. Upon completion of the course the student shall 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

III/IV B.PHARMACY 5TH & 6TH SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
501 & 502	Pharmaceutical chemistry-IV (Medicinal–II) (Theory & Practicals)	CO1 CO2 CO3 CO4	This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class. Upon completion of the course the student shall be able to : 1. Understand the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs 3. Know the Structural Activity Relationship of different class of drugs 4. Study the chemical synthesis of selected drugs.
503 & 504	Pharmaceutics-II (Dosage Form Technology Including Cosmetics) (Theory & Practicals)	CO1 CO2	Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product. Upon completion of the course the student shall be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Know various considerations in

		CO3	development of pharmaceutical dosage forms. 3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
505 & 506	Pharmacognosy-I (Theory & Practicals)	CO1 CO2 CO3 CO4	The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties. Upon completion of the course, the student shall be able : 1. To know the techniques in the cultivation and production of crude drugs 2. To know the crude drugs, their uses and chemical nature 3. Know the evaluation techniques for the herbal drugs 4. To carry out the microscopic and morphological evaluation of crude drugs
507	PHARMACOLOGY-I (Theory)		The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs. Upon completion of this course the student should be able to :

		CO1 CO2 CO3 CO4 CO5	1. Understand the pharmacological actions of different categories of drugs 2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. 3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. 4. Observe the effect of drugs on animals by simulated experiments 5. Appreciate correlation of pharmacology with other bio medical sciences.
601 & 602	Phramceuticl Engineering-II (Theory & Practicals)	CO1 CO2 CO3 CO4 CO5 CO6	This course is designed to impart a fundamental knowledge on the art and science of various unit operations used in pharmaceutical industry. Upon completion of the course student shall be able: 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process. 4. To carry out various test to prevent environmental pollution. 5. To appreciate and comprehend significance of plant lay out design for optimum use of resources. 6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.
603 & 604	Pharmaceutical Biotechnology (Theory & Practicals)		Biotechnology has a long promise to revolutionize the biological sciences and technology. Scientific application of biotechnology in the field of genetic engineering, medicine and

		CO1 CO2 CO3 CO4	fermentation technology makes the subject interesting. Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. Biotechnology has already produced transgenic crops and animals and the future promises lot more. It is basically a research-based subject. Upon completion of the subject student shall be able to; 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology
605 & 606	Hospital And Clinical Pharmacy (Theory& Practicals)		In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counseling for improved patient care in the community set up. Upon completion of the course, the student shall be able to :

		CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10	1. Know various drug distribution methods in a hospital 2. Appreciate the pharmacy stores management and inventory control 3. Monitor drug therapy of patient through medication chart review and clinical review 4. Obtain medication history interview and counsel the patients 5. Identify drug related problems 6. Detect and assess adverse drug reactions 7. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states 8. Know pharmaceutical care services 9. Do patient counseling in community pharmacy; 10. Appreciate the concept of Rational drug therapy.

IV/IV B.PHARMACY 7TH & 8TH SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
701& 702	Pharmaceutics-III (Biopharmaceutics, Pharmacokinetics & New Drug Delivery Systems) (Theory & Practicals)		This subject is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply Biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of Biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts. Upon completion of the course student shall be able to: 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics. 2. Use plasma data and derive the

		CO1 CO2 CO3 CO4 CO5 CO6 CO7	pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination. 3. Critically evaluate biopharmaceutical studies involving drug product equivalency 4. Design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutical parameters. 5. Detect potential clinical pharmacokinetic problems and apply basic pharmacokinetic principles to solve them **NEW DRUG DELIVERY SYSTEMS** This subject is designed to impart basic knowledge on the area of novel drug delivery systems. Upon completion of the course student shall be able 1. To understand various approaches for development of novel drug delivery systems. 2. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.
703	PHARMACOLOGY-II (Theory & Practicals)	CO1	This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory system, chemotherapy and drugs acting on endocrine system. Upon completion of this course the student should be able to:

		CO2 CO3	1. understand the mechanism of drug action and its relevance in the treatment of different infectious diseases 2. comprehend the principles of toxicology and treatment of various poisonings and 3. Appreciate correlation of pharmacology with related medical sciences.
705 & 706	Pharmaceutical Analysis –II (Theory& Practicals)	CO1 CO2 CO3	This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing. Upon completion of the course the student shall be able to 1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis 2. Understand the chromatographic separation and analysis of drugs. 3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.
707	Industrial Management And Pharmaceutical Marketing	CO1	The pharmaceutical industry not only needs highly qualified researchers, chemist, technical people but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. Sales & Marketing which grooms the people for taking a

			challenging role in Sales and Product management. The career in product management starts from having hands on experience in sales and marketing only. Course The course aim is to provide an understanding of marketing concepts and techniques and the application of the same in the pharmaceutical industry.
801	Pharmaceutical chemistry –V (Natural Products)- (Theory &Practicals)	CO1 CO2 CO3 CO4	The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties. Upon completion of the course, the student shall be able : 1. To know the techniques in the cultivation and production of crude drugs 2. To know the crude drugs, their uses and chemical nature 3. Know the evaluation techniques for the herbal drugs 4. to carry out the microscopic and morphological evaluation of crude drugs
803& 804	PHARMACOGNOSY- II (Theory & Practicals)	CO1	The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine.

		CO1 CO2 CO3	Upon completion of the course, the student shall be able : 1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents 2. To understand the preparation and development of herbal formulation. 3. To understand the herbal drug interactions 4. To carryout isolation and identification of phytoconstituents
805	Good Manufacturing Practices and Validation (Theory)	CO1	This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs. Upon completion of the course student shall be able to: understand the cGMP aspects in a pharmaceutical industry, appreciate the importance of documentation, understand the scope of quality certifications applicable to pharmaceutical industries understand the responsibilities of QA& QC departments

Subject Code	Subject	Course Outcome Number	Course Outcome
1.1 T	Human Anatomy and Physiology	CO1 CO2 CO3	Upon completion of the course the student shall be able to: a. Describe the structure (gross and histology) and functions of various organs of the human body; b. Describe the various homeostatic mechanisms and their imbalances of various systems; c. Identify the various tissues and

		CO4 CO5 CO6	organs of the different systems of the human body; d. Perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes; e. Appreciate coordinated working pattern of different organs of each system; and f. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body
1.1 P	Human Anatomy and Physiology	CO1	Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.
1.2 T &P	Pharmaceutics	CO1 CO2 CO3 CO4	Upon the completion of the course the student should be able to: a. Know the formulation aspects of different dosage forms; b. Do different pharmaceutical calculation involved in formulation; c. formulate different types of dosage forms; and d. appreciate the importance of good formulation for effectiveness.
1.3 T &P	Medicinal Biochemistry	CO1 CO2 CO3	Upon completion of the subject student shall be able to – a. understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases; b. know the metabolic process of biomolecules in health and illness (metabolic disorders); c. understand the genetic organization of mammalian genome; protein

		CO4 CO5	synthesis; replication; mutation and repair mechanism; d. know the biochemical principles of organ function tests of kidney, liver and endocrine gland; and e. do the qualitative analysis and determination of biomolecules in the body fluids.
1.4 T &P	Pharmaceutical Organic Chemistry	CO1 CO2 CO3 CO4 CO5	Upon completion of the subject student shall be able to – impart a very good knowledge about a. IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds; b. Some important physical properties of organic compounds; c. Free radical/ nucleophyllic [alkyl/ acyl/ aryl] /electrophyllic substitution, free radical/ nucleophyllic / electrophyllic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds; d. Some named organic reactions with mechanisms; and e. Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds
1.5 T &P	Pharmaceutical Inorganic Chemistry	CO1 CO2 CO3	Upon completion of the course student shall be able to: a. Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals; b. Know the analysis of the inorganic pharmaceuticals their applications; and

			c. Appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease
1.6 T & P	Remedial Mathematics/ Biology (THEORY)	CO1 CO2 CO3	**REMEDIAL MATHEMATICS** Upon completion of the course the student shall be able to : – a. Know Trignometry, Analytical geometry, Matrices, Determinant, Integration, Differential equation, Laplace transform and their applications; b. Solve the problems of different types by applying theory; and c. Appreciate the important applications of mathematics in pharmacy. **BIOLOGY** This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduces to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy.
2.1T	Pathophysiology	CO1 CO2 CO3	Upon completion of the subject student shall be able to – a. Describe the etiology and pathogenesis of the selected disease states; b. Name the signs and symptoms of the diseases; and c. Mention the complications of the diseases.

2.2 T &P	Pharmaceutical Microbiology	CO1 CO2 CO3 CO4 CO5	Upon completion of the subject student shall be able to – a. Know the anatomy, identification, growth factors and sterilization of microorganisms; b. Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect; c. Do estimation of RNA and DNA and there by identifying the source; d. Do cultivation and identification of the microorganisms in the laboratory; e. Do identification of diseases by performing the diagnostic tests; and f. Appreciate the behavior of motility and behavioral characteristics of microorganisms.
2.3 T &P	Pharmacognosy & Phytopharmaceuticals	CO1 CO2 CO3	Upon completion of the course student shall be able to: a. Understand the basic principles of cultivation, collection and storage of crude drugs; b. Know the source, active constituents and uses of crude drugs; and c. Appreciate the applications of primary and secondary metabolites of the plant.
2.4	Pharmacology-I	CO1 CO2 CO3 CO4	Upon completion of the subject student shall be able to (Know, do, appreciate) – a. understand the pharmacological aspects of drugs falling under the above mentioned chapters; b. Handle and carry out the animal experiments; c. Appreciate the importance of pharmacology subject as a basis of therapeutics; and d. Correlate and apply the knowledge therapeutically.

2.5	Community Pharmacy	CO1 CO2 CO3 CO4 CO5 CO6	Upon completion of the course, the student shall be able to – a. Know pharmaceutical care services; b. Know the business and professional practice management skills in community pharmacies; c. Do patient counseling & provide health screening services to public in community pharmacy; d. Respond to minor ailments and provide appropriate medication; e. Show empathy and sympathy to patients; and f. Appreciate the concept of Rational drug therapy.
2.6 T	Pharmacotherapeutics-I	CO1 CO2 CO3 CO4 CO5 CO6 CO7 CO8 CO9 CO10	At completion of this students will be able to understand – a. The pathophysiology of selected disease states and the rationale for drug therapy; b. The therapeutic approach to management of these diseases; c. the controversies in drug therapy; d. The importance of preparation of individualized therapeutic plans based on diagnosis; e. Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects); f. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy; g. Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence; h. Discuss the controversies in drug therapy; i. Discuss the preparation of

			individualized therapeutic plans based on diagnosis; and j. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).
3.1 T & P	Pharmacology-II	CO1	Upon completion of the subject student shall be able to: a. understand the pharmacological aspects of drugs falling under the

		CO2 CO3 CO4	above mentioned chapters, b. carry out the animal experiments confidently, c. appreciate the importance of pharmacology subject as a basis of therapeutics, and d. correlate and apply the knowledge therapeutically.
3.2 T & P	Pharmaceutical Analysis		This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs. Upon completion of the course student shall be able to understand: • The principles of volumetric and electro chemical analysis • Carryout various volumetric and electrochemical titrations • Develop analytical skills This subject deals with the monographs of inorganic drugs and pharmaceuticals. Upon completion of course student shall be able to know: • The sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals. • Understand the medicinal and pharmaceutical importance of inorganic compounds.
3.3 T & P	Pharmacotherapeutics-II	CO1 CO2 CO3 CO4	Upon completion of the subject student shall be able to – a. know the pathophysiology of selected disease states and the rationale for drug therapy b. know the therapeutic approach to management of these diseases; c. know the controversies in drug therapy; d. know the importance of preparation of individualized

		CO5	therapeutic plans based on diagnosis; and e. appreciate the needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).
3.4 T	Pharmaceutical Jurisprudence	CO1 CO2 CO3 CO4 CO5 CO6 CO7	Upon completion of the subject student shall be able to (Know, do, and appreciate) – a. Practice the Professional ethics; b. Understand the various concepts of the pharmaceutical legislation in India; c. Know the various parameters in the Drug and Cosmetic Act and rules; d. Know the Drug policy, DPCO, Patent and design act; e. Understand the labeling requirements and packaging guidelines for drugs and cosmetics; f. Be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act; and g. Other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.
3.5 T&P	Medicinal Chemistry		
3.6 T & P	Pharmaceutical Formulations		Upon completion of the subject student shall be able to (Know, do, appreciate) – a. Understand the principle involved in formulation of various pharmaceutical dosage forms; b. Prepare various pharmaceutical formulation; c. Perform evaluation of pharmaceutical dosage forms; and d. Understand and appreciate the

			concept of bioavailability and bioequivalence, their role in clinical situations.
4.1T&P	Pharmacotherapeutics-III		At completion of this subject students will be able to understand – a. The pathophysiology of selected disease states and the rationale for drug therapy; b. The therapeutic approach to management of these diseases; c. The controversies in drug therapy; d. The importance of preparation of individualized therapeutic plans based on diagnosis; e. Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects); f. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy; g. To summarize the therapeutic approach to management of these diseases including reference to the latest available evidence; h. To discuss the controversies in drug therapy; i. to discuss the preparation of individualised therapeutic plans based

			on diagnosis; and j. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects).
4.2 T&P	Hospital Pharmacy		Upon completion of the course, the student shall be able to – a. know various drug distribution methods; b. Know the professional practice management skills in hospital pharmacies; c. Provide unbiased drug information to the doctors; d. Know the manufacturing practices of various formulations in hospital set up; e. Appreciate the practice based research methods; and f. Appreciate the stores management and inventory control.
4.3 T &P	Clinical Pharmacy		Upon completion of the subject student shall be able to (Know, do, appreciate) – a. Monitor drug therapy of patient through medication chart review and clinical review; b. Obtain medication history interview and counsel the patients; c. Identify and resolve drug related problems; d. Detect, assess and monitor adverse drug reaction; e. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and f. Retrieve, analyse, interpret and formulate drug or medicine information.

4.4	Biostatistics & Research Methodology		Upon completion of the subject student shall be able to (Know, do, appreciate) – **Biostatistics** 1. Apply basic statistical concepts commonly used in Health and Medical Sciences; 2. Use basic analytical techniques to generate results; 3. Interpret results of commonly used statistical analyses in written summaries; and 4. Demonstrate statistical reasoning skills correctly and contextually. **Research Methodology** 1. Understand some basic concepts of research and its methodologies 2. Identify appropriate research topics 3. Select and define appropriate research problem and parameters 4. Prepare a project proposal (to undertake a project) 5.Organize and conduct research (advanced project) in a more appropriate manner 6. write a research report and thesis 7. write a research proposal (grants)
4.5 T	Biopharmaceutics & Pharmacokinetics T&P		This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

			Upon completion of this course it is expected that students will be able The use raw data and derive the pharmacokinetic models and The basic concepts in biopharmaceutics and pharmacokinetics. Understand, The critical evaluation of biopharmaceutical studies involving drug Parameters the best describe the process of drug absorption, distribution, metabolism and elimination. The design and evaluation of dosage regimens of the drugs using product equivalency. The potential clinical pharmacokinetic problems and application of pharmacokinetic and biopharmaceutic parameters. basics of pharmacokinetic
4.6 T	Clinical Toxicology		Develop a general working knowledge of the principles and practice of clinical toxicology. It is not the intent of this course to prepare students to function as Specialists in Poison Information. The level of professional preparation provided by this course would enable a practitioner to function as contributing health care team member when faced with a toxic exposure experience, including emergencies.
5.1 T	Clinical Research		Upon completion of the subject student shall be able to (Know, do, appreciate) – Know the new drug development process. 2. Understand the regulatory and ethical requirements. 3. Appreciate and conduct the clinical Pharm.D.- Fifth Year trials activities 4.

			Know safety monitoring and reporting in clinical trials 5. Manage the trial coordination process 6. Know the new drug development process. 7. Understand the regulatory and ethical requirements. 8. Appreciate and conduct the clinical trials activities 9. Know safety monitoring and reporting in clinical trials 10. Manage the trial coordination process.
5.2 T	Pharmacoepidemiology and Pharmacoeconomics		**<u>Pharmacoeconomics</u>** Pharmacoeconomics is a field that utilizes a combination of scientific and economic methods to evaluate and compare the value of one drug or therapy to another. The coursework combines applied economics with health care sciences to prepare students to efficiently evaluate and compare the value of one drug or therapy to another. students will learn to critique and apply pharmacoeconomic methods as they relate to cost-minimization, cost-effectiveness, cost-utility, and cost-benefit to improve clinical decision making. **<u>Pharmacoepidemiology</u>** At the completion of the course, the student should be able to: 1. Compare and contrasts different study designs. 2. Distinguish methods of data collection and recording. 3. Understand issues involved in selecting sample and recruiting participants. 4. Discuss threats to validity and issues of interpretations.

			5. Discuss applications of pharmacoepidemiological concepts and methods to pharmacy practice. 6. Explain measures of disease occurrence and association. 7. Demonstrate knowledge and understanding of statistical theory. 8. Select and apply appropriate statistical techniques for managing common types of medical data. 9. Interpret correctly the results of statistical analyses
5.3 T	Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring		Upon completion of the course, student should be able to: 1. Apply PK-PD principles in cases using patient data to optimize pharmacotherapy and drug dosing for maximal efficacy and minimal toxicity. 2. Recognize, document and manage drug dosing in cases involving significant patient pharmacokinetic variability due to physiology or disease (eg, age, obesity, pregnancy, malabsorption, organ dysfunction, critical illness, therapeutic target site). 3. Recognize, characterize and manage cases with clinically significant PK-PD drug interactions. 4. Demonstrate appropriate therapeutic drug management (TDM) in cases with medications for which concentrations can be measured or predicted from available PK research data
5.4	Clerkship *Attending ward rounds on daily basis		
5.5	Project work (Six Months)		

I/II M.PHARM., (PHARMACEUTICS) 1ST & 2nd SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
MPH 101 (T) & 102 (P)	Advanced Instrumental Methods of analysis (Theory & Practicals)		This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. After completion of course student is able to know about chemicals and Theoretical and practical skills of the instruments, The analysis of various drugs in single and combination dosage forms and excipients.
MPH 103 (T) & 104 (P)	Advanced Pharmaceutical Technology (Theory & Practicals)		Course designed to impart advanced knowledge and skills required to learn various aspects and concepts at pharmaceutical industries The Active Pharmaceutical Ingredients and Generic drug Product , The elements of preformulation studies, Objectives Upon completion of the course, student shall be able to understand Optimization Techniques, Industrial Management and GMP Considerations, development & Stability Testing, sterilization process, Pilot Plant Scale Up Techniques & packaging of dosage forms
MPH 105 (T)	Industrial Pharmacy (Theory)		This course is designed to impart knowledge and skills necessary to

			train the students to be on par with the routine of Industrial activities in Production. On completion of this course it is expected that students will be able to understand, Handle the scheduled activities in a Pharmaceutical firm. Manage the production of large batches of pharmaceutical formulations.
MPH 106	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. • Understand and discuss current, real-world issues.
MPH 107	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them • Provide students with preliminary skills to do further research in the field of international relations • Teach students to break down a piece of writing into its component parts and analyze the arguments. • Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 108 (T)	Drug Regulatory Affairs		Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of

			clinical trials and submitting regulatory To know the chemistry, manufacturing controls and their regulatory, To know the approval process of documents : filing process of IND, NDA and ANDA To learn the importance and To learn the documentation requirements for importance Objectives: Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process Preparation of Dossiers and their submission to regulatory agencies in process Pharmacovigilence and process of monitoring in clinical trials. Clinical trials requirements for approvals for conducting clinical trials Submission of global documents in CTD/ eCTD formats , Post approval regulatory requirements for actives and drug products different countries.
MPH 109 (T) & MPH 110 (P)	Advances in Drug Delivery Systems (Theory & Practicals)		This course is designed to impart knowledge on the area of advances in novel drug delivery systems. Upon completion of the course, student shall be able to understand The various approaches for development of novel drug delivery systems. The criteria for selection of drugs and polymers for the development of delivering system The formulation and evaluation of Novel drug delivery systems.
MPH 111 (T)	Advanced Bio-Pharmaceutics and		

& MPH 112 (P)	Pharmacokinetics (Theory & Practicals)		This course is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts. Upon completion of this course it is expected that students will be able The use raw data and derive the pharmacokinetic models and The basic concepts in biopharmaceutics and pharmacokinetics. Understand, The critical evaluation of biopharmaceutic studies involving drug Parameters the best describe the process of drug absorption, distribution, metabolism and elimination. The design and evaluation of dosage regimens of the drugs using product equivalency. The potential clinical pharmacokinetic problems and application of pharmacokinetic and biopharmaceutic parameters. basics of pharmacokinetic.
MPH 113	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. • Understand and discuss current, real-world issues.

MPH 114	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them • Provide students with preliminary skills to do further research in the field of international relations • Teach students to break down a piece of writing into its component parts and analyze the arguments. • Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 115	Comprehensive Viva Voce		Comprehensive Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.
MPH 116 & MPH 117	Seminar I & II		Students present the outcome of their project along with further scope for research. This develops their oratory and leadership skills.
MPH 118	Thesis Evaluation		Students submit a project work that spans over two semesters and comprises of literature review and practical project work. This hones their problem solving capabilities and enables them to think clearly in their future career.

MPH 119	Defence Viva-Voce		The achievement of the program outcomes is analyzed by the viva voce. It also screen whether the students are industry ready or not.
I/II M.PHARM., (PHARMACEUTICAL ANALYSIS) 1ST SEMESTER			
MPH 101 (T) & 102 (P)	Advanced Instrumental Methods of analysis (Theory & Practicals)		
MPH 201 (T) & 202 (P)	Quality control and quality assurance (Theory & Practicals)		
MPH 203 (T)	Biological standardization (Theory)		
MPH 204	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. • Understand and discuss current, real-world issues.
MPH 205	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them • Provide students with preliminary skills to do further research in the field of international relations • Teach students to break down a piece of writing into its component parts and analyze the arguments. • Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.

MPH 108 (T)	Drug Regulatory Affairs		Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory To know the chemistry, manufacturing controls and their regulatory. To know the approval process of documents : filing process of IND, NDA and ANDA To learn the importance and To learn the documentation requirements for importance Objectives: Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process Preparation of Dossiers and their submission to regulatory agencies in process Pharmacovigilence and process of monitoring in clinical trials. Clinical trials requirements for approvals for conducting clinical trials Submission of global documents in CTD/ eCTD formats Post approval regulatory requirements for actives and drug products different countries
MPH 206 (T) & 207 (P)	Advanced Pharmaceutical Analysis (Theory)		This subject deals with the various aspects of Impurity, Impurities in new drug products, in residual solvents, Elemental impurities, Impurity profiling and characterization of degradents, Stability testing of phytopharmaceuticals and their protocol preparation. It also covers the biological testing of various Appropriate analytical skills required for the analytical method vaccines

			and their principle and procedure. Objective After completion of the course students shall able to know, Principles of various reagents used in functional group analysis that development. renders necessary support in research methodology and Analysis of impurities in drugs, residual solvents and stability studies of demonstrates its application in the practical related problems. drugs and biological products
MPH 208 (T) & 209 (P)	Validation and Documentation (Theory)		The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology Validate the manufacturing facilities, Apply the knowledge of validation to instruments and equipments , Carryout validation of manufacturing processes , Explain the aspect of validation and application.
MPH 210	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. • Understand and discuss current, real-world issues.
MPH 211	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them • Provide students with preliminary skills to do further research in the

			field of international relations • Teach students to break down a piece of writing into its component parts and analyze the arguments. • Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 212	Comprehensive Viva Voce		Comprehensive Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.
MPH 213 & MPH 214	Seminar I & II		Students present the outcome of their project along with further scope for research. This develops their oratory and leadership skills.
MPH 215	Thesis Evaluation		Students submit a project work that spans over two semesters and comprises of literature review and practical project work. This hones their problem solving capabilities and enables them to think clearly in their future career.
MPH 216	Defence Viva-Voce		The achievement of the program outcomes is analyzed by the viva voce. It also screen whether the students are industry ready or not.

I/II M.PHARMACY(PHARMACEUTICAL CHEMISTRY) 1ST & 2ND SEMESTERS

Subject Code	Subject	Course Outcome Number	Course Outcome
MPH 101 (T) & 102 (P)	Advanced Instrumental Methods of Analysis (Theory & Practicals)		This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. After completion of course student is able to know about chemicals and Theoretical and practical skills of the instruments, The analysis of various drugs in single and combination dosage forms and excipients
MPH 301(T) & 302 (P)	Advanced Organic Chemistry (Theory & Practicals)		The students learn about heterocyclic compounds, and electrophillic and nucleophillic reactions, which helps them in acquiring further knowledge in biochemistry, pharmacology and medicinal chemistry.
MPH 303(T)	Advanced Medicinal Chemistry (Theory)		This subject helps in correlating between the pharmacology of a disease and its mitigation or cure. This also acts as a stepping stone for use of sophisticated analytical and computational tools by these students.
MPH 304	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. Understand and discuss current, real-world issues.

MPH 305	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them • Provide students with preliminary skills to do further research in the field of international relations • Teach students to break down a piece of writing into its component parts and analyze the arguments. • Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 108 (T)	Drug Regulatory Affairs		Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory To know the chemistry, manufacturing controls and their regulatory To know the approval process of documents : filing process of IND, NDA and ANDA To learn the importance and To learn the documentation requirements for importance Objectives: Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process Preparation of Dossiers and their submission to regulatory agencies in process Pharmacovigilence and process of monitoring in clinical trials. Clinical trials requirements for approvals for

			conducting clinical trials Submission of global documents in CTD/ eCTD formats Post approval regulatory requirements for actives and drug products different countries
MPH 306 & 307	Advanced Medicinal Chemistry II (Theory & Practicals)		The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design. Objectives At completion of this course it is expected that students will be able to Various strategies to design and develop new drug like molecules for Different techniques for drug discovery , Role of medicinal chemistry in drug research , Different stages of drug discovery ,understand Peptidomimetics, biological targets.
MPH 308 & 309	Chemistry of Natural Products (Theory & Practical)		
MPH 310	Seminars		• Improve Oral and written communication skills. • Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. • Understand and discuss current, real-world issues.
MPH 311	Assignments		Description of key goals to be accomplished by the assignment: • Introduce students to different types of scholarly sources and how to access them

			1.Provide students with preliminary skills to do further research in the field of international relations 2. Teach students to break down a piece of writing into its component parts and analyze the arguments. 3.Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 312	Comprehensive Viva Voce		Comprehensive Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.
MPH 313 & MPH 314	Seminar I & II		Students present the outcome of their project along with further scope for research. This develops their oratory and leadership skills.
MPH 315	Thesis Evaluation		Students submit a project work that spans over two semesters and comprises of literature review and practical project work. This hones their problem solving capabilities and enables them to think clearly in their future career.
MPH 316	Defence Viva-Voce		The achievement of the program outcomes is analyzed by the viva voce. It also screen whether the students are industry ready or not.
I/II M.PHARMACY(PHARMACOLOGY) 1ST & 2ND SEMESTERS			
MPH 101 (T)	Advanced Instrumental Methods of Analysis		

& 102 (P)	(Theory & Practicals)		This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. After completion of course student is able to know about chemicals and Theoretical and practical skills of the instruments. The analysis of various drugs in single and combination dosage forms and excipients.
MPH 501 & 502	Advanced Pharmacology – I (Theory & Practicals)		The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved Understand the adverse effects, contraindications and clinical uses of Explain the mechanism of drug actions at cellular and molecular level , Discuss the pathophysiology and pharmacotherapy of certain diseases Objectives Upon completion of the course the student shall be able to : drugs used in treatment of diseases
MPH 503	Clinical Pharmacology & Pharmacotherapeutics		This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This

			subject also focuses on global scenario of Pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development Perform the adverse drug reaction reporting systems and Detect new adverse drug reactions and their assessment Explain the principles of Pharmacovigilance Execute safety monitoring, reporting and close-out activities Explain the responsibilities of key players involved in clinical trials Demonstrate the types of clinical trial designs Explain the regulatory requirements for conducting clinical trial and post market surveillance.
MPH 504	Seminars		1. Improve Oral and written communication skills. 2. Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. 3. Understand and discuss current, real-world issues.
MPH 505	Assignments		Description of key goals to be accomplished by the assignment: 1. Introduce students to different types of scholarly sources and how to access them 2. Provide students with preliminary skills to do further research in the field of international relations 3. Teach students to break down a piece of writing into

			its component parts and analyze the arguments. 4. Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 108 (T)	Drug Regulatory Affairs		Course designed to impart advanced knowledge and skills required to learn the concept of generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory To know the chemistry, manufacturing controls and their regulatory. To know the approval process of documents : filing process of IND, NDA and ANDA To learn the importance and To learn the documentation requirements for importance Objectives: Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process Preparation of Dossiers and their submission to regulatory agencies in process Pharmacovigilence and process of monitoring in clinical trials. Clinical trials requirements for approvals for conducting clinical trials Submission of global documents in CTD/ eCTD formats Post approval regulatory requirements for actives and drug products different countries
MPH 506	Advanced Pharmacology – II (Theory & Practical)		The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various

			diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved Understand the adverse effects, contraindications and clinical uses , Explain the mechanism of drug actions at cellular and molecular level , Discuss the pathophysiology and pharmacotherapy of certain diseases drugs used in treatment of diseases
MPH 508	Screening Methods in Pharmacology & Clinical Research (Theory & Practical)		This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes Appraise the regulations and ethical requirement for the usage of Objectives Upon completion of the course the student shall be able to, Describe the various animals used in the drug discovery process and experimental animals. good laboratory practices in maintenance and handling of experimental Describe the various newer screening methods involved in the drug animals Appreciate and correlate the preclinical data to humans discovery process
MPH 510	Seminars		1. Improve Oral and written communication skills. 2. Explore an

			appreciation of the **self** in relation to its larger diverse social and academic contexts. 3. Understand and discuss current, real-world issues.
MPH 511	Assignments		Description of key goals to be accomplished by the assignment: 1. Introduce students to different types of scholarly sources and how to access them 2. Provide students with preliminary skills to do further research in the field of international relations 3. Teach students to break down a piece of writing into its component parts and analyze the arguments. 4. Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 512	Comprehensive Viva-Voce		Comprehensive Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.
MPH 513 & MPH	Seminar-I & II		Students present the outcome of their project along with further scope for research. This develops their oratory and leadership skills.

514			
MPH 515	Thesis Evaluation		Students submit a project work that spans over two semesters and comprises of literature review and practical project work. This hones their problem solving capabilities and enables them to think clearly in their future career.
MPH 516	Defense Viva-Voce		The achievement of the program outcomes is analyzed by the viva voce. It also screen whether the students are industry ready or not.

I/II M. Pharmacy (1st Semester)
Pharmaceutical Management & Regulatory Affairs Specialization

Subject Code	Subject	Course Outcome Number	Course Outcome
MPH 101 (T) & 102 (P)	Advanced Instrumental Methods of Analysis (Theory & Practicals)		This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc. After completion of course student is able to know about chemicals and Theoretical and practical skills of the instruments. The analysis of various drugs in single and combination dosage forms excipients.
MPH 601 & 602	Pharmaceutical Production & Management (Theory & Practical)		
MPH	Pharmaceutical		This course is designed to impart

603	Administration & Marketing (Theory)		knowledge and skills necessary to train the students on entrepreneurship management. On completion of this course it is expected that students will be able to Demands and challenges of Growth Strategies And Networking. Dynamics of motivation and concepts of entrepreneurship. The Role of enterprise in national and global economy.
MPH 604	Seminars		1. Improve Oral and written communication skills. 2. Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. 3. Understand and discuss current, real-world issues.
MPH 605	Assignments		Description of key goals to be accomplished by the assignment: 1.Introduce students to different types of scholarly sources and how to access them 2. Provide students with preliminary skills to do further research in the field of international relations 3. Teach students to break down a piece of writing into its component parts and analyze the arguments. 4. Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 108 (T)	Drug Regulatory Affairs		Course designed to impart advanced knowledge and skills required to learn the concept of

			generic drug and their development, various regulatory filings in different countries, different phases of clinical trials and submitting regulatory To know the chemistry, manufacturing controls and their regulatory. To know the approval process of documents : filing process of IND, NDA and ANDA To learn the importance and To learn the documentation requirements for importance Objectives: Upon completion of the course, it is expected that the students will be able to The Concepts of innovator and generic drugs, drug development understand The Regulatory guidance's and guidelines for filing and approval process Preparation of Dossiers and their submission to regulatory agencies in process Pharmacovigilence and process of monitoring in clinical trials. Clinical trials requirements for approvals for conducting clinical trials Submission of global documents in CTD/ eCTD formats Post approval regulatory requirements for actives and drug products different countries.
MPH 606 & 607	Validation & Documentation (Theory & Practical)		The main purpose of the subject is to understand about validation and how it can be applied to industry and thus to improve the quality of the products. The subject covers the complete information about validation, types, methodology Validate the manufacturing facilities, Apply the knowledge of validation to instruments and equipments , Carryout validation of manufacturing processes , Explain the aspect of validation and application.

MPH 608 & 609	Intellectual Property Rights (Theory & Practical)		A student who has successfully completed this course should: have an understanding of the fundamental legal principles relating to confidential information, copyright, patents, designs, trade marks and unfair competition; be able to identify, apply and assess principles relating to each of these areas of intellectual property; understand the legal and practical steps needed to ensure that intellectual property rights remain valid and enforceable; be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing; understand current and emerging issues relating to the intellectual property protection, including those relating to indigenous knowledge or culture, information technology especially the distribution of material on the internet, biotechnology and international trade; and be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
MPH 610	Seminars		1. Improve Oral and written communication skills.

			2. Explore an appreciation of the **self** in relation to its larger diverse social and academic contexts. 3. Understand and discuss current, real-world issues.
MPH 611	Assignments		Description of key goals to be accomplished by the assignment: 1. Introduce students to different types of scholarly sources and how to access them 2. Provide students with preliminary skills to do further research in the field of international relations 3. Teach students to break down a piece of writing into its component parts and analyze the arguments. 4. Give students the opportunity to read in depth on a topic and understand how different pieces of scholarship are engaged in conversation with one another.
MPH 612	Comprehensive Viva-Voce		Comprehensive Viva voce will be conducted towards the end of the semester which will be covering the complete syllabus. This will test the student's learning and understanding during the course of their post graduate programme. In doing so, the main objective of this course is to prepare the students to face interview both at the academic and the industrial sector.
MPH 613 &	Seminar-I & II		Students present the outcome of their project along with further

MPH 614			scope for research. This develops their oratory and leadership skills.
MPH 615	Thesis Evaluation		Students submit a project work that spans over two semesters and comprises of literature review and practical project work. This hones their problem solving capabilities and enables them to think clearly in their future career.
MPH 616	Defence Viva-Voce		The achievement of the program outcomes is analyzed by the viva voce. It also screen whether the students are industry ready or not.