

### List of courses offered during Academic year 2018-19

Sr. No	Class	Semester	Curriculum Pattern by SPPU	Course Code	Name of course	Name of staff	Course Outcomes
1	FY B. Pharmacy	First	2018 Pattern	BP 101T	Human Anatomy & Physiology I	S.R. Thanage	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Explain terminologies and its significance involved in human anatomy and physiology &amp; illustrate the gross morphology, structure and functions of various levels of organization of human body.</li> <li>• <b>CO2:</b> classify the various homeostatic mechanisms and their imbalances.</li> <li>• <b>CO3:</b> justify and list the various principles of cell communication at cellular level study with their different forms of signaling.</li> <li>• <b>CO4:</b> classify the different types of tissue, bones, and muscles, nerves with their structure, location, and function.</li> <li>• <b>CO5:</b> Describe special sense organs, digestive and circulatory with illustration of their structure and function.</li> </ul>
				BP102T	Pharmaceutical Analysis-I	M.S.Bhosle	<p><b>CO1:</b> To understand the concept of pharmaceutical analysis  <b>CO2:</b> To illustrate and examine acid base, non aqueous titration  <b>CO3:</b> To discuss and examine precipitation, complexometric titration and gravimetric  <b>CO4:</b> To understand and examine redox titration  <b>CO5:</b> To illustrate and examine conductometry, potentiometry and polarography method</p>
				BP103T	Pharmaceutics I – Th	S. S. Siddheshwar	<p><b>CO1:</b> To illustrate the history and development of pharmacy profession and different pharmacopoeias.  <b>CO2:</b> To explain, compare, contrast and classify various routes of drug administration and to Discuss concept of dosage forms.  <b>CO3:</b> To Illustrate the professional way of handling the prescription and Counsel patient.  <b>CO4:</b> To solve the pharmaceutical calculations and factors which influence the design of pharmaceutical dosage forms and administrations.</p>

				BP104T	Pharmaceutical Inorganic Chemistry	.K.V Dhamak	<p><b>CO1:</b> .To analyze the sources of impurities and methods to determine the impurities in inorganic drugs and Pharmaceuticals Inorganic substances.</p> <p><b>CO2:</b> To understand the medicinal and pharmaceutical importance of inorganic compounds and practical skills of inorganic compounds .</p> <p><b>CO3:</b> To understand in detail the Physico-chemical properties and pharmacological properties of pharmaceuticals inorganic compounds and its uses.</p> <p><b>CO4:</b> To identify the Inorganic Compounds by Qualitative Analysis</p>
				BP105T	Communication Skills	D.N Vikhe	<p><b>CO1:</b> To illustrate the communication process and importance of communication.</p> <p><b>CO 2:</b> To communicate effectively (Verbal and Non Verbal).</p> <p><b>CO 3:</b> Acquire the knowledge of listening skill and application.</p> <p><b>CO 4:</b> To develop interview skills.</p> <p><b>CO5:</b> To develop leadership qualities and essentials</p>
				BP 106BT	Remedial Biology	T.P.Dukre	<p><b>CO1:-</b> To understand Basic Nature of Plant cell and Animal cell)</p> <p><b>CO2:-</b> To illustrate Classification System of both Plants &amp; Animals</p> <p><b>CO3:-</b> To learn Various tissue system and organ system in plant and animals</p> <p><b>CO4:-</b> To understand Theory of evolution</p> <p><b>CO5:-</b> To illustrate Anatomy and Physiology of plants and animals</p>
				BP 106RMT	Remedial Mathematics	T.P.Dukre	<p><b>CO1:-</b> To apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.</p> <p><b>CO2:-</b> To illustrate mathematical representations and mathematical relationships</p> <p><b>CO3:-</b> To communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy</p> <p><b>CO4:-</b> To learn Perform abstract mathematical reasoning</p>
				BP107 P	Human Anatomy & Physiology I Practical	S.R. Thanage	<p><b>CO1:</b> To Illustrate different parts of microscope and determine RBC Count, WBC count, Hb content, blood group.</p> <p><b>CO2:</b> To Study histology of important tissues, cardiovascular system and human digestive system.</p> <p><b>CO3:</b> To determine clotting time, bleeding time, blood pressure</p>

						<p>, body temperature, pulse rate.  <b>CO4:</b> To determine ECG &amp; explain its significance  <b>CO5:</b> To observe hospital structure and working of blood bank</p>	
				BP108 P	Pharmaceutical Analysis-I	M.S.Bhosle	<p><b>CO1:</b> To compose and assess the chemical compound's  <b>CO2:</b> To assess and identify the chemical compound by standardization of titrant  <b>CO3:</b> To examine and assess the normality of compound's by electro-analytical methods</p>
				BP109P	Pharmaceutics I – Pr	S. S. Siddheshwar	<p><b>CO1:</b> To examine and design the various dosage forms.  <b>CO2:</b> To compare and contrast and design various dosage forms</p>
				BP110P	Pharmaceutical Inorganic Chemistry	K.V.Dhamak	<p><b>CO1:</b>To Access the limit tests for the compounds .  <b>CO2:</b> To design the different methods for identification of inorganic compounds.  <b>CO3.</b> To explain the tests for purity for the compounds .  <b>CO4.</b> To synthesize the Inorganic Pharmaceuticals by appropriate methods.</p>
				BP111 P	Communication Skills	P.S.Rao.	<p><b>CO1:</b>Explain basic Communication Skills  <b>CO2:</b> To Illustrate Various Pronunciation Skills.  <b>CO3:</b> To Access Direct / Indirect &amp; Effective Communications Skills  <b>CO4:</b> To Describe Effective Writing Skills &amp; Presentation</p>
				BP112RBP	Remedial Biology	T.P.Dukre	<p><b>CO1:</b> To understand Microscopic study and identification of tissues.  <b>CO2:</b>To learn Microscopic study and identification of tissues  <b>CO3:</b> To examine bone parts and blood components in body</p>

2.	Second Year B. Pharmacy	Third	2015 Pattern	2.3.1 T	Physical Pharmaceutics- I	S.B. Kakad	<p><b>CO1:</b> To explain the process of solubility of different drug/excipients, diffusion and dissolution and distribution phenomena for application in the design of dosage form.</p> <p><b>CO2:</b> To use the physicochemical properties of the state of matter and their importance in the development and evaluation of pharmaceutical dosage forms.</p> <p><b>CO3:</b> To understand basic principles and properties of liquid interfaces and surface and interfacial phenomenon.</p> <p><b>CO4:</b> To understand basic knowledge of pH, buffers, isotonicity, protein binding and complexation in pharmaceutical as well as in biological system.</p>
2.3.1 P				Physical Pharmaceutics- I	SB Kakad	<p><b>CO1:</b> To study solubility and distribution of solute in solvent under different experimental conditions</p> <p><b>CO2:</b> To study factors affecting miscibility in two and three component systems</p> <p><b>CO3:</b> to determine physical parameters of the solute solvent mixture in experimental set up</p>	
2.3.2 T				Pharmaceutical Microbiology	SD Mankar	<p><b>CO1:</b>To explain methods of cultivation and preservation of various microorganisms.</p> <p><b>CO2.</b>To identify the importance and implementation of sterilization in pharmaceutical processing and industry</p> <p><b>CO3.</b>To explain need of sterility testing, to learn basic principles &amp; Procedure of sterility testing of pharmaceutical products.</p> <p><b>CO4.</b>To plan out microbiological standardization of Pharmaceuticals including presence and absence of micro-organism as well as counting of total number of micro-organism</p> <p><b>CO5.</b>To explain the cell culture technology and its applications in pharmaceutical industries.</p>	
2.3.2 P				Pharmaceutical Microbiology	SD Mankar	<p><b>CO1:</b> To study different method of preparation &amp; sterilization of media for isolation &amp; identification of micro-organism</p> <p><b>CO2:</b> To study identification of different micro-organism by using different staining techniques.</p>	
2.3.3 T				Pharmaceutical	R K Godge	<p><b>CO1:</b>To analyze basics like chemistry, function, classification,</p>	

					Biochemistry	biological importance, qualitative tests & applications of various biomolecules. e.g. proteins, carbohydrates and lipids, etc <b>CO2:</b> To understand concept of free energy, endergonic and exergonic reaction <b>CO3:</b> To describe general metabolism process of carbohydrates. <b>CO4:</b> To illustrate biological oxidation process with respect to electron transport chain and oxidative phosphorylation.
			2.3.3 P	Pharmaceutical Biochemistry	R K Godge	<b>CO1:</b> To identify carbohydrates, proteins by qualitative test. <b>CO2:</b> To investigate abnormal constituent present in urine by qualitative test. <b>CO3:</b> To analyze creatinine blood sugar, serum total cholesterol present in blood. <b>CO4:</b> To illustrate enzymatic hydrolysis of starch by using temperature, time and pH.
			2.3.4 T	Pharmaceutical Organic Chemistry-III	S.D Magar.	<b>CO1:</b> To understand molecular representation, interconversion, significance and basic concepts of stereochemistry conformational analysis of molecules <b>CO2:</b> To learn various rearrangement reactions, pericyclic reactions and its mechanism with application <b>CO3:</b> To understand chemistry of amino acids and carbohydrates and its underlying concepts with synthesis and reaction methods.
			2.3.4 P	Pharmaceutical Organic Chemistry-III	S.D Magar.	<b>CO1:</b> To synthesize the organic compounds by appropriate method. <b>CO2:</b> To describe different methods for separation of column and thin layer chromatography. <b>CO3:</b> To design different methods for qualitative analysis of binary mixtures. <b>CO4:</b> To design different organic compounds by stereo models.
			2.3.5 T	Pharmacology-I	S.R. Thanage	<b>CO 1:</b> To Describe the basic pharmacology along with its scope. The nature and sources of drugs and route of drug administration. <b>CO 2:</b> To Know the process of drug discovery and development. <b>CO 3:</b> To Understand pharmacokinetic and pharmacodynamics of drugs. <b>CO 4:</b> To Understand receptor, drug receptor interaction, drug toxicity, drug interaction and adverse drug reactions. <b>CO 5:</b> To correlate the Rational drug treatment in pediatric and

						geriatric patients and in pregnancy
				2.3.6T	Pharmacognosy & Phytochemistry - I	D.N.Vikhe <b>CO 1:</b> Predict the meaning & significance of Pharmacognostic parameters & Pharmacognostic study of crude drugs. <b>CO 2:</b> To compare and contrast primary metabolites . <b>CO 3:</b> To categorize and analyze glycosides & tannin compounds of plant origin.
				2.3.6P	Pharmacognosy & Phytochemistry - I	D.N.Vikhe <b>CO 1:</b> To describe the morphology and microscopy of crude drugs <b>CO 2:</b> To identify crude drugs based upon the powder characteristics <b>CO 3:</b> To perform the qualitative analysis of unorganised crude drugs <b>CO 4:</b> To determine swelling index <b>CO 5:</b> To determine physical constants <b>CO 6:</b> To extract phytoconstituents <b>CO 7:</b> To estimate tannins
3.	Third Year B. Pharmacy	Fifth	2015 Pattern	3.5.1 T	Industrial Pharmacy-I	SD Mankar <b>CO1:</b> To explain excipients, formulation, evaluation and identify defects of tablets <b>CO2:</b> .To investigate the concept of technology transfer. <b>CO3:</b> To explain the concepts, technique and equipment's used in tablet coating. <b>CO4:</b> To describe capsules is types, additives, size, manufacturing, evaluation, equipment's, & defects.
3.5.1 P				Industrial Pharmacy-I	SD Mankar <b>CO1:</b> To explain Formulation, Development and evaluation of tablet & Capsule dosage form <b>CO2:</b> To invent the suitable packaging material (container-closure) for the preparation. <b>CO3:</b> To plan to conduct the survey and report its findings.	
3.5.2T				Pharmaceutical Analysis III	H S Bhavar <b>CO1:</b> To understand the different types of instrumental analytical techniques available for quality control of APIs and formulations. <b>CO2:</b> To discuss various sampling techniques employed in solid, semisolid and liquid dosage form. <b>CO3:</b> To learn the principles, instrumentation of UV-VIS , flourimetry, atomic absorption , atomic emission spectrosopes, flame photometry , phosphrimetry , nepheloturbidometry. <b>CO4:</b> To learn applications of UV-VIS, flourimetry, atomic absorption, atomic emission spectrosopes, flame Photometry,	

						phosphorimetry, nepheloturbidometry. <b>CO5:</b> To illustrate to interpret the data obtained and report result as per regulatory requirement.
			3.5.2P	Pharmaceutical Analysis III	H S Bhawar	<b>CO1:</b> To understand various sampling techniques employed in solid, semisolid and liquid dosage form. <b>CO2:</b> To learn the principles, instrumentation of UV-VIS , flourimetry, atomic absorption , atomic emission spectroscopes, flame photometry , phosphrimetry , nepheloturbidometry. <b>CO3:</b> To learn applications of UV-VIS, flourimetry, atomic absorption, atomic emission spectroscopes, flame Photometry, phosphorimetry, nepheloturbidometry <b>CO4:</b> To learn to interpret the data obtained and report result
			3.5.3.T	Medicinal Chemistry -I	A S Dighe	<b>CO1:</b> To Explain principles and concepts in medicinal chemistry such as biological membrane, physicochemical properties affecting drug action, stereo chemical aspects of drug action, Bioisosterism, Drug absorption, distribution, metabolism, elimination and toxicity, Protein binding, Blood brain barrier etc. <b>CO2:</b> To Explain different Types of receptors, forces involved in drug receptor interaction; mediators of biological response, signal transduction. <b>CO3.</b> To illustrate Biosynthesis, release and metabolism of noradrenaline, Receptor subtypes, design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the Adrenergic agents. <b>CO4.</b> To illustrate Biosynthesis, release and metabolism of Acetylcholine, Cholinergic receptor subtypes, design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the Cholinergic agents <b>CO5.</b> To Explain design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the cardiovascular Agents
			3.5.4 T	Pharmacology-II	S. B. Dighe	<b>CO1:</b> To discuss classification, mechanism of action, pharmacological actions, pharmacokinetics, therapeutic uses, adverse effects, drug interactions, contraindications, dosages, treatment of poisoning Pharmacotherapy shall include: Pharmacology of drug/s used for clinical management of

					<p>diseases/ disorder</p> <p><b>CO2:</b>To categorize Sympathetic and Parasympathetic Nervous system with neurotransmitters and their receptors with Signal Transduction mechanisms</p> <p><b>CO 3:</b>To describe the functioning of different endocrine glands and actions of different hormones on body organs for maintenance of homoeostasis</p> <p><b>CO 4:</b> To discuss disorders caused due to hyper or hyposecretion of hormones and drugs used for treatment of such disorders</p>	
			3.5.4 P	Pharmacology-II Practical	Dr. S. B. Dighe	<p><b>CO 1:</b> To describe commonly used instruments in experimental pharmacology.</p> <p><b>CO 2:</b> To discuss Care and handling of common laboratory animals, animal welfare and introduction of CPCSEA and its guidelines, OECD guidelines.</p> <p><b>CO 3:</b> To explain animal physiology with their biochemical reference values in various animal species.</p> <p><b>CO 4:</b> To examine various routes of drug administration and various anesthetics employed to anesthetize laboratory animals. various methods for collection of blood, body fluids and urine from experimental animals.</p> <p><b>CO 5:</b> To list physiological salt solutions, drug solution and use of molar solution in various animal experiments.</p>
			3.5.5 T	Analytical Pharmacognosy and extraction technology	R.S.Jadhav	<p><b>CO 1:</b> To investigate the principle of mass transfer, effect of various factors, various approaches in extraction methods and application of extraction methods.</p> <p><b>CO 2:</b> To identify principle &amp; applications of chromatographic&amp; non chromatographic separation methods.</p> <p><b>CO 3:</b> To assess material source and methods of extraction of phytochemicals.</p> <p><b>CO 4:</b>To explain analysis of various natural products and their application.</p> <p><b>CO 5:</b> To predict Quality control (safety and efficacy) parameters of herbal drugs.</p>
			3.5.5 P	Analytical Pharmacognosy and extraction technology	R.S.Jadhav	<p><b>CO 1:</b> To Conduct successive extraction &amp; qualitative tests to ascertain chemical nature of crude drugs.</p> <p><b>CO 2:</b> To Explain significance of use of various chemicals/solvents/ conditions; undertake extraction, verify extracted material by qualitative tests &amp; report yield.</p> <p><b>CO 3:</b> To Explain need of standardization of natural products &amp;</p>



					<p>explain their significance.</p> <p><b>CO 4:</b> Handling and application of UV to determine total phenolic content/ total flavonoids content/ total tannin content.</p> <p><b>CO 5:</b> To explain the principle and working procedure of column chromatography and its application to investigate phytoconstituents.</p> <p><b>CO 6:</b> To prioritize the need and to update the knowledge of industry/ cultivation farm/ processing unit</p>	
			3.5.6T	Pharmaceutical Business Management & Disaster Management	Mr.T.P Dukre	<p><b>CO1</b> -To discuss about the Pharmaceutical business and management strategy.</p> <p><b>CO2</b> -To gain knowledge of marketing research and product management.</p> <p><b>CO3</b>-To outline the human resource and development needs.</p> <p><b>CO4</b>-To assess the disaster management and preparedness and mitigation</p>
			3.5.7 T	Active Pharmaceutical Ingredient Technology	G S Shinde	<p><b>CO1:</b> To explain basics of chemical process kinetics and design some classes of reactions with examples of API for each unit process</p> <p><b>CO2:</b> To examine chemical process, reaction system, equipments used in API manufacturing and layout design for API manufacturing</p> <p><b>CO3:</b> To discuss Factors affecting chemical processes, reaction system, general list of equipments used in API manufacturing, layout of process equipments</p> <p><b>CO4:</b> To Explain principle, industrial process, scale up techniques, Industrial manufacturing process and construct flow charts of some important APIs and QA/QC guidelines in API manufacturing</p> <p><b>CO5:</b> To Explain principle, industrial process, scale up techniques, Industrial manufacturing process and construct flow charts of some important APIs and polymorphism in API</p>

4.	Final Year B. Pharmacy	Seventh	2015 Pattern	4.7.1 T	Sterile Products	MH Kolhe	<p><b>CO1:</b>To understand the General requirements, routes of administration, significance of tonicity adjustment and sterility and Pre-formulation of sterile products.</p> <p><b>CO2:</b>To understand various packaging materials used, types, choice of containers, official quality control tests and methods of evaluation.</p> <p><b>CO3:</b>To learn the concepts of the GMP and design and layout of Parenteral Production Facility, environmental control zones, heating ventilation air conditioning (HVAC), HEPA filter and laminar area flow systems.</p> <p><b>CO4:</b>To learn Classification and formulation of SVP and LVPs, their types and selection of vehicles and added substance, processing, manufacturing and Quality control of SVPs and LVPs along with Special types of SVPs and LVPs and Pilot plant scale up.</p> <p><b>CO5:</b>To understand concept of Ophthalmic, Blood, Surgical and Lypophilizedprodcuts</p>
4.7.1 P				Sterile Products	MH Kolhe	<p><b>CO1:</b> To inspect the validation of aseptic area.</p> <p><b>CO2:</b>To compare and contrast and design various SVPs &amp; LVPs</p> <p><b>CO3:</b>To compare and contrast and design various ophthalmic products.</p> <p><b>CO4:</b>To compare and contrast and design various packaging material.</p> <p><b>CO5:</b>To compare and contrast and design various dosage form.</p>	
4.7.2 T				Pharmaceutical Analysis V	G S Shinde	<p><b>CO1:</b> To explain principle, instrumentation, application and examine APIs using Gas chromatography</p> <p><b>CO2:</b> To explain theoretical, Practical parameters of Infared (FTIR) spectroscopy and assess organic compound using FTIR spectra.</p> <p><b>CO3:</b> To discuss principle, instrumentation and use of Raman Spectroscopy.</p> <p><b>CO4:</b> To Explain principle ,instrumentation ,application of HPLC and compare HPLC with UPLC</p> <p><b>CO5:</b> To explain and compare principle, instrumentation and application of SEM and TEM</p>	

				4.7.2 P	Pharmaceutical Analysis V	G S Shinde	<p><b>CO1:</b> To examine and identify API and its formulation by simultaneous equation method</p> <p><b>CO2:</b> To examine and identify API and its formulation by Absorbance ratio method.</p> <p><b>CO3:</b> To discuss process to record IR spectra of compounds containing different functional group.</p> <p><b>CO4:</b> To illustrate process ,interpret the data obtained through experimentation and assess the results as per regulatory requirements</p>
				4.7.3.T	Medicinal Chemistry -III	N S Dighe	<p><b>CO1:</b> To Know design &amp; development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses, synthesis and recent developments in <math>\beta</math>-lactam antibiotics</p> <p><b>CO2:</b> To Explain design &amp; development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses, synthesis and recent developments in aminoglycosides and macrolides.</p> <p><b>CO3:</b> To understand design &amp; development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses, synthesis and recent developments in tetracycline, Lincomycins, Polypeptides, Unclassified antibiotics</p> <p><b>CO4:</b> To Know design &amp; development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses, synthesis and recent developments in antineoplastic agents including recent drugs and monoclonal antibodies</p> <p><b>CO5:</b> To Understand design &amp; development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses, synthesis and recent developments in synthetic antibacterial agents, trypanosomicidal and antileishmaniasis drugs</p>

				4.7.3.P	Medicinal Chemistry -III	N S Dighe	<p><b>CO1:</b> To synthesize the medicinally important compounds by appropriate method and monitoring reaction with TLC.</p> <p><b>CO2:</b> To find synthesized compound by column chromatography</p> <p><b>CO3:</b> To access and interpret spectra of synthesized compound by IR</p> <p><b>CO4:</b> To access and interpret standard spectra of organic compound by <sup>1</sup>H-NMR</p> <p><b>CO5:</b> To explain and demonstrate principle and working of Gas Chromatography, Atomic Absorption Spectrophotometry &amp; SEM</p>
				4.7.4 T	Pharmacology-IV	S. B. Bhawar	<ul style="list-style-type: none"> <li>• CO 1: To understand the Chemotherapy including Drug resistance</li> <li>• CO 2: To describe mechanism of drugs used in Cardio-vascular system diseases</li> <li>• CO 3: To Composition of physiological salt solutions and basic instruments used in experimental pharmacology.</li> <li>• CO 4: To Performance of isolated experiments using various isolated preparation and the effects of different drugs on the concentration response curves.</li> <li>• CO 5: To Study the action of various drugs using preclinical models/ computer simulations.</li> </ul>
				4.7.4 P	Pharmacology-IV Practical	S. B. Bhawar	<p>CO 1: To understand the Critical appraisal of fixed dose drug combinations of marketed preparations</p> <p>CO 2: To describe Comment on given prescriptions with reference to case reports mentioning possible indications and contraindications with dose, route of administration and justification of each ingredient.</p> <p>CO 3: To carry out the statistical analysis of given experimental data using appropriate method(s) based on parametric or non-parametric methods</p> <p>CO 4: To performance of isolated experiments using various isolated preparation and the effects of different drugs on the concentration response curves.</p> <p>CO 5: To study the action of various drugs using preclinical models/ computer simulations.</p>

			4.7.5 T	Natural Drug Technology	.D.N.Vikhe	<p><b>CO1:</b> To discuss methods of cultivation .harvesting and storage of crude drugs and outline good agricultural and collection practises..</p> <p><b>CO2:</b> To explain application of plant tissue culture in production of secondary metabolites.</p> <p><b>CO3:</b> To investigate different in vitro screening methods of natural product.</p> <p><b>CO4:</b> To use the concept of health diagnosis &amp; treatment aspects of Ayurveda, Unani, Siddha &amp; Homeopathic system of medicine .</p> <p><b>CO5:</b> To predict potential of novel drug delivery system for herbals</p>
			4.7.5 P	Natural Drug Technology	.D.N.Vikhe	<p><b>CO1:</b> To design and assess ayurvedic formulations.</p> <p><b>CO2:</b> To design and assess herbal formulations,skin care cosmetic and hair care cosmetic.</p> <p><b>CO3:</b> To examine and inspect prepared and marketed skin and hair care cosmetic.</p> <p><b>CO4:</b> To investigate spectral data of isolated compounds.</p> <p><b>CO5:</b> To predict free radical scavenging activity by UV.</p> <p><b>CO6:</b> To predict anti-inflammatory activity of herbal drugs by in- vitro method</p>
			4.7.6 T	Bio-pharmaceutics & Pharmacokinetics	RB Laware	<p><b>CO 1 :</b> To describe the concept of biopharmaceutics and its applications in formulation development.</p> <p><b>CO 2:</b> To explain and apply knowledge of pharmacokinetic processes designing pharmaceutical dosage form.</p> <p><b>CO 3:</b> To discuss the concepts of bioavailability and bioequivalence studies.</p> <p><b>CO 4:</b> To explain various compartmental models and non-compartmental analysis methods.</p> <p><b>CO 5:</b> To explain and apply concept and mechanisms of dissolution and in vitro in vivo correlation</p>
			4.7.7 T	Pharmaceutical Jurisprudence	S S Siddheshwar	<p><b>CO1:</b>To explain Basic principles, purpose and dimensions of the laws.</p> <p><b>CO2:</b>.To discuss important rules and regulations and procedures made to execute the laws and to explain the definitions in the Act.</p> <p><b>CO3:</b>.To Identify potential fraud and abuse legal issues of narcotic &amp; psychotropic substance.</p> <p><b>CO4:</b>.To explain about Patents, procedure for patent application and IPR and to prioritize the regulatory system for safety and</p>

							effectiveness of medicine and quality of product.
5	First Year B. Pharmacy	Second	2018 Pattern	BP201T	Human Anatomy & Physiology II	S.R. Thanage	<p><b>CO1:</b> Describe significance of the different mechanisms that govern the normal working of various organs and systems as a whole.</p> <p><b>CO2:</b> Explain Basic fundamentals structural features of neurons, mechanism of neurotransmitters along with processes of neuro conduction and neurotransmission, detailed structure of brains parts along with role of Autonomic Nervous System involved maintaining the body's order and stability.</p> <p><b>CO3:</b> Name and describe various sense organs involved in our body to maintain homeostasis.</p> <p><b>CO4:</b> Discuss basic organs and mechanism involved in respiration along with clinical significance and disorders of respiratory system.</p> <p><b>CO5:</b> Explain the essentials of Urinary and endocrine system involved in regulation of Body functions &amp; how all parts of the human body contribute to the maintenance of homeostasis.</p>
BP202T				Pharmaceutical Organic Chemistry I	K V Dhamak	<p><b>CO1:</b>To Illustrate the structure, name and the type of isomerism of the organic compound.</p> <p><b>CO2:</b> To Learn the reaction, name the reaction and orientation of reactions .</p> <p><b>CO3:</b> To Discuss in detail the reactivity/stability of compound.</p> <p><b>CO4.</b> To Identify/confirm the identification of organic compounds</p>	
BP203 T				Biochemistry	M S Bhosale	<p><b>CO1:</b>To Understand the significance, concepts of Cell and applications of biochemistry.</p> <p><b>CO2:</b> To Describe the chemistry, biological functions of Carbohydrates, Lipids, Proteins, Vitamins and Amino acids.</p> <p><b>CO3:</b> To Apply the mechanism of enzyme action and identify the classes of enzymes and factors affecting action, mechanism of electron transport chain</p>	

					<p><b>CO4.</b> To Explain the synthesis of nucleic acids, their role in metabolic pathways transcriptional, translational, and post-translational levels, Hereditary Diseases.</p> <p><b>CO5.</b> To Discuss the metabolic pathways of Carbohydrates, Lipids, Proteins and Amino Acids</p>	
			BP204 T	Pathophysiology	S.B.Dighe	<p><b>CO1:</b> To describe the etiology and pathogenesis of the selected disease states</p> <p><b>CO2:</b> To knowledge of signs and symptoms of the diseases</p> <p><b>CO3:</b> To identify the complications of the diseases.</p> <p><b>CO4:</b> To understand most commonly encountered pathophysiological state(s) and/or disease mechanism(s), as well as any clinical testing requirements</p>
			BP205 T	Computer Application in Pharmacy	S B Bhawar	<p><b>CO1:</b> To Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement</p> <p><b>CO2:</b> To Design and develop solutions to analyze pharmaceutical problems using computers.</p> <p><b>CO3:</b> To Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities</p> <p><b>CO4:</b> To Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy .</p>
			BP206 T	Environmental sciences	K V Dhamak	<p><b>CO1:</b> To create awareness about environmental problems</p> <p><b>CO2:</b> To impart basic knowledge about the environments and its allied problems</p> <p><b>CO3:</b> To develop and attitude of concern for the environment.</p> <p><b>CO4:</b> To strive to attain harmony with nature</p>
			BP207 P	Human Anatomy & Physiology II Practical	S.R. Thanage	<p><b>CO1:</b> To Illustrate different parts of microscope and determine RBC Count, WBC count, Hb content, blood group.</p> <p><b>CO2:</b> To Study histology of important tissues, cardiovascular system and human digestive system.</p> <p><b>CO3:</b> To determine clotting time, bleeding time, blood pressure, body temperature, and pulse rate.</p> <p><b>CO4:</b> To determine ECG &amp; explain its significance</p> <p><b>CO5:</b> To observe hospital structure and working of blood bank</p>
			BP208P	Pharmaceutical Organic Chemistry	K V Dhamak	<p><b>CO1:</b> To identify and access the unknown organic compound by qualitative analysis.</p>

					I		<p><b>CO2:</b> To synthesize solid derivatives from organic compounds.  <b>CO3:</b> To construct the molecular models.</p>
				BP209 P	Biochemistry	M S Bhosale	<p><b>CO1:</b>To illustrate the concept of enzyme hydrolysis and examine the role of enzyme in day to day life.  <b>CO2:</b>To understand the various qualitative tests for identification of biomolecules  <b>CO3:</b> To identify the pH and blood constitute like blood sugar, blood creatinine and total serum cholesterol.  <b>CO4.</b> To examine the reducing sugar by DNS method, proteins by Biuret method and urine abnormalities.</p>
				BP210 P	Computer Application in Pharmacy	S.B.Bhawar	<p><b>CO1: To</b> Apply the knowledge of mathematics and computing fundamentals to pharmaceutical applications for any given requirement  <b>CO2:</b> To Design and develop solutions to analyze pharmaceutical problems using computers.  <b>CO3: To</b> Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities  <b>CO4: To</b> Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy .</p>
6	Second Year B. Pharmacy	Fourth	2015 Pattern	2.4.1 T	Physical Pharmaceutics-II	S B Kakad	<p><b>CO1: To</b> relate the scientific concepts of surface tension, viscosity, micromeritics, kinetics and colloids in connection with preparation, characterization and evaluation of dosage forms.  <b>CO2: To</b> explain the various methods for the determination of surface &amp; interfacial tension of liquids, the properties of colloids, properties of powder, order of reactions and flow of fluids.  <b>CO3:</b> To describe the rate of reactions, degradation and stability methods of drugs as well as principle and significance of accelerated stability testing.  <b>CO4: To</b> illustrate fundamentals and pharmaceutical applications of surface &amp; interfacial tension, kinetics, rheology,</p>



						micromeritics and colloids.
			2.4.1 P	Physical Pharmaceutics-II- Pr	S B Kakad	<b>CO1:</b> To determine the surface & interfacial tension of liquids, HLB of surfactants, properties of the powders, kinetic properties of reactions, Colloidal stability and rheological behaviour. <b>CO2:</b> to study various parameters to quantify surface and interfacial, rheological, micromeritic, colloidal and chemical kinetic properties
			2.4.2 T	Pathophysiology & Clinical Biochem	S.R. Thanage	<b>CO1:</b> To Explain the application, maintenance and uses of various instruments in clinical biochemistry. <b>CO2:</b> To Know the techniques of biological fluid collection and separation. <b>CO3:</b> To Understand the importance and estimation of various markers for liver, kidney and heart diseases. <b>CO4:</b> To Understand different techniques for the estimation blood glucose, CRP, HbA1c etc and its clinical importance.
			2.4.2 P	Pathophysiology & Clinical Biochem Practical	S.R. Thanage	<b>CO1.</b> To Illustrate different techniques of blood collection, preservation and disposal of specimen. <b>CO2.</b> TO Determine qualitative abnormal constituents of urine & Observe chemical examination of stool <b>CO3.</b> To Determine kidney test, liver test, cardiac profile test, C-reactive protein test, <b>CO4.</b> To find blood glucose level and HbA1c11.
			2.4.3 T	Pharmaceutical Organic Chemistry- IV	S D Magar	<b>CO1:</b> To understand principle, synthesis, manufacturing process, of some important heterocyclic and polycyclic compounds <b>CO2:</b> To understand basics of chemical process for new compounds and formulations <b>CO3:</b> To learn Theoretical chemical process, reaction system, chemical equipments used in manufacturing and practical skills of the instruments <b>CO4:</b> To apply Various techniques of combinatorial chemistry and understand applications of combinatorial chemistry in the speedy synthesis of organic compounds and peptides <b>CO5:</b> To remember basics of chemical process for new compounds and formulations
			2.4.3 P	Pharmaceutical Organic Chemistry-	S D Magar	<b>CO1:</b> To design different methods for qualitative analysis of binary mixtures.

				IV		<p><b>CO2:</b> To synthesize the organic compounds by appropriate method.</p> <p><b>CO3:</b> To synthesize organic compound by using microwave synthesizer.</p> <p><b>CO4:</b> To assess the reactive groups by quantitative determination.</p>
			2.4.4 T	Pharmaceutical Analysis-II	R K Godge	<p><b>CO1:</b> To understand principles, instrumentation and applications of various electrochemical techniques employed for the analysis of APIs and formulations</p> <p><b>CO2:</b> To describe Theoretical and practical skills of instruments</p> <p><b>CO3.</b> To apply various methods of analysis, parameters for analytical methods and interpretation of data for the analysis of APIs and formulations .</p> <p><b>CO4.</b>To understand various instrumental techniques.</p>
			2.4.4 P	Pharmaceutical Analysis-II	R K Godge	<p><b>CO1:</b> To assess purity of Pharmaceutical substances by potentiometric titrations.</p> <p><b>CO2:</b> To identify pKa of some monobasic, dibasic or tribasic acids of pharmaceutical</p> <p><b>CO3.</b> To apply calibration of pH meter, Conductometer, Refractometer and Polarimeter.</p> <p><b>CO4.</b> To identify Refractive Index (RI) and Molar Refraction of pharmaceutically important vegetable oils, glycerin-water mixture and organic solvents.</p>
			2.4.5.T	Pharmacognosy & Phytochemistry II	D N Vikhe	<p><b>CO1:</b> To describe Definition, classification, occurrences, properties, nomenclature, &amp; chemistry of alkaloids</p> <p><b>CO2:</b> The knowledge about pharmacognostic study of Alkaloidal drugs containing including history &amp; contribution to modern medicine</p> <p><b>CO3:</b> To write the Definition, classification, occurrences, properties, nomenclature, &amp; chemistry of Terpenoids &amp; Resins</p> <p><b>CO4:</b> To asses the pharmacognostic study of crude drugs containing Terpenoids &amp; Resins including history &amp; contribution to modern medicine</p>
			2.4.5.P	Pharmacognosy & Phytochemistry II	D N Vikhe	<p><b>CO1:</b> To Compare and Contrast the drugs by examining the difference in morphology, microscopy and powdered characteristics.</p> <p><b>CO2:</b> To examine and findout the various physical evaluation parameters of volatile oils</p> <p><b>CO3:</b> To examine and find out Phytochemical content in</p>

						<p>Rauwolfia by spectrophotometric methods</p> <p><b>CO4:</b> To investigate and examine the presence of phytoconstituent by using suitable extraction techniques</p> <p><b>CO5:</b> To investigate and examine the presence of phytoconstituent by using hydro distillation</p> <p><b>CO6:</b> To identify and examine the crude drugs by Physical and chemical analysis</p> <p><b>CO7:</b> To discuss and illustrate the principles and working, processing of fields/farm</p>	
				2.4.6 T	Pharmaceutical Engineering	S.S.Siddheshwar	<p><b>CO1:</b>To illustrate and explain the principle, theory, mechanism, working and construction of equipments of different unit operations.</p> <p><b>CO2:</b>To explain, classify and compare various equipments with respect to their applications in pharmacy.</p> <p><b>CO3:</b>To explain and prioritize the knowledge of product manufacturing with the help of various equipments.</p> <p><b>CO4:</b>.To Focus on graphical and digramatic representation of various equipments for unit operations.</p>
7	Third Year B. Pharmacy	Sixth	2015 Pattern	3.6.1 T	Industrial Pharmacy-II	S.D.Mankar	<p><b>CO1:</b> To explain suspensions, types, formulation development, manufacturing, excipients used, and evaluation, of suspensions.</p> <p><b>CO2:</b> To design &amp; Develop emulsions, their physico-chemical properties, theory of emulsification,.</p> <p><b>CO 3:</b> To explain semi-solids, anatomy &amp; physiology of skin, selection of bases; penetration enhancers, formulation development, Percutaneous absorption, flux measurement &amp; evaluation.</p> <p><b>CO4:</b> To design &amp; Describe layout for manufacturing of suspensions, emulsions &amp; semi-solids as per schedule M. Concept of Scale up &amp; technology transfer for dispersed system.</p>
				3.6.1 P	Industrial Pharmacy-II	S.D.Mankar	<p><b>CO1:</b> To explain formulation, evaluation &amp; design of various suspension dosage form</p> <p><b>CO2:</b> To design, Develop and evaluate different emulsion dosage form</p> <p><b>CO3:</b> To invent the suitable packaging material (container-closure) for the preparation.</p>
				3.6.2T	Pharmaceutical	H S Bhawar	<b>CO1:</b> To Understand and compare and use principles of various

				Analysis IV		<p>chromatographic techniques for isolation of compounds from mixture</p> <p><b>CO2:</b> To classify and to understand various Thermal Methods and to discuss and use of instrumentation of DSC, DTA, TGA in. pharmacy</p> <p><b>CO3:</b> To discuss principles and explain instrumentation and use of Electrophoresis and To discuss and to measure Nuclear reactions and radioactivity</p> <p><b>CO4:</b> To learn Principle, instrumentation and use of X- Ray Diffraction to solve simple calculations, calculation of Radii, study different crystal faces</p> <p><b>CO5:</b> To explain equipment qualification and validation of analytical instruments &amp; methods as per ICH/USP guidelines</p>
			3.6.2P	Pharmaceutical Analysis IV	H S Bhawar	<p><b>CO1:</b>To identify RF value of amino acids using various paper chromatographic and T.L.C techniques for isolation of compounds from mixture.</p> <p><b>CO2:</b> To explain to validate UV-VIS Spectrophotometric assay method as per ICH guidelines and to interpret the data obtained through experimentation and report the results as per regulatory requirements.</p> <p><b>CO3:</b> To construct the Column for separation of mixtures from component and To identify Rf value of component</p> <p><b>CO4:</b> To learn to Interpret the XRD spectrum and to outline use of HPTLC/DSC/Electrophoresis in Pharmaceuticals</p>
			3.6.3.T	Medicinal Chemistry -II	A S Dighe	<p><b>CO1:</b>To illustrate of drug metabolizing enzymes, phase I &amp; phase</p> <p><b>CO2:</b> To illustrate Biosynthesis, release and metabolism of noradrenaline, Receptor subtypes, design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the CNS active drug</p> <p><b>CO3:</b> To Explain design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the CNS Stimulants</p> <p><b>CO4:</b> To Explain design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the CNS depressant</p>

						<p><b>CO5:</b> To illustrate drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects, synthesis of drugs and recent developments in the Coagulants and anti-coagulants drug.</p>
			3.6.3.P	Medicinal Chemistry -II	A S Dighe	<p><b>CO1:</b> To analyze &amp; Separate solvents or substances by steam distillation.  <b>CO2:</b> To synthesize the following drug a. Phenytoin from benzoinb. Benzocaine from PABA  <b>CO3:</b> To Explain method for synthesis of medicinally important organic compounds using microwave assisted organic synthesis  <b>CO4:</b> To identify the synthesized compounds by Thin layer chromatography &amp; purified of synthesized compound by Column chromatography.</p>
			3.6.4 T	Pharmacology-III	S. B. Dighe	<ul style="list-style-type: none"> <li>• CO 1 : To know pharmacology and pharmacotherapy of various general and local anesthetics.</li> <li>• CO 2: To identify appropriate drug therapy and management of patients with specific CNS disorders.</li> <li>• CO 3: To understand the indications, mechanism of action, adverse effects and contraindications for the major classes of drugs used in the treatment of Parkinson's Disease, Migraine and Alzheimer's disease.</li> </ul> <p>CO 4: To describe Pharmacological features of different</p>
			3.6.4 P	Pharmacology-III Practical	S. B. Dighe	<p><b>CO 1:</b> To understand the basic principles of bioassay, types of bioassay along with advantages and disadvantages.  <b>CO 2:</b> To know Performance of isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves.  <b>CO 3:</b> To study the preclinical screening of various drugs.</p>
			3.6.5.T	Natural Product Chemistry	S R Vikhe	<p><b>CO 1:</b> To Understand natural products are appropriate material in discovering new drugs &amp; contribution in modern drug discovery.  <b>CO 2:</b> To Explain difficulties in elucidation of biosynthetic pathways in plant.  <b>CO 3:</b> Explain source, extraction, processing, chemistry &amp; applications of natural products used in pharmaceutical &amp; allied industry .  <b>CO 4:</b> Compare nutraceuticals , functional foods &amp; their significance.  <b>CO 5:</b> To outline significance of natural pesticides &amp; applications.</p>

				3.6.5.P	Natural Product Chemistry	S R Vikhe	<p><b>CO 1:</b> To illustrate various physical constants required in characterization of natural product</p> <p><b>CO 2:</b> To identify significance of use of various chemicals in extraction and analyze extracted material by qualitative tests.</p> <p><b>CO 3:</b> To predict isolated phytoconstituents by chemical, chromatographic and spectral methods.</p> <p><b>CO 4:</b> To analyze UV/IR spectrum of phytoconstituent.</p> <p><b>CO 5:</b> Evaluation of isolated phytoconstituents by chemical, chromatographic and spectral methods.</p> <p><b>CO 6:</b> To discuss and illustrate the knowledge of processing unit /field visit.</p>
				3.6.6 T	Bioorganic Chemistry & Drug Design	G S Shinde	<p><b>CO1:</b>To understand the significance of Bioorganic Chemistry and establish its relevance in drug design</p> <p><b>CO2:</b> To understand basics of approaches in rational drug design.</p> <p><b>CO3:</b> To Explain various drug targets and their biochemical features, physiological &amp; pathophysiological roles and their significance in drug design and drug mechanism and uses</p> <p><b>CO4:</b> To Explain pro-drug concept in drug design and guidelines involved in QSAR applications</p>
8	Final Year B. Pharmacy	Eight	2015 Pattern	4.8.1 T	Advanced Drug Delivery System	MH Kolhe	<p><b>CO1:</b>To understand the Fundamental Concept of Modified Drug Release and Pre requisites of drug candidates, along with various approaches and classification.</p> <p><b>CO2:</b>To learn concept of polymers and its classification, types, selection, application and examples.</p> <p><b>CO3:</b>To understand the concept of formulation, merits, demerits, application and evaluation of Novel Drug Delivery Systems and optimization.</p> <p><b>CO4:</b>To learn the Therapeutic Aerosols along with typical formulations from, metered dose, intranasal and topical applications.</p> <p><b>CO5:</b>To learn the concept of microencapsulation, merits, demerits and application, Types of Microencapsulation and Evaluation of microcapsules.</p>
				4.8.1 P	Advanced Drug Delivery System	MH Kolhe	<p><b>CO1:.</b> To compare and contrast and design various tablets.</p> <p><b>CO2:</b>To compare and contrast various polymers.</p> <p><b>CO3:.</b> To compare and contrast and design various NDDS.</p> <p><b>CO4:</b>To compare and contrast and design various microcapsules.</p>

				4.8.2 T	Cosmetic science	S.S.Siddheshwar	<p><b>CO1:</b>To illustrate concepts of cosmetics, anatomy of skin v/s hair and to categorize and justify general excipients used in cosmetics.</p> <p><b>CO2:</b>To design and examine and manufacture formulation of various cosmetics.</p> <p><b>CO3:</b>To explain the concept of cosmeceuticals, history, compare and contrast cosmetics ,cosmeceuticals&amp;cosmeceutical agents.</p>
				4.8.2 P	Cosmetic science	S.S.Siddheshwar	<p><b>CO1:</b>To design and examine the various dosage forms.</p> <p><b>CO2:</b>To explain the correct use of various equipments in pharmaceuticals laboratory relevant to cosmetics.</p> <p><b>CO3:</b>.To design and examine the various dosage forms.</p>
				4.8.3. T	Pharmaceutical Analysis VI	G S Shinde	<p><b>CO1:</b> To explain theoretical, Practical parameters of NMR spectroscopy, and assess organic compound using NMR data and outline FT-NMR and C13 NMR</p> <p><b>CO2:</b> To illustrate principle, instrumentation, application of Electron spin resonance</p> <p><b>CO3:</b> To understand principle,instrumentation, application of Ion exchange chromatography and capillary electrophoresis</p> <p><b>CO4:</b> To explain principle ,instrumentation ,application of high Performance liquid chromatography and compare HPLC with UPLC</p> <p><b>CO5:</b>To explain principle,instrumentation and application of mass spectrometry and hyphenated techniques like GC-MS,LC-MS,MS-MS</p>
				4.8.3. P	Pharmaceutical Analysis VI	G.S.Shinde	<p><b>CO1:</b> To illustrate and examine Validation of analytical methods</p> <p><b>CO2:</b> To describe the system suitability parameters</p> <p><b>CO3:</b> To understand quantitation technique and identify API in bulk and formulation</p> <p><b>CO4:</b> To illustrate knowledge in interpretation of UV, IR, NMR, MS spectra's and examine structure of organic compound</p>
				4.8.4 T	Medicinal Chemistry -IV	N.S.Dighe.	<p><b>CO1:</b> To Examine the general aspects of the design and development of drugs including history, classification, nomenclature of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic, diagnostic and serotonergic agents</p> <p><b>CO2:</b>ToDescribe and discuss the drug design including SAR and mechanism of action of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic,</p>



					diagnostic and serotonergic agents. <b>agents.</b> <b>CO3:</b> Explain and illustrate adverse effects, therapeutic uses and recent developments of antihistaminic, autacoids, NSAID's, narcotic, steroidal, hormones, insulin, oral antihypoglycemic, diagnostic and serotonergic <b>CO4:</b> To Designscheme of synthesis of drugs of antihistaminic, NSAID's, narcotic, steroidal insulin and oral antihypoglycemic.
			4.8.4 P	Medicinal Chemistry -IV	N.S.Dighe. <b>CO1:</b> To synthesize the medicinally important compound by appropriate method <b>CO2:</b> To identify a proper method for purification of synthesized compounds by column chromatography <b>CO3:</b> To examine prepared compounds by preparative TLC Method and IR Spectroscopy <b>CO4:</b> To Outline the method for high vacuum distillation and CADD technique.
			4.8.5 T	Pharmacology-V including biostatistics	S. B. Bhawar <b>CO1:</b> To describe various methods of drug-drug interaction inside the body. <b>CO2:</b> To discuss the mechanism of adverse drug reactions and pharmacovigilance. <b>CO3:</b> To restate knowledge about recent development in pharmacology <b>CO4:</b> To explain different aspects of hospital pharmacy and clinical trials
			4.8.5 P	Pharmacology-V	S. B. Bhawar <b>CO1:</b> To illustrate the in vivo and in vitro experiments, drug antagonism <b>CO2:</b> To compare and contrast use of software for the study of preclinical experiments. <b>CO3:</b> To explain statistics, relate its applications and how to solve problems using various statistical tests. <b>CO4:</b> To assess statistical problems using suitable software.
			4.8.6.T	Natural Product: Commerce , Industry & Refulations	R.S.Jadhav <b>CO1:</b> To discuss importance of natural product and explain demand and supply of natural product <b>CO2:</b> To categorize and illustrate herbal drug industry <b>CO3:</b> .To learn patenting of herbal/natural drugs <b>CO4:</b> To investigate safety monitoring of herbals in pharmacovigilance systems <b>CO5:</b> To discuss plant allergens and examine plant allergens
			4.8.7 T	Quality Assurance Techniques	R.B.Laware <b>CO1:</b> To Describe the quality, quality assurance, quality control and IPQC in pharmaceutical industry <b>CO2::</b> To Explain the Calibration and Qualification in Quality



							Assurance <b>CO3::</b> To Understand the GMP, GLP and GDP while working in pharmaceutical industry with document and record <b>CO4::</b> To Explain the Pharmaceutical Validation in QA <b>CO5::</b> To Recognize the regulatory agencies and explain the concept of QbD
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Sr. No	Class	Semester	Curriculum Pattern by SPPU	Course Code	Name of course	Name of staff	Course Outcomes
1.	First Year M.Pharmacy- Pharm. Q.A.	First	2018 Pattern	MPC 101T	MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES	N S Dighe	<b>CO1:</b> To describe and understand identification characterization and quantification of drugs using instrumental techniques. <b>CO2:</b> To learn and understand principle and instrumentation of different spectroscopic techniques. <b>CO3:</b> To learn and understand principle and instrumentation of different chromatographic techniques <b>CO4:</b> To learn and understand principle and instrumentation of electrophoresis and Xray techniques <b>CO5:</b> To understand application of different instrumental techniques.
2.				MQA102T	Quality Management System	SD Mankar	<b>CO1:</b> To explain the importance of quality, justify the parameter affect the quality. <b>CO2:</b> To understand the six system inspection model. <b>CO3:</b> To explain drug stability and justify design & process development. <b>CO4:</b> To examine the statistical process control for quality & to plan for statistical process control.
3.				MQA103T	Quality Control and Quality Assurance	MH Kolhe	<b>CO1:</b> To explain concept of Quality Control, Quality Assurance and Documentation in pharmaceutical industry. <b>CO2:</b> To discuss cGMP guidelines and use of it in pharmaceutical industry. <b>CO3:</b> To investigate raw material and finished product. <b>CO4:</b> To illustrate Manufacturing operations and controls: Sanitation of manufacturing premises.
4.				MQA104T	Product Development and Technology transfer	RB Laware	<b>CO1:</b> To describe and understand the principles of new drug discovery and development <b>CO2:</b> To explain role of preformulation, stability study and pilot plant scale up in drug product development <b>CO3:</b> To explain role of packaging material in pharmaceutical

						dosage forma and their quality control test <b>CO4:</b> To discuss and apply various aspects of technology transfer from R&D to actual manufacturing
5.				MQA105P	Pharmaceutical quality assurance Practical I	SB Kakad <b>CO1:</b> To Analyse quantitatively organic and inorganic constituents by using Instrumental Methods of Analysis <b>CO2:</b> To build case studies and protocol of various processes of quality assurance and quality control <b>CO3:</b> To evaluate preformulation parameters, in process, finished product and packaging material quality.
6.	First Year M.Pharmacy- Pharm. Chemistry			MPC102T	Advance Organic Chemistry 1	H S Bhawar <b>CO1:</b> To understand the various intermediate formed in organic reactions and mechanisms of reactions <b>CO2:</b> To describe the mechanism & applications of various named reactions <b>CO3:</b> To discuss application of catalysts, Synthetic Reagents and protecting groups used in organic reactions <b>CO4:</b> To Explain the chemistry of heterocyclic compounds and to study Synthesis of few representative drugs containing these heterocyclic nucleus <b>CO5:</b> To elaborate the principles and applications of reterosynthesis and the concept of disconnection to develop synthetic routes for small target molecule
7.				MPC 103T	ADVANCED MEDICINAL CHEMISTRY	K V Dhamak <b>CO1:</b> To Understand the importance of drug design and different techniques of drug design. <b>CO2:</b> To Know design & development of Medicinal Chemistry drug study of Anti-hypertensive drugs, psychoactive drugs, Anticonvulsant drugs, H1 & H2 receptor antagonist, COX-1 & COX-2 inhibitors, Alzheimer's and Parkinson's disease, Antineoplastic and Antiviral agents. <b>CO3:</b> To Understand design and development of peptidomimetics. <b>CO4:</b> To Explain development of Rational Design of Enzyme Inhibitors <b>CO5:</b> To Understand the importance of Pro drug Design and Analog design
8.				MPC 104 T	Chemistry of Natural Products	R K Godge <b>CO1:</b> To understand different types of natural compounds and their chemistry and medical importance

						<p><b>CO2:</b> To apply the importance of natural compound as lead molecule for new drug discovery.</p> <p><b>CO3:</b> To analyze general methods of structural elucidation of compounds of natural origin</p> <p><b>CO4:</b> To evaluate isolation, purification, and characterization of simple chemical constituent from natural source</p>	
9.				MPC 105P	PHARMACEUTICAL CHEMISTRY PRACTICAL – I	N S Dighe	<p><b>CO1:</b> To learn the concept of disconnection to develop synthetic routes for small target molecule.</p> <p><b>CO2:</b> To understand and impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.</p> <p><b>CO3:</b> To learn designed to provide detail knowledge about chemistry of medicinal compounds from various reagents and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds</p> <p><b>CO4:</b> To Explain development of different techniques of organic synthesis and their applications to process chemistry as well as drug discovery.</p> <p><b>CO5:</b> To examine the importance of recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.</p>
10.				MPG102T	Advanced Pharmacognosy I	Priya Rao	<p><b>CO1:-</b> To get Brief knowledge about specific care in herbal material, &amp; various approaches in extraction processes with their theoretical consideration, methodological steps, &amp; applications.</p> <p><b>CO2:-</b> To Know various chromatographic &amp; non-chromatographic separation methods.</p> <p><b>CO3:-</b> To understand theoretical To understand source material &amp; extraction methods of phytochemicals specified; and to draw schematic representation of such processes.</p> <p><b>CO4:-</b> To Study need of analysis of natural products &amp; explain their significance; Understand &amp; explain various parameters with their principles, significance &amp; applications.</p>
11.				MPG103T	Phytochemistry	S R Vikhe	<p><b>CO1:-</b> To discuss the skills for Separation of the active constituents obtained from natural sources and different methods of separation .</p> <p><b>CO2:-</b>To identify the active ingredients and methods to evaluate natural components .</p> <p><b>CO3:-</b>To explain the actual process of Herbal Drug discovery and development.</p>

						<p><b>CO4:-</b>To compare and contrast extraction, Isolation and Phytochemical analysis of Natural products.</p> <p><b>CO5:-</b> To predict the principle of sophisticated instruments and studyof chromatographic fingerprinting methods</p>	
12.				MPG104T	Industrial Pharmacognostical technology	R S Jadhav	<p><b>CO1:-</b> To identify requirement for setting of herbal drug industry.</p> <p><b>CO2:-</b> To learn guidelines for quality and regulatory issues of herbal /natural medicines .</p> <p><b>CO3:-</b>To explain and compare general parameters of monographs of herbal drugs as per various pharmacopeia.</p> <p><b>CO4:-</b>To assess various clinical laboratory and stability testing of herbal drugs.</p> <p><b>CO5:-</b>To learn patenting of herbal/natural drugs.</p>
13.				MPG105T	Pharmacognosy Practical I	R S Jadhav/ Priya Rao	<p><b>CO1:-</b>To illustrate the Pharmacopoeial compounds of natural origin and formulations by UV Vis spectrophotometer.</p> <p><b>CO2:-</b>To design Estimation of sodium/potassium by flame photometry</p> <p><b>CO3:-</b>To investigate Development of fingerprint of medicinal plant extracts used in herbal drug industry by TLC/HPTLC method.</p> <p><b>CO4:-</b>To identify the Methods of extraction and phytochemical screening .</p> <p><b>CO5:-</b>To predict the Monograph analysis of clove oil and castor oil.</p>
		Second		MQA201T	Hazards and safety	MH Kolhe	<b>CO1:</b> To explain Natural resources and associated problems
15.					Management		<p><b>CO2:</b> To discuss Types of Hazards and its prevention.</p> <p><b>CO3:</b> To Classify chemical based hazards and their control measures.</p> <p><b>CO4:</b> To describe and illustrate Fire and Explosion hazards and Preventive and protective management from fires and explosion</p> <p>5. To describe and compose Hazard and risk management</p>
16.					MQA202T	Pharmaceutical Validation	RB Laware

17.				MQA203T	Audits and regulatory compliance	S S Siddheshwar	<p><b>CO1:</b>To explain the importance of auditing.</p> <p><b>CO2:</b>To compose the auditing report and check list for auditing</p> <p><b>CO3:</b>To plan out the audit process.</p> <p><b>CO4:</b>To compose the auditing report And check list for auditing.</p> <p><b>CO5:</b>To illustrate the methodology of auditing</p>
18.				MQA204T	Pharmaceutical manufacturing technology	S.D.Mankar	<p><b>CO1:</b>To identify the legal requirements and licenses for API &amp; formulation industry and Justify the plant location factors influenced on API &amp; formulation industry.</p> <p><b>CO2:</b> To design &amp; construct Non sterile manufacturing process technology in pharmaceutical industry</p> <p><b>CO3:</b> To explain the importance of Quality by design (QbD) and process analytical technology in pharmaceutical industry.</p> <p><b>CO4:</b> To design and construct aspectic process technology in pharmaceutical industry.</p>
19.				MQA205P	Pharmaceutical Quality assurance Practical II	RB Laware	<p><b>CO1:</b> To Validate equipment and instruments, analytical methods and cleaning processes</p> <p><b>CO2:</b> To Design validation documents, plant lay out of processing and testing area, check list for pharmaceutical manufacturing processes</p> <p><b>CO3:</b> To build case studies of various processes of quality assurance and quality control</p> <p><b>CO4:</b> To Analyse quantitatively organic and inorganic constituents by using Instrumental Methods of Analysis</p>
20.				MPC 201 T	Adavanced spectral Analysis	G S Shinde	<p><b>CO1:</b> To discuss interpretation of organic compound by using UV,IR ,mass spectroscopy</p> <p><b>CO2:</b> To understand theoretical technique of NMR spectroscopy and assess organic compound using NMR data</p> <p><b>CO3:</b> To explain principle, instrumentation and application Chromatographic and its hyphenated analytical technique</p> <p><b>CO4:</b> To illustrate principle, instrumentation and use of DTA,DTA and TGA.</p> <p><b>CO5:</b> To discuss the general theory and principles of bioassay , ELISA and assess quantity of Digitalis and insulin</p>
21.				MPC202T	Advance Organic Chemistry 2	H S Bhawar	<p><b>CO1:</b>To discuss the principle of Green Chemistry and use techniques of green chemistry in synthesis of pharmaceutical compounds.</p> <p><b>CO2:</b> To understand Chemistry of peptides and use solid phase and solution phase synthesis reaction for synthesis of</p>

						<p>pharmaceutical compounds.</p> <p><b>CO3:</b> To learn principle and mechanism for photochemical and pericyclic reaction</p> <p><b>CO4:</b> To explain basic concept of Stereochemistry &amp; Asymmetric Synthesis using chiral pool, chiral auxiliaries.</p> <p><b>CO5:</b> To classify and explain use of various catalyst in heterogeneous and homogeneous reactions and transitional phase transfer, and biocatalysis reactions.</p>	
22.				MPC 203 T	Computer Aided Drug Design	R K Godge	<p><b>CO1:</b> To understand the role of CADD in drug discovery</p> <p><b>CO2:</b> To describe different CADD techniques and their applications</p> <p><b>CO3:</b> To analyze the various strategies to design and develop new drug like molecules.</p> <p><b>CO4:</b> To illustrate working with molecular modeling software's to design new drug molecules</p> <p><b>CO5:</b> To describe the in silico virtual screening protocols.</p>
23.				MPC 204T	Pharmaceutical Process Chemistry	M S Bhosale	<p><b>CO1:</b> To illustrate the process chemistry and stages of scale-up</p> <p><b>CO2:</b> To understand the unit operation extraction, filtration, distillation, evaporation</p> <p><b>CO3:</b> To learn the unit process of nitration, halogenations, oxidation, reduction</p> <p><b>CO4:</b> To explain the fermentation of antibiotic, vitamin, static</p> <p><b>CO5:</b> To understand industrial safety and fire hazards safety assessment series</p>
24.				MPC 205P	PHARMACEUTICAL CHEMISTRY PRACTICAL – II	N S Dighe	<p><b>CO1:</b> To learn the designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery</p> <p><b>CO2:</b> To impart knowledge on the development and optimization of a synthetic route/s and described as scale up reactions, taking them from small quantities created in the research lab to the larger quantities</p> <p><b>CO3:</b> To Understand designed to provide detail knowledge about chemistry of medicinal compounds from various reagents and general methods of structural elucidation of such compounds. It also emphasizes on isolation, purification and characterization of medicinal compounds</p> <p><b>CO4:</b> To examine development of different techniques of organic synthesis and their applications to process chemistry as</p>

					well as drug discovery <b>CO5:</b> To learn the importance of recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.
25.			MPG201 T	Medicinal Plant Biotechnology	Priya Rao <b>CO1:-</b> To provide students with the necessary skills to learn different methods of tissue culture <b>CO2:-</b> To study the various tissue culture techniques <b>CO3:-</b> To explain the various immobilisation techniques and to study the metabolites <b>CO4:-</b> To learn various biotransformation techniques <b>CO5:-</b> To learn various fermentation techniques
26.			MPG202 T	Advanced Pharmacognosy II	S R Vikhe <b>CO1:-</b> To assess the Efficacy of Herbal medicine products <b>CO2:-</b> To discuss the methods of screening of herbals for various biological properties <b>CO3:-</b> .To investigate the analytical profiles <b>CO4:-</b> To investigate the analytical profiles of herbal drugs of herbal drugs <b>CO5:-</b> .To examine ethnobotany in herbal drug evaluation and Impact of Ethnobotany in traditional medicine
27.			MPG203T	Indian System of Medicine	D N Vikhe <b>CO1:-</b> Acquire knowledge of Primary concepts of traditional system of medicine as well as Formulation development and standardization of various traditional dosage forms <b>CO2:-</b> Describe the Basic principles and healing potentials of Yoga, Naturopathy and Aromatherapy. <b>CO3:-</b> . The course aims to provide students with the necessary skills in learning and acquiring knowledge in Formulation, development and standardization of various traditional formulations. <b>CO4:-</b> To study Good manufacturing skills in traditional drug industry & Safety monitoring of herbal medicines. <b>CO5:-</b> To explain the Concepts of AYUSH, AYUSH, ISM, CCRAS, CCRS, CCRH, CCRU.
28.			MPG204T	Herbal Cosmetics	R S Jadhav <b>CO1:-</b> To understand the basic principles of herbal cosmetics <b>CO2:-</b> To learn the current good manufacturing practices of herbal cosmetics

							<b>CO3:-</b> To understand the various types of herbal cosmetics used.
29.				MPG205 P	Pharmacognosy-II	Mr.D.N.Vikhe	<b>CO1:-</b> To illustrate the Isolation of nucleic acid. <b>CO2:-</b> To design the Quantitative estimation of DNA, <b>CO3:-</b> To identify total phenolic, total flavonoid content and total alkaloid content in herbal raw materials. <b>CO4:-</b> To investigate the Preparation and standardization of various simple dosage forms from traditional medicine. <b>CO5:-</b> To assess the herbal formulation and herbal cosmetic product.



Academic In-Charge



Principal  
Pravara Rural College of Pharmac.  
Pravaranagar, A/p. Loni-413736

Principal