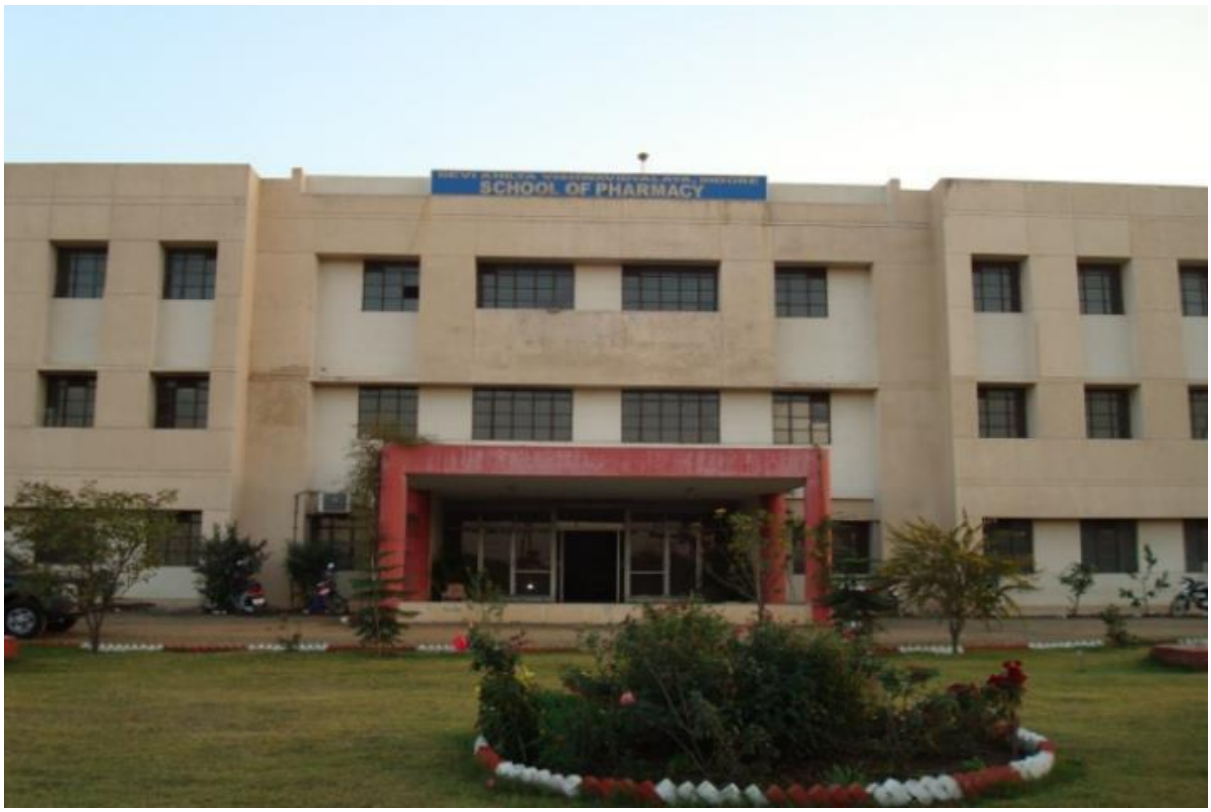
DEVI AHILYA VISHWAVIDYALAYA, INDORE

School of Pharmacy

1.1.1
Program outcome and course outcome



DEVI AHILYA VISHWAVIDYALAYA, INDORE
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PROGRAM OUTCOME (PO)

BACHELOR OF PHARMACY

PO1	**Pharmacy Knowledge and understanding**	Provide basic knowledge and understanding of the principles in drug discovery, formulation, pharmacological evaluation, sophisticated instruments and their applications in the area of Pharmaceutical Sciences and Technology.
PO2	**Technical Skills**	Provides in depth knowledge on usage of various equipments and different kinds of simulation software to perform experiments on synthesis, drug design, pharmaceutical analysis, pharmacological evaluation and formulation development.
PO3	**Modern tool usage**	Enables to understand techniques, models, and software for prediction, interpretation of data and analysis of data generated in pharmaceutical processes like formulation, quality assurance, quality control, etc.
PO4	**Research and Development**	Provides an in depth knowledge to identifying a problem, critical thinking, analysis and provide rational solutions in different disciplines of Pharmaceutical Sciences and Technology. Provides practical based education to apply the concept of manufacturing, formulation, pharmaceutical analysis, drug design, medicinal chemistry and quality control in the drug discovery and development of various pharmaceutical and cosmetic products.

PO5	**Lifelong Learning**	Inculcate an aptitude for continuous learning and professional development with ability to engage in pharmacy practice and health education programs. Develop problem-solving skills and aptitude to participate and succeed in competitive examinations.
PO6	**Communication skills**	Enables effective oral and written communication on health care issues, research and development and other Pharmaceutical problems.
PO7	**Patient counseling and Pharmaceutical Care**	Provide an aptitude to promote health awareness and disease prevention. Provides knowledge to comprehend medical prescription, perform patient counseling and dispensing of drugs in Pharmacy practice.
PO8	**Ethics**	Follow the code of ethics and commit to professional values and responsibilities and norms of the Pharmacy practice.
PO9	**Invention and Entrepreneurship**	Provides an ability to implement the knowledge to execute the responsibilities successfully towards developing expertise, to grow as an entrepreneur and serve the needs of industry and academia.

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PROGRAM SPECIFIC OUTCOMES (PSO)

BACHELOR OF PHARMACY

PSO1	Understanding of basic principles of Pharmaceutical Chemistry, Pharmaceutics, Pharmacology and Pharmacognosy for drug discovery and formulation development.
PSO2	Understanding of the formulation parameters in manufacturing of a dosage form, storage, packaging and dispensing of dosage forms.
PSO3	Understanding of basics principles for drug analysis through conventional methods and modern sophisticated instruments.
PSO4	Understanding of drug chemistry and its structure for synthesis of drug and drug designing using modern software.
PSO5	Understanding of crude drug, its identification, extraction and purification for its medicinal value
PSO6	Understanding of pharmacological action of drugs and their evaluation for their therapeutic effectiveness.
PSO7	Understanding of documentation, quality control and quality assurance of all the processes and pharmaceutical formulations.
PSO8	Understanding of biostatics, novel drug delivery systems, molecular modeling, pharmcovigillence, Pharma management etc as per the need of industry and future prospects.

Program Outcome (PO)

MASTER OF PHARMACY

PO1	**Drug discovery/synthesis**	Provide basic knowledge and understanding of the principles in drug discovery, chemistry and structure of drugs, organic reactions, and mechanism of action, identification and analytical chemistry.
PO2	**Advanced Technical Skills**	Provides in depth knowledge on usage of various equipments and different kinds of simulation software to perform experiments on synthesis, drug design and interpretation of analytical data generated from LC-MS, GC-MS, ATR-IR, DSC etc. theoretically and practically.
PO3	**Research and Development**	Provides an in depth knowledge to identifying a problem, critical thinking, analysis and provide rational solutions in design and development of medicinal compounds.
PO4	**Learning Aptitude**	Inculcate an aptitude for continuous learning and professional development with ability to engage in research and development.
PO5	**Scientific Writing**	Enables effective oral and written communication on research and development and other analytical issues.
PO6	**Ethics**	Follow the code of ethics and commit to professional values and responsibilities and norms of the Pharmacy practice.

PO7	**Research and development**	Provides practical based education to apply the concept of pharmaceutical analysis, organic reactions, drug design, medicinal chemistry and quality control in the drug discovery and development of various medicinal compounds.
PO8	**Invention and Entrepreneurship**	Provides an ability to implement the knowledge to execute the responsibilities successfully towards developing expertise, to grow as an entrepreneur and serve the needs of industry and academia.

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Program Specific outcomes (PSO)

Master of Pharmacy (Pharmaceutical Chemsitry)

PSO1	Understanding of basic principles of organic Chemistry, medicinal chemistry, natural products and their related synthesis and analysis.
PSO2	Understanding of the mechanisms for various reactions in order to carry out an organic reaction, including isolating, purifying, and characterizing the product.
PSO3	Understanding of the processes involved in the design, development and discovery of medicinal compounds and mechanism of action of various drug molecules.
PSO4	Understanding of different types of natural products, their occurrence, structure, biosynthesis, their properties and the use of natural products as starting materials.
PSO5	Understanding to apply various organic reactions in single & multistep process in manufacturing of drugs and drug intermediates
PSO6	Understanding of various molecular modeling soft-wares in the design of novel drug-like molecules and to apply the various soft-wares for physico-chemical property prediction.
PSO7	To predict the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism.

Dr. Tamanna Narsinghani
DQAC, Coordinator

Dr. Rajesh Sharma
Head

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COURSE OUTCOME (w.e.f.-2015-2016)

B. Pharm. Semester-I

Course code	Name of the course	Course Outcome
PYB-101(A) T	Remedial Mathematics	Upon completion, students would have learnt application of mathematical concepts and principles to perform computations for pharmaceutical sciences. They would be able to create, use and analyze mathematical representations and mathematical relationships.
PYB-101(B) T	Remedial Biology	The course, would provide the insight of salient features of five kingdoms of life and the basic components of anatomy & physiology of plant. They would know about cell biology, morphology and classification system of Plant cell.
PYB -101 P	Remedial Biology Practicals	Upon completion of course, student would have understanding of experimental biology including basics of microscope and microscopic studies of cell and its inclusion and plants.
PYB -103 T	Pharmaceutics-I	Upon completion of this course the students would know the history of profession of pharmacy, prescription handling and its significance and the basics of different dosage forms.
PYB -103 P	Pharmaceutics-I Practical	Practical Pharmaceutics would impart a fundamental knowledge on the formulation of the different conventional dosage forms.
PYP -105 T	Inorganic Medicinal Chemistry	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. They would have understanding of the medicinal and pharmaceutical importance of inorganic compound.
PYB -105 P	Inorganic Medicinal Chemistry Practicals	Practicals would provide insight of the monographs of inorganic drugs and pharmaceuticals along with their testing.

PYB -107 T	**Human Anatomy and Physiology-I**	Upon completion of this course the student should be able to explain the gross morphology, structure and functions of various organs of the human body. It also helps in understanding various homeostatic mechanisms and their imbalances.
PYB -107 P	**Human Anatomy and Physiology-I Practicals**	Practicals of physiology allow the clear understanding for identification of the various tissues and organs of different systems of human body and to perform the various experiments related to special senses.
PYB -109 T	**Environmental Science**	This program shall create an awareness about environmental problems, develop an attitude towards of concern for the environment and Motivate learner to participate in environment protection and environment improvement.
PYB -111 T	**IT Skills for Pharmacists**	On completion of this course, the students will be able to apply the fundamentals of computer application in pharmacy. They would have knowledge of various databases and their application in pharmacy.
PYB -111 P	**IT Skills for Pharmacists Practicals**	Practical would provide experimental skills to create, store and reteive various database.

B. Pharm. Semester-II

Course code	Name of the course	Course Outcome
PYB-102 T	Mathematics and Biostatistics	Upon completion, students would have learnt application of mathematical concepts and principles to perform computations for pharmaceutical sciences. They would be able to create, use and analyze mathematical representations and mathematical relationships.Upon completion of the course the student shall be able to Know the operation of ANOVA,f-test, t-test and various other statistical techniques to solve statistical problems
PYB-104 T	Pharmaceutical Microbiology	Upon completion of the subject student shall know methods of identification, cultivation and preservation of various microorganisms. They would understand the importance and implementation of sterlization in pharmaceutical processing and industry. They shall have the knowledge of microbiological standardization of Pharmaceuticals, the cell culture technology and its applications in pharmaceutical industries.
PYB-104 P	Pharmaceutical Microbiology Practicals	They would have knowledge of basic principles involved in sterility testing, microbiological assay, staining and culture media.
PYB-106 T	Pharmaceutical Chemistry-I (Organic-I)	Upon completion of the course the student would have the understanding of the structure, name and the type of isomerism of the organic compound. They would be able to understand the reaction, name the reaction and orientation of reactions. They shall be able to identify/confirm the identification of organic compound.

PYB-106 P	**Pharmaceutical Chemistry-I (Organic-I) Practicals**	Practicals would allow students to perform Systematic qualitative analysis of unknown organic compounds, preparation of suitable solid derivatives from organic compounds and construction of molecular models.
PYB-108 T	**Human Anatomy and Physiology-II**	Upon completion of this course the student Students would have studied the gross morphology, structure and functions of various organs of the human body, various homeostatic mechanisms and their imbalances, identification of various tissues and organs of different systems of human body. They would have insight of working pattern of different organs of each system in coordination.
PYB-108 P	**Human Anatomy and Physiology-II Practicals**	Practical physiology would allow the students to understand physiological processes through charts/models. This is helpful for developing an insight on the subject.
PYB-110 T	**Pharmacognosy-I**	Upon completion of the course, the student shall be able to know the techniques in the cultivation and production of crude drugs, the crude drugs, their uses and chemical nature. They would know the evaluation techniques for the herbal drugs and the microscopic and morphological evaluation of crude drugs.
PYB-110 P	**Pharmacognosy-I Practicals**	The students would know the determination of various pharmacognostic parameters like stomatal index, swelling inder, stomatal number, etc.
PYB-112 T	**Professional Communication**	Upon completion of the course the student shall be able to communicate effectively (Verbal and Non Verbal) and manage the team as a team player. These all would add value to the pharmaceutical business.

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B. Pharm. Semester-III

Course code	Name of the course	Course Outcome
PYB-201 T	**Pharmacognosy-II**	Upon completion of the course, the student shall be able to know the techniques in the cultivation and production of crude drugs, the crude drugs, their uses and chemical nature. They would know the evaluation techniques for the herbal drugs and the microscopic and morphological evaluation of plants.
PYB-201 P	**Pharmacognosy-II Practicals**	The students would know the determination of various morphological parameters of plants.
PYB-203 T	**Pharmaceutical Analysis- I**	The subject content would help to understand the fundamental of analytical chemistry electrochemical analytical techniques. 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. It would help to develop analytical skills
PYB-203 P	**Pharmaceutical Analysis- I Practicals**	Upon completion of course, students would be able to deals with the principles of electrochemical analysis of drugs and techniques to perform the estimation of different category drugs.
PYB-205 T	**Physical Pharmacy-I**	Upon the completion of the course students would have the understanding of physicochemical properties of drug molecules like solubility, distribution, adsorption, and stability for application in dosage forms designing. They would know the role of surfactants, interfacial phenomenon and thermodynamics. Also, the principles o protein binding and its significance.

PYB-205 P	**Physical Pharmacy-I Practicals**	Practicals in Physical Pharmacy would help the to understand the concepts of partition coefficient, phase diagram, adsorption isotherm and surfactants.
PYB-207 T	**Pharmaceutical Chemistry-II (Organic-II)**	Upon completion of the course the student would have the understanding of the structure, name and the type of isomerism of the organic compound. They would be able to understand the reaction, name the reaction and orientation of reactions. They shall be able to identify/confirm the identification of organic compound.
PYB-207 P	**Pharmaceutical Chemistry-II (Organic-II) Practicals**	Practicals would allow students to perform Systematic qualitative analysis of unknown organic compounds, preparation of suitable solid derivatives from organic compounds and construction of molecular models.
PYB-209 T	**Generic Elective-I (Food Science Technology)**	Upon completion students would be able to know the composition, chemical constituents and nutritive value of food products. Also they shall be aware of laws and standard related to food products and technology.
PYB-209 T	**Generic Elective-I (Health Education)**	Upon completion students would be able to know the Concepts of Health and Disease, Health problems in India, Social factors effecting health. Environment and Health, Economics and health. Disease causing agents and prevention of disease. Also various organizations and their objectives like WHO.

B. Pharm. Semester-IV

Course code	Name of the course	Course Outcome
PYB-202 T	**Pharmaceutics –II**	Students shall have understanding of formulation and additives employed in pharmaceutical dosage forms and various considerations in development of pharmaceutical dosage forms.
PYB-202 P	**Pharmaceutics –II Practicals**	Students shall be able to design a dosage forms and evaluate them for their quality.
PYB-204 T	**Pharmaceutical Analysis-II**	The subject content would help to understand the fundamental of analytical chemistry electrochemical analytical techniques. 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. It would help to develop analytical skills
PYB-204 P	**Pharmaceutical Analysis-II Practicals**	Upon completion of course, students would be able to deals with the principles of electrochemical analysis of drugs and techniques to perform the estimation of different category drugs.
PYB-206 T	**Pharmaceutical Biochemistry**	Upon completion of course student shall be able to understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. They would have learnt the metabolism of nutrient molecules in physiological and pathological conditions. Also, they would be able to understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
PYB-206 P	**Pharmaceutical Biochemistry Practicals**	The student would be able to determine qualitatively/ quantitatively sugars, starch, carbohydrates and protein.

PYB-208 T	**Physical Pharmacy-II**	Upon the completion of the course student shall be able to understand various physicochemical properties of drug molecules and their application in formulation development and evaluation of dosage forms.
PYB-208 P	**Physical Pharmacy-II Practicals**	Practicals in Physical Pharmacy would help the to understand the applications of theoretical concepts experimentally in dosage form design.
PYB-210 T	**Generic Elective-II Intellectual Property Rights**	Upon the completion of the course student shall be able to understand concept of Intellectual Property Protection, its importance and its application in commercialization.
PYB-210 T	**Generic Elective-II Consumer Rights**	Upon the completion of the course student shall be able to understand concept, definition and laws of consumer rights. They shall know the procedure for consumer redressal agencies and Appeals.

B. Pharm. Semester-V

Course code	Name of the course	Course Outcome
PYB-301 T	Pharmaceutics-III	Students shall have understanding of various pharmaceutical dosage forms and their manufacturing techniques. Various considerations in development of pharmaceutical dosage forms.
PYB-301 P	Pharmaceutics-III Practicals	Students shall be able to formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.
PYB-303 T	Medicinal Chemistry-I	Upon completion of the course the student shall be able to understand the chemistry of drugs with respect to their pharmacological activity, the drug metabolic pathways, adverse effect and therapeutic value of drugs. They will know the Structural Activity Relationship (SAR) of different class of drugs and would have learnt the chemical synthesis of some drugs
PYB-303 P	Medicinal Chemistry-I Practicals	The students would able to sysnthesis drugs/intermediates and also could perform assay of drugs
PYB-305 T	Pharmacognosy-III	Upon completion of the course, the students would know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. They shall have understanding of the herbal drug interactions.
PYB-305 P	Pharmacognosy-III Practicals	Students shall have learnt the preparation and development of herbal formulation to carryout isolation and identification of phytoconstituents.
PYB-307 T	Pharmacology-I	Upon completion of this course the students would know the pharmacological actions of different categories of drugs, the mechanism of drug action at organ system/sub cellular/ macromolecular levels. They shall be able to apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

PYB-307 P	**Pharmacology-I Practicals**	Students would know the basics of experimental pharmacology. They would be able to correlate their theoretical knowledge with the pharmacological data obtained from various experiments.
PYB-309 T	**DSE-I Dietary Supplements and Nutraceuticals**	Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals.
PYB-309 T	**DSE-I Cosmetic Science**	Upon completion of course, student shall be able to understanding of fundamentals of skins, teeth, hairs and their related problems. They shall know the composition and excipients used in formulation of various cosmetic preparations and their evaluation.

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B. Pharm. Semester-VI

Course code	Name of the course	Course Outcome
PYB-302T	**Pharmaceutical Engineering**	Upon completion of the course student would know various unit operations used in Pharmaceutical industries, the material handling techniques and various processes involved in pharmaceutical manufacturing. They would understand and comprehend significance of plant lay out design for optimum use of resources. Also, they would know the various preventive methods used for corrosion control in Pharmaceutical Industries.
PYB-302 P	**Pharmaceutical Engineering Practicals**	Practicals of Engineering would impart practical application of concepts and equipments in pharmaceutical industries.
PYB-304 T	**Medicinal Chemistry-II**	Upon completion of the course the student shall be able to understand the chemistry of drugs with respect to their pharmacological activity, the drug metabolic pathways, adverse effect and therapeutic value of drugs. They will know the Structural Activity Relationship (SAR) of different class of drugs and would have learnt the chemical synthesis of some drugs
PYB-304 P	**Medicinal Chemistry-II Practicals**	The students would able to sysnthesis drugs/intermediates and also could perform assay of drugs.
PYB-306 T	**Pharmacology-II**	Upon completion of this course the students would know the pharmacological actions of different categories of drugs, the mechanism of drug action at organ system/sub cellular/ macromolecular levels. They shall be able to apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

PYB-306 P	**Pharmacology-II Practicals**	Upon completion of this course the students would know the basics of animal handling and care, the design of Pharmacological experiments to understand the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
PYB-308 T	**Pharmaceutical Biotechnology**	Upon completion of the subject student shall be able to understand the importance and application of Immobilized enzymes, recombinant DNA technology, fermentation techniques and ELISA in production in pharmaceutical industry.
PYB-310 T	**Pharmaceutics Jurisprudence and Ethics**	Upon completion of the course, the student shall be able to understand the code of ethics during the pharmaceutical practice, the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals, various Indian pharmaceutical Acts and Laws. They shall be able to know various regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals in India.
PYB-312 T	**Discipline Specific Elective-II Packaging Technology**	Upon completion of the course, the student shall be able to understand various packaging material, their composition, functions and evaluation parameters. They shall also know the regulatory aspect of various packaging materials and techniques to pack different pharmaceutical dosage forms.
PYB-312 T	**Discipline Specific Elective-II Drug Design**	Upon completion of the course, the student shall be able to understand, about drug discovery, Quantitative Structure Activity Relationship (QSAR), molecular modeling and its application in drug designing.

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B. Pharm. Semester-VII

Course code	Name of the course	Course Outcome
PYB-401 T	Pharmaceutics IV	Students shall have understanding of various pharmaceutical dosage forms and their manufacturing techniques. Various considerations in development of pharmaceutical dosage forms.
PYB-401 P	Pharmaceutics IV Practicals	Students shall be able to formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.
PYB-403 T	Medicinal Chemistry-III	Upon completion of the course the student shall be able to understand the chemistry of drugs with respect to their pharmacological activity, the drug metabolic pathways, adverse effect and therapeutic value of drugs. They will know the Structural Activity Relationship (SAR) of different class of drugs and would have learnt the chemical synthesis of some drugs.
PYB-403 P	Medicinal Chemistry-III Practicals	The students would able to sysnthesis drugs/intermediates and also could perform assay of drugs.
PYB-405 T	Pharmaceutical Analysis-III	Upon completion of the course the student shall be able to understand the interaction of matter with electromagnetic radiations and its applications in drug analysis. They shall understand the chromatographic separation and analysis of drugs.
PYB-405 P	Pharmaceutical Analysis-III Practicals	They shall know the quantitative & qualitative analysis of drugs using various analytical instruments.
PYB-407 T	Pharmacology-III	Upon completion of this course the students would know the pharmacological actions of different categories of drugs, the mechanism of drug action at organ system/sub cellular/ macromolecular levels. They shall be able to apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

PYB-407 P	**Pharmacology-III Practicals**	Students would know the basics of experimental pharmacology. They would be able to correlate their theoretical knowledge with the pharmacological data obtained from various experiments.
PYB-409 T	**Discipline Specific Elective – III Pharmaceutical Regulatory Science**	Upon completion of the subject student shall be able the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. Also, they would know various regulatory approval process and their registration in Indian and international markets.
PYB-409 T	**Discipline Specific Elective – III Pharmacovigilance**	Upon completion of course, students shall know importance of drug safety monitoring, pharmacovigilance, detection of new adverse drug reactions and their assessment, methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle. They shall also have knowledge of ICH guidelines and objectives in reporting.

B. Pharm. Semester-VIII

Course code	Name of the course	Course Outcome
PYB-402T	**Pharmaceutics V (Bio-pharmaceutics & Pharmacokinetics)**	Upon completion of the course student shall be able to understand the basic concepts in biopharmaceutics, compartment models and pharmacokinetics and their significance. They shall know significance of plasma drug concentration-time curve, to calculate the pharmacokinetic parameters and their application. They shall have understanding of bioavailability and bioequivalence of drug products and their significance.
PYB-402 P	**Pharmaceutics V (Bio-pharmaceutics & Pharmacokinetics) Practicals**	Practicals would provide the experimental insight of compartment modeling, plasma drug concentration-time curve, pharmacokinetic parameters and their calculation.
PYB-404 T	**Pharmaceutical Industrial Management and Accountancy**	Students shall have an understanding of management, organisations concepts, accountancy and book keeping systems with financial accountancy.
PYB-406 T	**Pharmaceutical Quality Assurance**	Upon completion of the course student shall be able to understand the importance of cGMP, documentation aspects and the responsibilities of QA & QC departments in a pharmaceutical industry.
PYB-408 T	**Generic Elective-III Pharmaceutical Marketing**	Students shall have an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.
PYB-408 T	**Generic Elective-III Clinical Pharmacy and Drug Interactions**	Principles of clinical pharmacology and clinical toxicology. They shall know the rationale for drug use and evaluation of drug interaction.

PYB-410 P	**Project Report**	Students shall have an understanding of literature review, scientific writing and presentation skills.
PYB-412 T	**Professional Training**	Students shall have an understanding of drug dispensing, patient counseling and industrial scale manufacturing and quality control methods for drug product.

Dr. (Mrs.) Tamanna Narsinghani
DQAC, Coordinator

Dr. Rajesh Sharma
Head

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COURSE OUTCOME (w.e.f.-2016-17)
BACHELOR OF PHARMACY
B.PHARM. I SEMESTER

Course code	Name of the course	Course Outcome
BP101T	Human Anatomy and Physiology-I (Theory)	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. Upon completion of this course the student should be able to explain the gross morphology, structure and functions of various organs of the human body. It also helps in understanding various homeostatic mechanisms and their imbalances. They would be able to identify the various tissues and organs of different systems of human body, perform the various experiments related to special senses and nervous system. Besides, they would have learnt various techniques like blood group determination, blood pressure measurement, blood cells counting
BP107P	Human Anatomy and Physiology (Practical)	Practicals of physiology allow the clear understanding 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 of the subject.
BP102T	Pharmaceutical Analysis I (Theory)	The subject content would help to understand the fundamental of analytical chemistry electrochemical analytical techniques. 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. It would help to develop analytical skills.

BP108P	**Pharmaceutical Analysis I – Practical**	Upon completion of course, students would be able to deals with the principles of electrochemical analysis of drugs and techniques to perform the estimation of different category drugs.
BP103T	**Pharmaceutics I (Theory)**	Upon completion of this course the students would know the history of profession of pharmacy, the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations. The content would provide basic understanding of the professional way of handling the prescription and preparation of various conventional dosage forms.
BP109P	**Pharmaceutics I – Practical**	Practical Pharmaceutics would impart a fundamental knowledge on the formulation of the different conventional dosage forms.
BP104T	**Pharmaceutical Inorganic Chemistry (Theory)**	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. They would have understanding of the medicinal and pharmaceutical importance of inorganic compound.
BP110P	**Pharmaceutical Inorganic Chemistry –**	Practicals would provide insight of the monographs of inorganic drugs and pharmaceuticals along with their testing.
BP105T	**Communication skills – (Theory)**	Upon completion of the course the student shall be able to communicate effectively (Verbal and Non Verbal) and manage the team as a team player. These all would add value to the pharmaceutical business.
BP111P	**Communication skills – Practical***	Practical would prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers.

BP 106RBT	**Remedial Biology Theory***	The course, would provide the insight of salient features of five kingdoms of life and the basic components of anatomy & physiology of plant. They would know about cell biology (Basic Nature of Plant cell and Animal cell), classification system of both Plants & Animals, tissue system and organ system in plant and animals.
BP 106RMT	**Remedial Mathematics (Theory)**	Upon completion, students would have learnt application of mathematical concepts and principles to perform computations for pharmaceutical sciences. They would be able to create, use and analyze mathematical representations and mathematical relationships.
BP112RBP	**Remedial Biology – Practical***	Upon completion of course, student would have understanding of experimental biology including basics of microscope and microscopic studies of cell and its inclusion and plants.

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B.PHARM.II SEMESTER

Course code	Name of the	Course Outcome
BP201T	**Human Anatomy and Physiology II - Theory**	Upon completion of this course the student Students would have studied the gross morphology, structure and functions of various organs of the human body, various homeostatic mechanisms and their imbalances, identification of various tissues and organs of different systems of human body. They would be able to erform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume. They would have insight of working pattern of different organs of each sy stem in coordination.
BP207P	**Human Anatomy and Physiology II -Practical**	Practical physiology would allow the students to understand physiological processes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.
BP202T	**Pharmaceutical Organic Chemistry I- Theory**	Upon completion of the course the student would have the understanding of the structure, name and the type of isomerism of the organic compound. They would be able to understand the reaction, name the reaction and orientation of reactions. They shall be able to identify/confirm the identification of organic compound.
BP208P	**Pharmaceutical Organic Chemistry I- Practical**	Practicals would allow students to perform Systematic qualitative analysis of unknown organic compounds, preparation of suitable solid derivatives from organic compounds and construction of molecular models.

BP203T	**Biochemistry-Theory**	Upon completion of course student shall be able to understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. They would have learnt the metabolism of nutrient molecules in physiological and pathological conditions. Also, they would be able to understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
BP209P	**Biochemistry-Practical**	The student would be able to determine qualitatively/ quantitatively sugars, starch, carbohydrates and protein.
BP204T	**Pathophysiology-Theory**	Upon completion of the subject student shall be able to describe the etiology and pathogenesis of the selected disease states; name the signs and symptoms of the diseases and to mention the complications of the diseases.
BP205T	**Computer Applications in Pharmacy-Theory**	On completion of this course, the students will be able to apply the fundamentals of computer application in pharmacy. They would have knowledge of various database and their application in pharmacy.
BP210P	**Computer Applications in Pharmacy-Practical**	Practical would provide experimental skills to create, store and reteive various database.
BP206T	**Environmental sciences-Theory**	This program shall create an awareness about environmental problems, develop an attitude towards of concern for the environment and Motivate learner to participate in environment protection and environment improvement.

B.PHARM.III SEMESTER

Course code	Name of the course	Course Outcome
BP301T	**Pharmaceutical Organic Chemistry II- Theory**	Upon completion of the course the student would have the understanding of the structure, name and the type of isomerism of the organic compound. They would be able to understand the reaction, name the reaction and orientation of reactions. They shall be able to identify/confirm the identification of organic compound and prepare organic compounds
BP305P	**Pharmaceutical Organic Chemistry II-Practical**	Practicals would allow students to prepare organic compounds and to determine oil values.
BP302T	**Physical Pharmaceutics I-Theory**	Upon the completion of the course students would have the understanding of physicochemical properties of drug molecules like solubility, distribution, adsorption, and stability for application in dosage forms designing. They would know the role of surfactants, interfacial phenomenon and thermodynamics. Also, the principles o protein binding and its significance.
BP306P	**Physical Pharmaceutics I-Practical**	Practicals in Physical Pharmacy would help the to understand the concepts of partition coefficient, phase diagram, adsorption isotherm and surfactants.
BP303T	**Pharmaceutical Microbiology-Theory**	Upon completion of the subject student shall know methods of identification, cultivation and preservation of various microorganisms. They would understand the importance and implementation of sterlization in pharmaceutical processing and industry. They shall have the knowledge of microbiological standardization of Pharmaceuticals, the cell culture technology and its applications in pharmaceutical industries.

BP307P	**Pharmaceutical Microbiology – Practical**	They would have knowledge of basic principles involved in sterility testing, microbiological assay, staining and culture media.
BP304T	**Pharmaceutical Engineering – Theory**	Upon completion of the course student would know various unit operations used in Pharmaceutical industries, the material handling techniques and various processes involved in pharmaceutical manufacturing. They would understand and comprehend significance of plant lay out design for optimum use of resources. Also, they would know the various preventive methods used for corrosion control in Pharmaceutical Industries.
BP 308P	**Pharmaceutical Engineering –Practical**	Practicals of Engineering would impart practical application of concepts and equipments in pharmaceutical industries.

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B.PHARM. IV SEMESTER

Course code	Name of the course	Course Outcome
BP401T	Pharmaceutical Organic Chemistry III– Theory	Upon completion of the course, the student shall know the methods of preparation and properties of organic compounds. They would have the knowledge of stereo chemical aspects of organic compounds and stereo chemical reactions. Also, they shall know the medicinal uses and other applications of organic compounds
BP402T	Medicinal Chemistry I – Theory	Upon completion of the course the student shall be able to understand the chemistry of drugs with respect to their pharmacological activity, the drug metabolic pathways, adverse effect and therapeutic value of drugs. They will know the Structural Activity Relationship (SAR) of different class of drugs and would have learnt the chemical synthesis of some drugs
BP406P	Medicinal Chemistry I – Practical	The students would able to sysnthesis drugs/intermediates and also could perform assay of drugs
BP403T	Physical Pharmaceutics II – Theory	Upon the completion of the course student shall be able to understand various physicochemical properties of drug molecules in the designing the dosage forms, the principles of chemical kinetics and their application in formulation development and evaluation of dosage forms.
BP407P	Physical Pharmaceutics II- Practical	Practicals in Physical Pharmacy would help the to understand the applications of theoretical concepts experimentally in dosage form design.
BP404T	Pharmacology I- Theory	Upon completion of this course the students would know the pharmacological actions of different categories of drugs, the mechanism of drug action at organ system/sub cellular/ macromolecular levels. They shall be able to apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

BP408P	**Pharmacology I – Practical**	Students would know the basics of experimental pharmacology. They would be able to correlate their theoretical knowledge with the pharmacological data obtained from various experiments.
BP405T	**Pharmacognosy and Phytochemistry I– Theory**	Upon completion of the course, the student shall be able to know the techniques in the cultivation and production of crude drugs , the crude drugs, their uses and chemical nature. They would know the evaluation techniques for the herbal drugs and the microscopic and morphological evaluation of crude drugs.
BP409P	**Pharmacognosy and Phytochemistry I – Practical**	The students would know the determination of various pharmacognostic parameters like stomatal index, swelling index, stomatal number, etc.

B.PHARM. V SEMESTER

Course code	Name of the course	Course Outcome
BP501T	**Medicinal Chemistry II-Theory**	At the end of the course, students shall be able to understand the chemistry and pharmacological activity of various class of drugs, their metabolic pathways, adverse effect, the Structural Activity Relationship of different class of drugs and chemical synthesis of selected drugs.
BP502T	**Industrial Pharmacy I-Theory**	Students shall have understanding of various pharmaceutical dosage forms and their manufacturing techniques. Various considerations in development of pharmaceutical dosage forms.
BP506P	**Industrial Pharmacy I-Practical**	Students shall be able to formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.
BP503T	**Pharmacology II -Theory**	Students shall know the mechanism of drug action and its relevance in the treatment of different diseases. They would be able to correlate pharmacology with related medical sciences.
BP507P	**Pharmacology II -Practical**	Students would have the understanding of isolation of different organs/tissues from the laboratory animals by simulated experiments.
BP504T	**Pharmacognosy II-Theory**	Upon completion of the course, the students would know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. They shall have understanding of the herbal drug interactions.
BP 508P	**Pharmacognosy II-Practical**	Students shall have learnt the preparation and development of herbal formulation to carryout isolation and identification of phytoconstituents.

BP505T	**Pharmaceutical Jurisprudence-Theory**	Upon completion of the course, the student shall be able to understand the code of ethics during the pharmaceutical practice, the Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals, various Indian pharmaceutical Acts and Laws. They shall be able to know various regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals in India.

B.PHARM. VI SEMESTER

Course code	Name of the course	Course Outcome
BP601T	**Medicinal Chemistry III-Theory**	Upon completion of the course student shall be able to understand the importance of drug design and different techniques of drug design, the chemistry of drugs with respect to their biological activity. They shall know the metabolism, adverse effects and therapeutic value of drugs. Also, they would have knowledge of structural activity relationship.
BP607P	**Medicinal chemistry III-Practical**	Students shall know the structure of drugs and drug design. They shall know the synthesis, assay and determination of various physicochemical properties of drugs.
BP602T	**Pharmacology III – Theory**	Students shall know the mechanism of drug action and its relevance in the treatment of different diseases. They would be able to correlate pharmacology with related medical sciences.
BP608P	**Pharmacology III- Practical**	Students would have the understanding of isolation of different organs/tissues from the laboratory animals by simulated experiments. They shall know application of biostatics, calculation of dose and pharmacokinetic parameters.
BP603T	**Herbal Drug Technology-Theory**	Upon completion of this course the student should be able to understand raw material as source of herbal drugs, know the WHO and ICH guidelines for evaluation of herbal drugs. They shall know the herbal cosmetics, natural sweeteners, nutraceuticals and procedures for patenting of herbal drugs.
BP609P	**Herbal Drug Technology-Practical**	They shall know the preliminary screening of crude drugs, formulation of carious dosage form using herbal extract and analysis of herbal drugs as per pharmacopoeia.

BP 604 T	**Biopharmaceutics and Pharmacokinetics -Theory**	Upon completion of the course student shall be able to understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. They shall know significance of plasma drug concentration-time curve, to calculate the pharmacokinetic parameters and their application. They shall have understanding of bioavailability and bioequivalence of drug products and their significance.
BP605T	**Pharmaceutical Biotechnology-Theory**	Upon completion of the subject student shall be able to understand the importance and application of Immobilized enzymes, genetic engineering, fermentation techniques and monoclonal antibodies in production in pharmaceutical industry.
BP606T	**Quality Assurance-Theory**	Upon completion of the course student shall be able to understand the importance of cGMP, documentation aspects and the responsibilities of QA & QC departments in a pharmaceutical industry.

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B.PHARM. VII SEMESTER

Course code	Name of the course	Course Outcome
BP701T	Instrumental Methods of Analysis- Theory	Upon completion of the course the student shall be able to understand the interaction of matter with electromagnetic radiations and its applications in drug analysis. They shall understand the chromatographic separation and analysis of drugs.
BP705P	Instrumental Methods of Analysis- Practical	They shall know the quantitative & qualitative analysis of drugs using various analytical instruments.
BP702T	Industrial Pharmacy II- Theory	Upon completion of the course, the student shall be able to now the pilot plant and scale up technology, used in formulation of pharmaceutical dosage forms used in technology transfer from lab scale to commercial batch. They would also know different Laws and Acts and approval processes required for drug products.
BP703T	Pharmacy Practice- Theory	Upon completion of the course, the student shall know various drug distribution methods in a hospital, stores management and inventory control in hospital pharmacy. They would be able to understand monitoring of drug therapy of patient through medication chart review and clinical review. They would know to counsel the patients and detect and assess adverse drug reactions. They would have the insight of hospital pharmacy in pharmaceutical care services.
BP704T	Novel Drug Delivery System- Theory	Upon completion of the course student shall be able various approaches in development of novel drug delivery system, criteria for selection of drugs and polymers along with evaluation of novel drug delivery systems.

B.PHARM.VIII SEMESTER

Course code	Name of the course	Course Outcome
BP801T	**Biostatistics and Research Methodology**	Upon completion of the course the student shall be able to Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment) and various other statistical techniques to solve statistical problems
BP802T	**Social and Preventive Pharmacy**	The student shall be able to acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide. They would gain a critical way to think and evaluate alternative ways of solving problems related to health and pharmaceutical issues.
BP803ET	**Pharma Marketing Management**	Students shall have an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.
BP804ET	**Pharmaceutical Regulatory Science**	Upon completion of the subject student shall be able the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. Also, they would know various regulatory approval process and their registration in Indian and international markets.
BP805ET	**Pharmacovigilance**	Upon completion of course, students shall know importance of drug safety monitoring, pharmacovigilance, detection of new adverse drug reactions and their assessment, methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle. They shall also have knowledge of ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning and CIOMS requirements for ADR reporting.

BP806ET	**Quality Control and Standardization of Herbals**	Upon completion of the subject student shall be able to know WHO guidelines for quality control of herbal drugs, quality assurance in herbal drug industry. They shall know the regulatory approval process and their registration in Indian and international markets.
BP807ET	**Computer Aided Drug Design**	Upon completion of the course, the student shall be able to understand Design and discovery of lead molecules, its role in drug design, QSAR and docking and various strategies to develop new drug like molecules.
BP808ET	**Cell and Molecular Biology**	Upon completion of the subject student shall have knowledge of cell and molecular biology history, cellular functioning and composition, protein structure and function and basic of molecular genetic mechanisms.
BP809ET	**Cosmetic Science**	Upon completion of course, student shall be able to know regulatory aspect of coemetic preparation in India and worldwide. They would have understanding of fundamentals of skins, teeth, hairs and their related problems. They shall know the composition, excipients used in formulation of various cosmetic preparations and their evaluation.
BP810ET	**Experimental Pharmacology**	Upon completion of the course the student shall know the applications of various commonly used laboratory animals, various screening methods used in preclinical research, the importance of biostatistics and research methodology and would be able to design and execute a research hypothesis independently.

BP811T	**Advanced Instrumentation Techniques**	Upon completion of the course the student shall be able to understand the advanced instruments used and its applications in drug analysis, the chromatographic separation of drugs and analysis of drugs using various analytical instruments.
BP812ET	**Dietary Supplements and Nutraceuticals**	By the end of the course, students should be able to understand the need of supplements by the different group of people to maintain healthy life and the regulatory and commercial aspects of dietary supplements including health claims.

Dr. (Mrs.) Tamanna Narsinghani

DQAC, Coordinator

Dr. Rajesh Sharma

Head

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COURSE OUTCOMES

M. Pharm. (Pharmaceutical Chemistry) : CBCS SCHEME (2015-2016)

S. No.	Name of the Course	Course Code/Sem.	Course Outcome
1	**Modern Analytical Techniques-I**	**PYM-PC 701T First sem.**	After completion of course student is able to know • Preparation of drug sample for analysis such as pharmaceutical solids, liquids and biological sample. • Theoretical and practical skills of techniques such as Soxhlet extraction, liquid-liquid extraction, solid-phase extraction, column-switching techniques, solid phase micro extraction, protein precipitation methods, ultrafiltration and dialysis. • Theoretical and practical knowledge of sample preparation of drug conjugates, direct-injection techniques for plasma samples, derivatization techniques, residual-solvent sample preparation for gas chromatography, calibration methods. • Students will able to understand the concept of ICH Guidelines for Validation of analytical methods. • The analysis of various drugs in single and combination dosage forms. • Theoretical and practical skills of the instruments such as UV and FTIR. • Student will able to understand theoretical concepts of chromatographic methods such Thin Layer Chromatography, High Performance Thin Layer Chromatography, Gas Chromatography and High Performance Liquid Chromatography.
2	**Impurity profiling and Stability studies**	**PYM-PC 703T First sem.**	After the completion of course, students will be able to learn about • Impurities in pharmaceutical products, origin of impurities, types of impurities, Impurity-drug interaction, differences between impurities and degradation products. • Toxicological perspectives of impurities in pharmaceutical products. • Impurity identification, structure elucidation of unknown impurities, synthesis, purification, standardization, and quantification of impurities of active drug substances. • Regulatory requirements of impurity profiling • Stability of drugs and drug products • The kinetics of degradation and Stability prediction of drug • Basic concept, objectives of stability study and importance of accelerated stability study. • Statistical and regulatory aspect of drug stability studies • Study parameters and applications of physical stability testing for tablets, dispersed systems, semisolids, liquid dosage forms and preservatives.

3	**Medicinal Chemistry (Drug Discovery and Development)**	**PYM-PC 705T First sem.**	At completion of this course it is expected that students will be able to know about • Role of medicinal chemistry in drug research • Strategies and steps involved in drug discovery. • Drug targets, lead molecule and structure-activity relationship of various medicinally important molecules. • Physico-chemical properties of new drug molecule and drugs, Lipinski and Verber rule. • Bio-isosterism and stereo chemical aspects of drug design • Structure and types of receptors, drug receptor interactions, drug receptor theories • Design of agonist and antagonists of opioid receptors, histamine and dopamine receptors. • Structure of proteins and enzymes, kinetics of enzyme mechanisms of enzyme catalysis, types of enzyme inhibitors and design strategies of cyclooxygenase (COX), matrix metalloproteinase (MMPs) and dipeptidyl peptidase- IV (DPP-IV) inhibitors • Case studies of the discovery of new drugs such as omeprazole, ritonavir, cimetidine, imatinib, marimastat, raloxifene
4	**Pharmacological Screening**	**PYM-PC 707T (A) First sem.**	The subject is designed to impart the knowledge of • Mechanism of drug action and drug targets receptors, various screening methods in pharmacology, pharmacokinetics of drug • Strategies involved in new drug discovery and concept of bioavailability and bioequivalence for drugs and drug products. • CPCSEA guidelines for performing experiments on animals • Principle, types, methods and advantages of bioassays traditional and modern *in vitro* techniques for pharmacological screening of drugs • Methods of preclinical evaluation of drugs like Analgesics, antipyretics, anti-inflammatory agents Anticonvulsants, anti-psycotics, CNS stimulants, antianxiety, antidepressants, sedative, hypnotic, Histamine antagonists, Hypoglycaemic, Anti-malarial, Anti-ulcer, and diuretics. • Principles of toxicity evaluation, determination of ED_{50}, LD_{50} and TD values, OECD guideline for animal testing, regulatory bodies, histopathological studies of various organs.

5	**Laboratory Practicals-1**	**PYM-PC 709T First sem.**	The student will be able to learn practical skills for various techniques • Soxhlet extraction, liquid-liquid extraction solid phase extraction, column-switching techniques, solid phase micro extraction, protein precipitation methods, ultrafiltration and dialysis. • Development of analytical methods for simultaneous estimation of two and more than two drugs using UV and HPLC. • Interpretation of UV and IR spectra. • Determination of melting point, Thin Layer Chromatography, High Performance Thin Layer Chromatography, Gas Chromatography and High Performance Liquid Chromatography. • Pharmacological screening of various categories of drugs
6	**Modern Analytical Techniques-II**	**PYM-PC 702 T**	After the completion of course student will be able to understand • Theoretical and practical skills of the instruments such as NMR (PMR and ^{13}C NMR), Mass spectroscopy (LC-MS, GC-MS, GC-MS-MS, LC-MS, MS-MS), radioimmunoassay and related techniques. • Instrumentation and applications of Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Optical Rotatory Dispersion(ORD), Circular Dichroism (CD) Differential Scanning Calorimetry (DSC) and x-ray diffraction.
7	**Drug Design**	**PYM-PC 704T**	The subject is designed to impart the knowledge of • The methodologies of drug design such as analogue based drug design, molecular modelling, ligand based drug design (2D and 3D QSAR approaches) and Structure Based Drug Design • Importance of informatics and pharmacokinetics in drug design
8	**Advanced Organic Chemistry**	**PYM-PC 706T**	After the completion of course the student will be able to understand • Basic Concepts of aromaticity, Substitution reactions (S_N1, S_N2, S_N1 vs S_N2, S_Ni, Neighbouring group effect) and Elimination reactions (E_1, E_2 and $E1_{cb}$) • Reaction mechanism of synthetically important reactions, stereochemistry and reaction of ylides)

9	**Logics in Organic Synthesis-I**	**PYM-PC 708T (A)**	The subject deals with the knowledge of • Principles of synthetic analysis and planning, importance of protecting group in multistep synthesis, case studies of syntheses of natural products. • Basic principles of green chemistry, and the importance of green chemistry over the conventional chemistry. • The basic idea about combinatorial synthesis and click chemistry
10	**Laboratory Practicals-2**	**PYM-PC 710P**	• Interpretation of NMR and Mass spectra • Practical knowledge for the selection of most appropriate synthetic route for the synthesis of medicinally important compounds. • Ligand based and structure based approaches of drug design. • Exposure to different molecular modelling softwares.
11	**Research Methodology and Biostatistics**	**PYM-PC 801T**	• Students should be able to distinguish a purpose statement, a research question or hypothesis, and a research objective. • Students should be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses. • Students should be familiar with the steps involved in identifying and selecting a good instrument to use in a study. • Students should be familiar with conducting a literature review for a scholarly educational study: • Study of different parametric and non parametric test would help in proper use of these tests • Ethical aspects of medical research • Complete knowledge of CPCSEA guidelines.
12	**Drug Regulatory Affairs and Quality Assurance**	**PYM-PC 803T**	After the completion of course, student will be able to know about • Importance of intellectual property rights and patent, filing of patent application • Salient features of Drug and Cosmetics act and USFDA.WHO guidelines and WHO certification scheme • Preparation of documents for new drug approval, export registration and common technical document • INDA, NDA, SNDA, ANDA, CMC, PAC, SUPAC, BACPAC and pharmacovigilance • Basic concept and scope of quality control, quality assurance, quality audit and quality management systems

			• Concept of validation, process validation and its application • Statistical quality control, types of sample and sampling, concept of acceptance sampling, acceptance sampling plan, sampling risk, operating characteristics curves and quality control charts • Regulatory drug analysis, analytical method validation, ICH guidelines on analytical method validation.

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COURSE OUTCOMES

M.Pharm. (Pharmaceutical Chemistry) : PCI SCHEME(2016-2017)

S. No.	Name of the Course	Course Code/Sem.	Course Outcome
1	**Modern Pharmaceutical Analytical Techniques**	**MPC 101T** **First sem.**	• After completion of course student is able to know • The analysis of various drugs in single and combination dosage forms. • Theoretical and practical skills of the instruments such as UV, IR, NMR, Mass, spectroflourimetry, flame emission spectroscopy and atomic absorption spectroscopy. • Student will able to understand theoretical concepts of chromatographic methods such Thin Layer Chromatography, High Performance Thin Layer Chromatography, Ion Exchange Chromatography, Column Chromatography, Gas Chromatography, High Performance Liquid Chromatography, Ultra High Performance Liquid Chromatography, Affinity Chromatography and Gel Chromatography. • Student will also able to understand concepts of electrophoresis, x-ray diffraction and different thermal techniques and their applications in the field of Pharmacy.
2	**Advanced Organic Chemistry - I**	**MPC 102T** **First sem.**	• The student shall be able to understand • The principles and applications of retrosynthesis • The mechanism & applications of various named reactions • The concept of disconnection to develop synthetic routes for small target molecule. • The various catalysts used in organic reactions • The chemistry of heterocyclic compounds
3	**Advanced Medicinal Chemistry**	**MPC 103 T** **First sem.**	• The student shall be able to understand • Different stages of drug discovery • Role of medicinal chemistry in drug research • Different techniques for drug discovery • Various strategies to design and develop new drug like molecules for biological targets • Peptidomimetics

4	**Chemistry of Natural Products**	**MPC 104T** **First sem.**	• The student shall be able to understand • Different types of natural compounds and their chemistry and medicinal importance • The importance of natural compounds as lead molecules for new drug discovery • The concept of rDNA technology tool for new drug discovery • General methods of structural elucidation of compounds of natural origin • Isolation, purification and characterization of simple chemical constituents from natural source
5	**Pharmaceutical Chemistry Practical I**	**MPC 105P** **First sem.**	• The student is expected to learn practical skills for the development of analytical methods for simultaneous estimation of two and more than two drugs using UV and HPLC. • Interpretation of UV and IR spectra. • Practical skills for the determination of melting point, thin layer and column chromatography. • Identification of organic compounds using various functional group tests. • Application of different organic reaction for the synthesis of medicinally important compounds. • Purification of organic solvents and isolation of plant constituents.
6	**Seminar**	**First sem.**	• 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 and real-world issues.
7	**Assignments**	**First sem.**	• 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

8	**Advanced Spectral Analysis**	**MPC 201T** **Second sem.**	• Student will learn the various hyphenated analytical instrumental techniques • Student will deal with different analytical data from different principle instrument. • The fellow student will gain the interpretation skills • Student will expose to different analytical data like LC-MS, GC-MS, ATR-IR, DSC etc. theoretically and practically. • Fellow student will be able to handle different analytical data to predict the unknown structures • At the end of the course student should know how to handle different hyphenated instruments data
9	**Advanced Organic Chemistry – II**	**MPC 202T** **Second sem.**	• Utilization of green chemistry concepts and to be the effective substitute for conventional chemistry. • Application of catalysis in single and multistep process in manufacturing of drugs and drug intermediates • Synthesis of novel peptidomimetics using peptide chemistry. • Stereo-chemical features including conformation and stereo electronic effects; reaction dynamics, and photochemical reactions
10	**Computer Aided Drug Design**	**MPC 203T** **Second sem.**	• Role of CADD in drug discovery • Different CADD techniques and their applications • Various strategies to design and develop new drug like molecules. • Working with molecular modeling softwares to design new drug molecules • The in silico virtual screening protocols
11	**Pharmaceutical Process Chemistry**	**MPC 204T** **Second sem.**	• Exposure to develop safe, cost-effective, environmentally friendly, and efficient synthetic routes. • It would impart knowledge on the development and optimization of a synthetic route/s. • The pilot plant procedure for the manufacture of Active Pharmaceutical Ingredients and new chemical entities for the drug development phase. • Exposure on different separation procedures. • Prediction of the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism. • The principles and applications of modern chemical instrumentation, experimental design, and data analysis.

12	**Pharmaceutical Chemistry Practicals – II**	**MPC 205P** **Second sem.**	• Interpretation of UV, IR, NMR and Mass spectra • Practical knowledge for the selection of most appropriate synthetic route for the synthesis of medicinally important compounds. • Direct and indirect approaches of drug design. • Exposure to different molecular modelling softwares.
13	**Seminar**	**Second sem.**	• 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 and real-world issues.
14	**Assignments**	**Second sem.**	• 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
15	**Research Methodology & Biostatistics**	**MPC 301T Third Sem.**	• Students should be able to distinguish a purpose statement, a research question or hypothesis, and a research objective. • Students should be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses. • Students should be familiar with the steps involved in identifying and selecting a good instrument to use in a study. • Students should be familiar with conducting a literature review for a scholarly educational study: • Study of different parametric and non-parametric test would help in proper use of these test • Ethical aspects of medical research • Complete knowledge of CPCSEA guidelines.

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