



Where talent meets opportunity

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

**VISION, MISSION, PROGRAMME
OUTCOMES, PROGRAMME SPECIFIC
OUTCOMES & COURSE OUTCOMES**

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BACHELOR OF PHARMACY
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Outcome based Curriculum for
Undergraduate Degree Courses in Pharmacy

(1) Vision:

To develop pharmacists, educators and scientists whose leadership, knowledge and innovations improve the health of our communities.

(2) Mission:

To prepare tomorrow's leaders through innovative teaching, research and clinical practices that translate scientific discoveries into new treatments and models of care to improve both health and quality of life.

(3) Programme Educational Objectives: (PEOs)

PEO1: To offer academic programs of high quality in pharmaceutical sciences which are recognized nationally, regionally and internationally.

PEO2: To ensure that pharmacy students are equipped with adequate knowledge and skills to enter successfully into the different fields of pharmaceutical sciences & practice.

PEO3: To contribute to the advancement of knowledge of pharmaceutical sciences and practice through research.

(4) Programme Level Outcomes: POs

POs-1: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices. Demonstrate knowledge of basic skills and techniques of drug manufacturing and development, drug design and Quality Assurance of Pharmaceutical products.

POs-2: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

POs-3: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines

POs-4: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

POs-5: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



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POs-6: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

POs-7: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

POs-8: Pharmaceutical Rules and Regulation: To help the government and businesses to ensure that product development, manufacturing, and marketing practices meet government standards and ensure products are safe for public use. Regulatory affairs is a mandatory and necessary undertaking (ethically and regulatory) in development, inspection, quality assurance, and safety assessment of new and existing consumable, therapeutic, and diagnostic products.

POs-9: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

POs-10: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

POs-11: Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

POs-12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

(5) PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To prepare graduate to success in technical or professional careers in various pharmaceutical industry and/ or institute and /or Health care system through excellent real time exposure to rigorous education.

PSO2: To prepare graduate of the program to learn and adapt in a globe of constantly developing trends

PSO3: To prepare the graduate to have Knowledge of formulation technology, synthesis, Discovery tools as per the requirement of Pharmaceutical sectors.



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PSO4: To strengthen the professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate pharmaceutical sciences issues to broader social context.

PSO5: To streams a lifelong career of personal and practicing professional growth with ethical codes and self esteem.




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(06) Programme PO's and PSO's Mapping

S. No	Program	Courses Category	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
			Pharmacy Knowledge	Problem Analysis	Planning Abilities	Modern tool usage	Leadership skills	Professional Identity	Pharmaceutical Ethics	Pharmaceutical Rules and Regulations	Communication	The Pharmacist and Society	Environment and sustainability	Life-Long learning						
1	B Pharm	Humanities and Social Sciences including Management courses	*							*	*	*	*	*		*				
2		Basic Science courses		*	*	*	*	*	*		*	*	*	*		*				
3		Professional core courses	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4		Open subjects – Electives from other technical and /or pharmacy * subjects	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5		Project work, seminar and internship in industry or elsewhere	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
6		Specific core subject	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
7		Mandatory Course (Non credit)			*							*			*				*	



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07) Semester wise PO's and SPO's Mapping

Semester	B Pharma	Programme Outcomes												Programme Specific outcomes					
		POs-1	POs-2	POs-3	POs-4	POs-5	POs-6	POs-7	POs-8	POs-9	POs-10	POs-11	POs-12	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
FIRST	Human Anatomy and Physiology I – Theory	*			*														
	Pharmaceutical Analysis I – Theory	*	*		*														
	Pharmaceutics I – Theory	*		*	*														
	Pharmaceutical Inorganic Chemistry – Theory	*	*		*														
	Communication skills – Theory*					*						*							
	Remedial Biology/ Remedial Mathematics – Theory*		*		*										*				
	Human Anatomy and Physiology – Practical				*										*				
	Pharmaceutical Analysis I – Practical	*	*		*										*				
	Pharmaceutics I – Practical	*		*	*										*				
																	*	*	*
																		*	*



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	Pharmaceutical Inorganic Chemistry -- Practical								*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Communication skills -- Practical*						*		*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Remedial Biology -- Practical*					*			*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Human Anatomy and Physiology II -- Theory					*			*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Organic Chemistry I -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Biochemistry -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pathophysiology -- Theory				*			*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Computer Applications in Pharmacy -- Theory*				*		*		*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Environmental sciences -- Theory*				*				*						*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Human Anatomy and Physiology II -- Practical				*			*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Organic Chemistry I -- Practical				*			*	*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Biochemistry -- Practical				*		*		*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Computer Applications in Pharmacy -- Practical*				*		*		*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Organic Chemistry II -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Physical Pharmaceutics I -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Microbiology -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Engineering -- Theory				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical Organic Chemistry II -- Practical				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Physical Pharmaceutics I -- Practical				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Pharmaceutical				*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
THIRD					*				*									*	*	*	*	*	*	*	*	*	*	*	*	*	*	

SECOND

THIRD



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	Microbiology – Practical	*																		
	Pharmaceutical Engineering –Practical	*		*																*
	Pharmaceutical Organic Chemistry III- Theory	*	*																	*
	Medicinal Chemistry I – Theory	*	*																	*
	Physical Pharmaceutics II – Theory	*	*																	*
	Pharmacology I – Theory	*	*																	*
	Pharmacognosy and Phytochemistry I- Theory	*	*																	*
	Medicinal Chemistry I – Practical	*	*																	*
	Physical Pharmaceutics II – Practical	*	*																	*
	Pharmacology I – Practical	*	*																	*
	Pharmacognosy and Phytochemistry I – Practical	*	*																	*
	Medicinal Chemistry II – Theory	*	*																	*
	Industrial Pharmacy- Theory	*	*																	*
	Pharmacology II – Theory	*	*																	*
	Pharmacognosy and Phytochemistry II- Theory	*	*																	*
	Pharmaceutical Jurisprudence – Theory	*													*					*
	Industrial Pharmacy – Practical	*	*																	*
	Pharmacology II – Practical	*	*																	*
	Pharmacognosy and Phytochemistry II – Practical	*	*																	*
	Medicinal Chemistry III –	*	*																	*

FOURTH

FIFTH



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SCIENCE																							
PHARMACOVIGILANCE	*																*	*	*	*			
QUALITY CONTROL AND STANDARDIZATION OF HERBALS	*				*											*	*	*	*				
COMPUTER AIDED DRUG DESIGN	*				*											*	*	*	*				
CELL AND MOLECULAR BIOLOGY	*				*										*	*	*	*	*				
COSMETIC SCIENCE	*				*										*	*	*	*	*				
PHARMACOLOGICAL SCREENING METHODS	*				*										*	*	*	*	*				
ADVANCED INSTRUMENTATION TECHNIQUES	*				*										*	*	*	*	*				
DIETARY SUPPLEMENTS AND NUTRACEUTICALS	*				*									*	*	*	*	*	*				
PROJECT WORK	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mandatory Courses		*			*								*				*						*
BIV I (preferred Semester)																							

#Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course.

\$ Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM) course.



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(08) Structure of Programme: To fulfill the need of development of all the POs/ GAs, as per above mapping, the following semester wise programme structure are as under.

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Total Credits* = 209/211⁵/212⁶

Structure of Undergraduate Pharmacy program:

S. No.	Course Category	Credits of the pharmacy Curriculum
1.	Humanities and Social Sciences including Management courses	9
2.	Basic Science courses	16
3.	Professional core courses	152
4.	Open subjects – Electives from other technical and /or pharmacy *subjects	10
5.	Project work, seminar and internship in industry or elsewhere	12
6.	Specific core subject	12
7.	Mandatory Course (Non-credit)	Non-credit
	Total	209/211⁵/212⁶

The credit points assigned for extracurricular and or co-curricular activities shall be given by the Principals of the colleges and the same shall be submitted to the University. The criteria to acquire this credit point shall be defined by the colleges from time to time.

Applicable ONLY for the students studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics course.

#Applicable ONLY for the students studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology course.

***Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (Lab)/week	1 Credit




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Course Outcomes: (Cos)

Semester	SUBJECT CODE	SUBJECT	OUTCOME
I	BP101T	HUMAN ANATOMY AND PHYSIOLOGY-I	Cos1: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy. 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.
	BP102T	PHARMACEUTICAL ANALYSIS	Cos2: This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs including their principles, titrations and analytical skills.
	BP103T	PHARMACEUTICS- I	Cos3: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
	BP104T	PHARMACEUTICAL INORGANIC CHEMISTRY	Cos4: This subject deals with the monographs of inorganic drugs and pharmaceuticals.
	BP105T	COMMUNICATION SKILLS	Cos5: 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.
	BP 106RBT	REMEDIAL BIOLOGY	Cos6: To learn and understand the components of living world, structure and functional system of plant and animal kingdom.




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	BP 106RMT	REMEDIAL MATHEMATICS	Cos7: 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.
II	BP 201T	HUMAN ANATOMY AND PHYSIOLOGY-II	Cos8: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
	BP202T	PHARMACEUTICAL ORGANIC CHEMISTRY -I	Cos9: 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.
	BP203 T	BIOCHEMISTRY	Cos10: 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.
	BP 204T	PATHOPHYSIOLOGY	Cos11: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and Understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.



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	BP205T	COMPUTER APPLICATIONS PHARMACY	IN	Cos12: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.
	BP206T	ENVIRONMENTAL SCIENCES		Cos13: 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.
III	BP301T	PHARMACEUTICAL ORGANIC CHEMISTRY – II		Cos14: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.
	BP302T	PHYSICAL PHARMACEUTICS-I		Cos15: The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.
	BP303T	PHARMACEUTICAL MICROBIOLOGY		Cos16: Study of all categories of microorganisms especially for the production of alcohol antibiotics, vaccines, vitamins enzymes etc.
	BP304T	PHARMACEUTICAL		Cos17: This course is designed to impart a fundamental knowledge on the art and



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		ENGINEERING	Science of various unit operations used in pharmaceutical industry.
IV	BP401T.	PHARMACEUTICAL ORGANIC CHEMISTRY - III	Cos18: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.
	BP402T.	MEDICINAL CHEMISTRY - I	Cos19: 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.
	BP403T	PHYSICAL PHARMACEUTICS-II	Cos20: The course deals with the various physical and physicochemical properties, and principals involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms
	BP404T.	PHARMACOLOGY-I	Cos21: 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




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			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.
	BP405T	PHARMACOGNOSY AND PHYTOCHEMISTRY I	Cos22: 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.
V	BP501T	MEDICINAL CHEMISTRY - II	Cos23: 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
	BP502T.	Industrial Pharmacy-I	Cos24: 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.
	BP503.T.	PHARMACOLOGY-II	Cos25: 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 different systems of body and in addition, emphasis on the basic concepts of bioassay.
	BP504T.	PHARMACOGNOSY AND PHYTOCHEMISTRY II	Cos26: 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



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VI	BP505T.	PHARMACEUTICAL JURISPRUDENCE	Cos27: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.
	BP601T.	MEDICINAL CHEMISTRY - III	Cos28: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.
	BP602T.	PHARMACOLOGY- III	Cos29: 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 and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.




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BP603 T.	HERBAL DRUG TECHNOLOGY CO30	Cos30: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs
BP604 T.	BIOPHARMACEUTIC AND PHARMACOKINETICS	Cos31: This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein
BP605T.	PHARMACEUTICAL BIOTECHNOLOGY	Cos32: Biotechnology has a long promise to revolutionize the biological sciences and technology. Scientific application of biotechnology in the field of genetic engineering, medicineand fermentation technology makes 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.
BP606T	PHARMACEUTICAL QUALITY ASSURANCE	Cos33: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.
BP701	BP701T. INSTRUMENTAL METHODS OF ANALYSIS	Cos34: 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.



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VII	BP702T.	INDUSTRIAL PHARMACYII	Cos35: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market
	BP703T.	PHARMACY PRACTICE	Cos36: 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
	BP704T	NOVEL DRUG DELIVERY SYSTEMS	Cos37: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.
	BP801T.	BIOSTATISTICS AND RESEARCH METHODOLOGY	Cos38: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.




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VII	BP802T	SOCIAL PREVENTIVE PHARMACY AND	Cos39: The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.
	BP803ET.	PHARMA MARKETING MANAGEMENT	Cos40: The pharmaceutical industry not only needs highly qualified researchers, chemists and, 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. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.
	BP804ET:	PHARMACEUTICAL REGULATORY SCIENCE	Cos41: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.
	BP805ET:	PHARMACOVIGILANCE	Cos42: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.




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BP806ET.	QUALITY CONTROL AND STANDARDIZATION OF HERBALS	Cos43: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.
BP807 ET.	COMPUTER AIDED DRUG DESIGN	Cos44: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.
BP808ET	CELL AND MOLECULAR BIOLOGY	Cos45: Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function. This is done both on a microscopic and molecular level. Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organisms such as humans, plants, and sponges.
BP809ET.	COSMETIC SCIENCE	Cos46: This subject deals with the study of cosmetics including their preparation, uses and effects.
BP810ET.	PHARMACOLOGICAL SCREENING METHODS	Cos47: This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.




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	BP811ET.	ADVANCED INSTRUMENTATION TECHNIQUES	Cos48: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.
	BP812 ET.	DIETARY SUPPLEMENTS AND NUTRACEUTICALS CO49	Cos49: This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

COs-POs Relationship




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B.Pharm	Programme Outcomes												Specific Programme outcomes					Course Outcomes		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		COS	
Allied Subject																				
Communication skills – Theory *				*			*		*			*					*			Cos5
Communication skills – Practical*				*			*		*			*					*			Cos5
Remedial Biology/ Remedial Mathematics – Theory*	*			*			*		*			*					*			Cos6 / Cos7
Core Subject																				
Human Anatomy and Physiology I – Theory				*			*		*			*					*			Cos1
Pharmaceutical Analysis I – Theory	*			*			*		*			*					*			Cos2
Pharmaceutics I – Theory	*			*			*		*			*					*			Cos3
Pharmaceutical Inorganic Chemistry – Theory	*			*			*		*			*					*			Cos4
Human Anatomy and Physiology – Practical				*			*		*			*					*			Cos1
Pharmaceutical Analysis I – Practical	*			*			*		*			*					*			Cos2



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Pharmaceutics I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos3		
Pharmaceutical Inorganic Chemistry – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos4		
Remedial Biology – Practical*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos6		
Allied Subject																											
Computer Applications in Pharmacy – Theory *	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12	
Environmental sciences – Theory *												*	*	*	*	*	*	*	*	*	*	*	*	*	Cos13		
Computer Applications in Pharmacy – Practical*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12		
Core Subject																											
Human Anatomy and Physiology II – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos8	
Pharmaceutical Organic Chemistry I – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos9		
Biochemistry – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos10		
Pathophysiology – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos11		
Human Anatomy and Physiology II – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos8		
Pharmaceutical Organic Chemistry I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos9		
Biochemistry – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos10		
Core Subject																											
Pharmaceutical Organic Chemistry II – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos14		
Physical Pharmaceutics I – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos15		
Pharmaceutical Microbiology – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos16		



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Pharmaceutical Engineering – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos17	
Pharmaceutical Organic Chemistry II – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos14
Physical Pharmaceutics I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos15
Pharmaceutical Microbiology – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos16
Pharmaceutical Engineering – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos17
Core Subject																				
Pharmaceutical Organic Chemistry III – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos18
Medicinal Chemistry I – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos19
Physical Pharmaceutics II – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos20
Pharmacology I – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos21
Pharmacognosy and Phytochemistry I – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos22
Medicinal Chemistry I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos19
Physical Pharmaceutics II – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos20
Pharmacology I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos21
Pharmacognosy and Phytochemistry I – Practical	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos22
Core Subject																				
Medicinal Chemistry II – Theory	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos23
Industrial Pharmacy I –	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos24



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– Practical																						
Core Subject																						
Instrumental Methods of Analysis – Theory	*																	*	*	*		Cos34
Industrial PharmacyI – Theory	*	*																*	*	*		Cos35
Pharmacy Practice – Theory	*																	*	*	*		Cos36
Novel Drug Delivery System – Theory	*											*						*	*	*		Cos37
Instrumental Methods of Analysis – Practical	*			*														*	*	*		Cos34
Core Subject																						
BIostatistics and Research Methodology																		*	*	*		Cos38
Social and Preventive Pharmacy	*									*								*	*	*		Cos39
Elective Subject																						
Pharma Marketing Management	*								*									*	*	*		Cos40
Pharmaceutical Regulatory Science	*							*		*								*	*	*		Cos41
Pharmacovigilance	*							*	*									*	*	*		Cos42
Quality Control and Standardization of Herbs	*							*	*	*								*	*	*		Cos43
Computer Aided Drug Design	*							*	*	*								*	*	*		Cos44
Cell and Molecular Biology	*							*	*	*								*	*	*		Cos45
Cosmetic Science	*							*	*	*								*	*	*		Cos46
Pharmacological	*							*	*	*								*	*	*		Cos47



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(1) **Vision:** To prepare tomorrow's leaders through innovative teaching, research and clinical practices that translate scientific discoveries into new treatments and models of care to improve both health and quality of life.

(2) **Mission:**

To develop pharmacists, educators and scientists whose leadership, knowledge and innovations improve the health of our communities.

(3) **Program Educational Objectives (PEO's):**

PEO 1: To offer academic programs of high fundamental principles and their applications in the area of Pharmaceutical Sciences and Technology

PEO 2: The Post-Graduates will master the key concepts in the discipline of their interest in pharmaceutical sciences. They will demonstrate these skills to use modern pharmaceutical tools, software, and equipments to analyze & solve problems.

PEO 3: The Post-Graduates will demonstrate the impact of pharmacy knowledge on the society and also will be aware of modern issues. They will create awareness of healthcare issues through interactions with others and will gain a sense of self-respect towards community and citizenship.

(4) **Programme Outcomes (PO's): Master of Pharmacy**

POs1: Pharmaceutical Sciences knowledge: To understand the knowledge of mathematics, science, Pharmaceutical fundamentals, and a Pharmacy specialization to the solution of complex Pharmaceutical problems.

POs2: Physicochemical properties of Formulations: To understand the importance of physical and chemical properties of the different pharmaceutical ingredients and the factors influencing them is very valuable for pharmaceutical dosage form design.

POs3: Entrepreneurship: The knowledge on different pharmaceutical dosage forms are imparted on students. This knowledge comes while handling a pharmacy or a manufacturing unit or in the further courses.




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POs4: Design/Development of solutions: The information on solid dosage forms like tablets and capsules, their formulation and quality control serves as an important prerequisite for dosage form design.

POs5: Application oriented Knowledge: To understand Biopharmaceutics enables the students the effect of pharmacokinetic (ADME) parameters on the biological effect of the drug. The correlation of pharmacokinetics and pharmacodynamics is thus introduced.

POs6: Environment and Sustainability: Enable extension of pharmaceutical dosage forms, and enables the students to learn about different packaging materials used in pharmaceutical industry and the factors governing their use.

POs7: Conduct investigations of complex problems: To understand biopharmaceutical principles and pharmacokinetic principles through different compartment models, multiple dosage regimens, non-linear pharmacokinetics, and assessment of bioavailability and bioequivalence.

POs8: Effective Citizenship: Determine assumed social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

POs9. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

POs10: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

(5) Program Specific Outcomes (PSOs) Pharmaceutics

These outcomes are specific to a program in addition to NBA defined POs Pharmacy can have PSOs as:

PSO1: Impart knowledge on the novel drug delivery systems, approaches, criteria for selection of polymers and drugs and their formulation and evaluation.




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PSO2: To know various preformulation elements, industrial management and GMP considerations, Pilot Plant Scale up Techniques, Stability testing, sterilization and packaging of dosage forms.

PSO3: To impart knowledge and skills in generic drug development, various regulatory filings the approval process, and concept of generics across the globe.

PSO4: To impart knowledge and skills for dose calculations, dose adjustments and apply biopharmaceutics theories in practical problem solving. The pharmacokinetic models, bioequivalence and potential clinical pharmacokinetic problem analysis

PSO5: Skill development in Pharmaceutical research, Pharmacoinformatics, in drug development in Computational modeling, Preclinical development, clinical development, Artificial Intelligence, advanced Pharmaceutical instruments and Computational fluid dynamics.

Program Specific Outcomes (PSOs) Pharmacology

PSO1: To demonstrate knowledge of Pharmacology. Relate the acquired scientific informations and principles of pharmacokinetics and pharmacodynamics in drug discovery process. To identify, formulate and solve quality issues in pharmaceutical industry.

PSO2: Translate the high-level of understanding of drug action into key stages in preclinical and clinical research studies.

PSO3: Evaluate current drug information in the delivery of pharmaceutical care and assure in regard to drug usage and their adverse effects Appraise pharmacological model for investigation through logics and problem to solving ability.

PSO4: Demonstrate knowledge of professional and ethical responsibilities in clinical and non-clinical laboratory as required by regulatory bodies.

PSO5: Promote health and wellness and disease prevention and appropriately address patient-specific and population-specific needs effectively utilizing systems of care to provide cost-effective, optimal care.

(6) Mapping of POs and PSOs of Pharmaceutics

One way of verifying this to prepare a match matrix as shown below.




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Semester	M. Pharma (Pharmaceutics)	Course Code	Programme Outcomes									Specific Programme outcomes					Credit Points					
			PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PSO-1	PSO-2	PSO-3	PSO-4		PSO-5				
FIRST	Modern Pharmaceutical Analytical Techniques	MPH 101T	*													*					4	
		MPH 102T	*		*	*								*			*					4
	Modern Pharmaceutics	MPH 103T	*		*	*								*			*					4
		MPH 104T																*				4
	Pharmaceutics Practical I	MPH 105P	*		*	*				*							*					6
		MPH 106P																				4
Total																					26	
SECOND	Molecular Pharmaceutics (Nano Tech and Targeted DDS) Advanced	MPH 201T	*		*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	4	
		MPH	*						*	*	*	*	*	*	*	*	*	*	*	*	*	4



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Mapping of POs and PSOs of Pharmacology

One way of verifying this to prepare a match matrix as shown below

Semester	M. Pharma (Pharmacology)	Course Code	Programme Outcomes										Specific Programme outcomes					Credit Points						
			POs-1	POs-2	POs-3	POs-4	POs-5	POs-6	POs-7	POs-8	POs-9	POs-10	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5							
FIRST	Modern Pharmaceutical Analytical Techniques	MPL 101T	*															*					4	
	Advanced Pharmacology-I	MPL 102T	*	*														*						4
	Pharmacological and Toxicological Screening Methods-I	MPL 103T	*	*														*						4
	Cellular and Molecular Pharmacology	MPL 104T													*									4
	Experimental Pharmacology - I	MPL 105P	*			*												*						6
	Seminar /Assignment	MPL 106P																						4
			Total										Total					26						
SECOND	Advanced Pharmacology II	MPL 201T	*		*				*								*	*	*	*				4
	Pharmacological and Toxicological Screening Methods-II	MPL 202T	*				*			*							*	*	*	*				4
	Principles of Drug	MPL	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	4



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Course Outcomes Pharmaceutics: (Cos)

SEMESTER	SUBJECT CODE	SUBJECT	OUTCOME
FIRST	MPH 101T	Modern Pharmaceutical Analytical Techniques	Cos1: To understand the basic knowledge on assay of single and multiple component pharmaceuticals by using various analytical instruments. To develop basic practical skills using instrumentation techniques Skills in selecting the suitable techniques for analysis of drugs and pharmaceuticals To expand the theoretical knowledge on various instrumental techniques available for analysis of organic substances. To apply the knowledge learnt in developing new procedures of their own design. Comparing various methods of analysis and their outcomes
	MPH 102T	Drug Delivery System	Cos2: To understand the Principles & Fundamentals in development on novel drug delivery systems. To understand the various approaches for development of novel drug delivery systems. To understand the criteria for selection of drugs and polymers for the development of delivering system. To understand the formulation and evaluation of Novel drug delivery systems
	MPH 103T	Modern Pharmaceutics	Cos3: To understand the elements of preformulation studies and to optimization techniques in pharmaceutical formulation and processing. To Understand the Pharmaceutical Validation, policies of current good manufacturing practices and concept of Total Quality Management. To understand the Physics of tablet compression, Dissolution parameters and Pharmacokinetic parameter and linearity Concept of significance.




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	MPH 104T	Regulatory Affair	Cos4: To know, the concepts of innovator and generic drugs, drug development process, regulatory guidance's and guidelines for filing and approval process and documentation in pharmaceutical industry. To know, Preparation of dossiers and their submission to regulatory agencies in different countries. To Know about the post approval regulatory requirements for actives and drug products and submission of global documents in CTD/ eCTD formats. To Know about the clinical trials requirements for approvals for conducting clinical trials pharmacovigilence and process of
	MPH 105P	Pharmaceutics Practical I	Cos5: Analysis of pharmacopoeial compounds and their formulations by UVV is spectrophotometer/HPLC/Gas Chromatography. To carry out formulation and evaluation of sustained release matrix tablets. To carry out the formulation and evaluation of Trans dermal patches preformulation studies of tablets, effect of compressional force and to plot Heckal plot, Higuchi and peppas factors.
	MPH 201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	Cos6: To know the basic concepts of Targeting and Targeted Drug Delivery Systems. To know the preparation and evaluation of Micro Capsules / Micro Spheres/ Niosomes, Aquasomes. To know the preparation and evaluation of Pulmonary Drug Delivery Systems. To know the preparation and evaluation of Veterinary Drug Delivery Systems.



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SECOND	MPH 202T	Advanced Biopharmaceutics and pharmacokinetics	<p>Cos7: To know the basic concepts in biopharmaceutics and pharmacokinetics. To Know the use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination. To Know the critical evaluation of biopharmaceutic studies involving drug product equivalency. To Know the design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters and potential clinical pharmacokinetic problems and application of basics of pharmacokinetic.</p>
	MPH 203T	Computer Aided Drug Delivery System	<p>Cos8: To Know the history of Computers in Pharmaceutical Research and Development. To Know the computational Modeling of Drug Disposition. To Know the computers in Preclinical Development. To Know the optimization Techniques in Pharmaceutical Formulation.</p>
	MPH 204T	Cosmetic and Cosmeceuticals	<p>Cos9: To know, regulatory requirement of cosmetics product and biological aspects of skin, hair and oral cavity with their problems and remedial formulation. To know, Key ingredients used in cosmetics and cosmeceuticals and key building blocks for various formulations. Know about the current technologies in the market and various key ingredients and basic science to develop and design cosmetics and cosmeceuticals. Know about the scientific knowledge to develop herbal cosmetics and cosmeceuticals with desired safety, stability, and efficacy.</p>




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	MPH 205P	Pharmaceutics Practical II	<p>Cos10: To Know and Carry out the formulation and evaluation of novel drug delivery systems such as: Alginate beads/ liposomes/Neosomes. To Know and Carry out the Solubility studies and Bioavailability studies of many drugs. To Know and carry out the development and evaluation of cosmetic formulations such as: Creams/Shampoo and Toothpaste etc.</p> <p>To Know and carry out the Formulation data analysis Using Design Expert®Software and Computer Simulations studies.</p>
THIRD	MPH 301T	Research Methodology and Biostatistics	<p>Cos11: To know and recollect transport mechanisms and factors affecting absorption, distribution, metabolism and excretion. To analyze and evaluate protein drug binding, drug-drug, drug – food interaction and clearance.</p> <p>To know and evaluate bioavailability and bioequivalence. To evaluate pharmacokinetic parameters in compartment modelling and non-linear pharmacokinetics.</p>
	MPH 302T	Journal Club	<p>Cos12: To know the Implementation journal clubs, group discussions, participation in laboratory and experimental work and involvement in research studies in the concerned speciality and exposure to the applied aspects of the subject relevant to the specialties.</p>
	MPH 303T	Discussion / Presentation (Proposal Presentation)	<p>Cos13: To know the Implementation group discussions, participation in laboratory and experimental work and involvement in research studies in the concerned speciality and exposure to the applied aspects of the subject relevant to the specialties.</p>




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	MPH 304P	Research work	Cos14: To understand about the research work under the guidance of a Teacher, Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.
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Course Outcomes Pharmacology: (Cos)

SEMESTER	SUBJECT CODE	SUBJECT	OUTCOME
	MPL 102T	Advanced Pharmacology-I	Cos15: To Know the basic concept pharmacology adverse effects, contraindications and clinical uses of certain diseases and Explain the mechanism of drug actions at cellular and molecular level analysis and their outcomes. To Know the Anatomy and Physiology of human nervous system and the common disorders affecting the human nervous system. To know the Anatomy and Physiology of human cardiovascular system and the common disorders affecting the human cardiovascular system. To Know the basic concept of autocooids, regulation and its importance in pathogenesis and pharmacotherapy.




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FIRST	MPL 103T	Pharmacological and Toxicological Screening Methods-I	<p>Cos16: To review the regulations and ethical requirement for the usage of experimental animals. To describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals.</p> <p>To describe the various newer screening methods involved in the drug discovery process. To appreciate and correlate the preclinical data to humans.</p>
	MPL 104T	Cellular and Molecular Pharmacology	<p>Cos17: To describe the receptor signal transduction processes. To describe the molecular pathways affected by drugs. To appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process. To determine molecular biology techniques as applicable for pharmacology.</p>
	MPL 105P	Experimental Pharmacology - I	<p>Cos18: To Know the concept and methodology of basic bio analysis using sophisticated instruments. Assessment and evaluation of behavioral experiments in animals. To Know the concept and methodology of biotechnology in pharmacological analysis.</p> <p>To Know Pharmacokinetic studies and data analysis of drugs given by different routes of administration using softwares.</p>




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	MPL 201T	Advanced Pharmacology II	<p>Cos19: To Know basic concepts and general principles of antibiotics, antibacterials, chemotherapy and sulfonamides.</p> <p>To Know concepts and principles of Quinolones, fluoroquinolones, penicillins, cephalosporins, macrolides, tetracyclins, chloramphenicols and antifungal agents.</p> <p>To Know concepts of antiviralagents, anticanceragents, chemotherapy of parasitic diseases, amoebiasis, Antimalarial, anthelmintics and chemotherapy of tuberculosis and leprosy.</p> <p>To Know pharmacology of drugs used cancer chemotherapy and GI disorders and the Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids.</p>
	MPL 202T	Pharmacological and Toxicological Screening Methods-II	<p>Cos20: Explain various types of toxicity and toxico-kinetics studies as per OECD, ICH and EPA and appreciate the alternative methods to animal toxicity testing. Define regulatory guidelines and ethical considerations as per OECD, ICH and EPA. Detail the IND enabling studies for submission of pharmaceutical products. Explain the concept and importance of safety pharmacological studies (TIER I & TIER II).</p>




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 of Technology & Medical Sciences,
 Sehore (M.P.)

Department of Pharmacy
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	MPL 203T	Principles of Drug Discovery	<p>Cos21: Explain the various stages and various targets of drug discovery.</p> <p>Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery</p> <p>Explain various lead seeking method and lead optimization</p> <p>Appreciate the importance of the role of computer aided drug design in drug discovery.</p>
	MPL 204T	Clinical Research and pharmacovigilance	<p>Cos22: To know the regulatory requirements for conducting clinical trial. Demonstrate the types of clinical trial designs and explain the responsibilities of key players involved in clinical trials. Execute safety monitoring, reporting and close-out activities and explain the principles of Pharmacovigilance. To detect new adverse drug reactions and their assessment, Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance.</p>
	MPL 205T	Experimental Pharmacology - II	<p>Cos23: To Know the concept and methodology of different bioassays</p> <p>Assessment of PA2 values of various antagonists using suitable isolated tissue preparations.</p> <p>Evaluation Drug absorption by averted rat ileum preparation</p> <p>To Know the concept of toxicology and OECD guidelines.</p>




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Co's and Po's Mapping of Pharmaceutics

Semester	M. Pharma (Pharmaceutics)	Programme Outcomes										Specific Programme outcomes					Course Outcoms	
		POs-1	POs-2	POs-3	POs-4	POs-5	POs-6	POs-7	POs-8	POs-9	POs-10	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5		
FIRST	Modern Pharmaceutical Analytical Techniques	*						*	*	*	*	*	*	*	*	*	*	Cos1
	Drug Delivery System	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos2
	Modern Pharmaceutics	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos3
	Regulatory Affair	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos4
	Pharmaceutics Practical I	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos5
SECOND	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos6
	Advanced Biopharmaceutics & Pharmacokinetics	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos7
	Computer Aided Drug Delivery System	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos8
	Cosmetic and Cosmeceuticals	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos9
	Pharmaceutics Practical II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos10
THIRD	Research Methodology and Biostatistics	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos11
	Journal Club	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12
	Discussion / Presentation	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos13



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FOURTH	(Proposal Presentation) Research work											Cos14			
		*	*	*	*	*	*	*	*	*	*	*	*		
Journal club Discussion / Final Presentation Research work and Colloquium		*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12
		*	*	*	*	*	*	*	*	*	*	*	*	*	Cos13
		*	*	*	*	*	*	*	*	*	*	*	*	*	Cos14



Cos and Pos Mapping of Pharmacology

Semester	M. Pharma (Pharmacology)	Course Code	Programme Outcomes										Specific Programme outcomes					Course outcome						
			POs-1	POs-2	POs-3	POs-4	POs-5	POs-6	POs-7	POs-8	POs-9	POs-10	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5							
FIRST	Modern Pharmaceutical Analytical Techniques	MPL 101T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos1		
	Advanced Pharmacology-I	MPL 102T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos15	
	Pharmacological and Toxicological Screening Methods-I	MPL 103T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos16	
	Cellular and Molecular Pharmacology	MPL 104T																			*	*	Cos17	
	Experimental Pharmacology - I	MPL 105P	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos18
	Advanced Pharmacology II	MPL 201T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos19


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	Pharmacological and Toxicological Screening Methods-II	MPL 202T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos20		
	Principles of Drug Discovery	MPL 203T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos21	
	Clinical Research and Pharmacovigilance	MPL 204T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos22	
	Experimental Pharmacology - II	MPL 205T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos23	
																						Total	
																							26
THIRD	Research Methodology and Biostatistics	MPL 301T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos11
	Journal Club	MPL 302T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12
	Discussion / Presentation (Proposal Presentation)	MPL 303T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos13
	Research work	MPL 304P	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos14
FOURTH	Journal club	MPL 401T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos12
	Discussion / Final Presentation	MPL 402T	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos13
	Research work and Colloquium	MPL 403P	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Cos14



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Scheme of Studies: Pharmaceutics

Table 1:- Course of study for semester I

Course Code	Course Title	CONTENT TREATMENT MODE					CRE DITS	MARK S
		Lecture s/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practic als	Works-hops		
MPH 101T	Modern Pharmaceutical Analytical Techniques	4	-	NA	-	NA	4	100
MPH 102T	Drug Delivery System	4	-	NA	-		4	100
MPH 103T	Modern Pharmaceutics	4	-	NA	-		4	100
MPH 104T	Regulatory Affair	4	-	NA	-		4	100
MPH 105P	Pharmaceutics Practical I	-	-	NA	12		6	150
MPH 106P	Seminar /Assignment	-	7	NA	-		4	100
Total							26	650

Table 2:- Course of study for semester II

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARK
		Lecture s/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Works-hops		
MPH 201T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	4	-	NA	-	NA	4	100
MPH 202T	Advanced Biopharmaceutics & Pharmacokinetics	4	-	NA	-		4	100
MPH 203T	Computer Aided Drug Delivery System	4	-	NA	-		4	100
MPH 204T	Cosmetic and Cosmeceuticals	4	-	NA	-		4	100
MPH 205P	Pharmaceutics Practical II	-	-	NA	12		6	150
MPH 206P	Seminar /Assignment	-	7	NA	-		4	100
Total							26	650




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Table 3:- Course of study for semester III

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Works-hops		
MPH 301T	Research Methodology and Biostatistics*	4		NA	-	NA	4	100
MPH 302T	Journal Club	1		-	-		1	25
MPH 303T	Discussion / Presentation (Proposal Presentation)	-	2	-	-		2	50
MPH 304P	Research work*	-	14	-	-		14	350
Total							21	525

Table 4:- Course of study for semester IV

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Works-hops		
MPH 401T	Journal Club	1		-	-		1	25
MPH 402T	Discussion / Presentation (Proposal Presentation)	-	3	-	-		3	75
MPH 403P	Research work*	-	16	-	-		16	400
Total							20	650




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Table 1:- Course of study for semester I

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Workshops		
MPL 101T	Modern Pharmaceutical Analytical Techniques	4	-	NA	-	NA	4	100
MPL 102T	Advanced Pharmacology-I	4	-	NA	-		4	100
MPL 103T	Pharmacological and Toxicological Screening Methods-I	4	-	NA	-		4	100
MPL 104T	Cellular and Molecular Pharmacology	4	-	NA	-		4	100
MPL 105P	Experimental Pharmacology - I	-	-	NA	12		6	150
MPL 106P	Seminar /Assignment	-	7	NA	-		4	100
Total							26	650

Table 2:- Course of study for semester II

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Workshops		
MPL 201T	Advanced Pharmacology II	4	-	NA	-	NA	4	100
MPL 202T	Pharmacological and Toxicological Screening Methods-II	4	-	NA	-		4	100
MPL 203T	Principles of Drug Discovery	4	-	NA	-		4	100
MPL 204T	Clinical Research and pharmacovigilance	4	-	NA	-		4	100
MPL 205P	Experimental Pharmacology - II	-	-	NA	12		6	150
MPL 206P	Seminar /Assignment	-	7	NA	-		4	100
Total							26	650




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Table 3:- Course of study for semester III

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Works-hops		
MPL 301T	Research Methodology and Biostatistics*	4		NA	-	NA	4	100
MPL 302T	Journal Club	1		-	-		1	25
MPL 303T	Discussion / Presentation (Proposal Presentation)	-	2	-	-		2	50
MPL 304P	Research work*	-	14	-	-		14	350
Total							21	525

Table 4:- Course of study for semester IV

Course Code	Course Title	CONTENT TREATMENT MODE					CREDITS	MARKS
		Lectures/Week	Assignment & Seminar Presentations	ICT enabled Learning	Practicals	Works-hops		
MPL 401T	Journal Club	1		-	-		1	25
MPL 402T	Discussion / Presentation (Proposal Presentation)	-	3	-	-		3	75
MPL 403P	Research work*	-	16	-	-		16	400
Total							20	650




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