

First Year B Pharm (2013 course) SEM-I

**Pharmaceutics-I:**

Student should be able to

No.	Course Outcomes
1	Know introduction to pharmaceutics and its various branches, special emphasis on different official Pharmacopoeia.
2	Understand concept of drug and dosage form. Various solid and liquid dosage forms, its evaluation
3	Understand concept of pre-formulation, aspects of bulk drug characterization, solubility and stability studies.

  
D. S. Bhamber  
subject I/c.

**Modern Dispensing Practices:**

Student should be able to

No.	Course Outcomes
1	Apply basic mathematical calculations in the compounding and dispensing.
2	Review basic requirements in the compounding and dispensing of pharmaceutical products.
3	Generate accurate and appropriate drug information and report health care professionals.
4	Counsel patient for prescription drug, OTC products and cosmetics and read, interpret.
5	Identify the type of incompatibility and explain the methods to remove these incompatibilities.
6	Demonstrate a working knowledge of drug dosages, routes of administration, and dosage forms and incompatibility.

  
S. P. Kakad.

First Year B Pharm (2013 course) SEM-I

**Pharmaceutical Inorganic Chemistry:**

Student should be able to

No.	Course Outcomes
1	Know significance of Inorganic chemistry and overview of various pharmacopoeias.
2	Study purity of chemical compounds, limit tests, water and its official quality control tests.
3	Study gastrointestinal tract agents.
4	Study extracellular and intracellular ions in the body, discuss the biological importance of essential and trace elements and study official compounds.
5	Study topical agents, dental products, expectorants, antidepressant, antidotes, cytotoxic agents.
6	Perform qualitative analysis for detection of acidic and basic radicals.

*S. D. Patil*  
S. D. Patil  
(subject etc)

**Pharmaceutical Organic Chemistry I:**

Student should be able to

Course	Course Outcomes
1	Explain and clarify common and IUPAC nomenclatures of different alcohols and ethers. Synthesis and general reactions of the alcohols and ethers.
2	Memorize chemistry of amines, separation of amines. Outline the synthesis, chemical reactions of amines. Illustrate the use.
3	Clarify the synthesis, chemical reactions of a given carboxylic acid along with mechanism
4	Learn planning and synthesis of NCEs
5	Learn purification and physical constants recording
6	Learn different chemical tests required for qualitative analysis

*S. S. Ch*  
S. S. Ch  
Sub. Inorganic



First Year B Pharm (2013 course) SEM-I

**Human Anatomy & Physiology-I:**

Student should be able to

No.	Course Outcomes
1	explain the relevance, significance and basic terminologies of used in Human Anatomy and Physiology to Pharmaceutical Sciences.
2	explain the anatomy & physiology of cells, tissues, skeletal & smooth muscle, Blood component and Hemostasis, cardiovascular, lymphatic and digestive system contribute to the regulation of human body homeostasis.
3	explain WHO Definition of health and health promotion.
4	clarify significance of bleeding time, clotting time, blood pressure, detection of blood group, haemoglobin detection, W.B. C. and R.B. C. count.
5	demonstrate human cardiovascular system and digestive system using models, charts and histological slides

*FD*  
F.L. Dolkhata  
(SI)

**Communication and Soft Skill Development:**

Student should be able to

No.	Course Outcomes
1	Handle interpersonal relations & communicate effectively, choose career and make appropriate decisions, move from the lexical level to the syntactic level.
2	Describe the four basic communication skills, convert the conceptual understanding of communication into everyday practice.
3	Become aware of their thinking styles and to enable them to convert thinking into performance.
4	Make students reflect and improve their use of body language, and to identify, classify and apply relevant soft skills, illustrate role of skills in real-life work situations with case studies, role play, etc.
5	Identify the concept and components of personality, march towards excellence in their respective academic careers. Bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced.
6	Sharpen memory skills and other study skills, identify the concept of positive thinking which will keep the students in a good stead at the time of crisis.

*C.S.S.D.*

First Year B. Pharm (2013 Pattern) SEM-II

**Pharmaceutics - II:**

Student should be able to

No.	Course Outcomes
1	Describe importance of packaging and Packaging of various dosage forms like liquid, powders, tablets and semisolid dosage forms.
2	Understand Various unit operations required in the processing of finished dosage forms like filtration, size reduction, size separation and also principle, construction and working of various equipments used in these unit operations.
3	Know Importance of various unit operations in formulation and mechanism of the unit operations in formulation of various dosage forms.
4	Understand Various guidelines of Good manufacturing practices (GMP) described as per schedule M.
5	Understand Bioavailability and bioequivalence. Concepts and mechanisms related to absorption, distribution, metabolism and excretion.
6	Know Various departments in pharmaceutical manufacturing unit. Flow chart and layout of liquid manufacturing and packaging section.

*gan*  
U.D. Laddha  
Sub. II(c)

**Dosage Form Design:**

Student should be able to

Course	Course Outcomes
1	List reasons for the incorporation of drugs into various dosage forms.
2	Compare and contrast the advantages/disadvantages of various drug dosage forms.
3	Identify factors that affect drug solubility and describe approaches to optimizing drug solubility.
4	Describe appropriate uses of pharmaceutical powders and granules.
5	find corresponding marketed preparations along with the contents, name of the manufacturer, study the label and note the shelf life period.
6	Understand Evaluation parameters for liquids include organoleptic properties.

*Shahul*  
S. P. Kulkarni



First Year B. Pharm (2013 Pattern) SEM-II

**Pharmaceutical Organic Chemistry-II:**

Student should be able to

No.	Course Outcomes
1	Explain and clarify common and IUPAC nomenclatures of different alcohols and ethers. Synthesis and general reactions of the alcohols and ethers.
2	Memorize chemistry of amines, separation of amines. Outline the synthesis, chemical reactions of amines. Illustrate the use.
3	Clarify the synthesis, chemical reactions of a given carboxylic acid along with mechanism
4	learn planning and synthesis of NCEs
5	learn purification and physical constants recording
6	learn different chemical tests required for qualitative analysis

✓  
S.S.C  
Sub. In charge

**Human Anatomy & Physiology -II:**

Student should be able to

No.	Course Outcomes
1	explain the anatomy & physiology of Nervous system, various sense organs, respiratory, Urinary, Endocrine and reproductive system of the human body contribute to the maintenance of homeostasis.
2	demonstrate and aware the students various parameters are use to check and regulate the normal functions of Human body - Lung volumes and capacities, pH of urine and ECG.
3	demonstrate techniques for identification, counting, determination of various integral components of the body -Differential leukocyte count, Reticulocyte count, Platelet count, coombs ameth Index and osmotic fragility count.

✓  
H.L. Pathak  
(SI)

First Year B. Pharm (2013 Pattern) SEM-II

**Pharmacognosy:**

Student should be able to

No.	Course Outcomes
1	Know Significance of Biology and its relevance in Pharmacy. Understood basic components of cell, its division, tissue systems along with morphology.
2	Identify the parts of plants from its morphological & microscopical features by applying experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.
3	Know Principle of Genetics which helps in further understanding of plant tissue culture and recombinant technology
4	Understand Concept of Pharmacognosy, classification systems and global understanding of nomenclature.
5	Know modes of nutrition, photosynthetic and chemosynthetic mechanism, also, environmental conditions to be taken care of so as to preserve plant biodiversity.
6	Handle microscope and microtome.

*Dr. S. N. Surge*  
Sub I/c

**Pharmaceutical Analysis- I:**

Student should be able to

No.	Course Outcomes
1	Illuminate relevance & significance of Analytical Chemistry to Pharmaceutical Sciences.
2	Understand basic principles of data treatment and data handling.
3	Explain basic concepts and principles of aqueous acid base titrations and non-aqueous acid base titrations and perform standardization and estimation of compounds.
4	Understand different terms, types and basic principles of precipitation titrations and redox titrations and perform standardization and estimation of compounds.
5	Explain concept and reaction conditions for complexation and perform standardization and estimation of compounds.
6	Understand and explain the difference between precipitation and gravimetric analysis and perform standardization and estimation of compounds.

*Subject Incharge*  
*P. H. D.*  
*P. H. D.*



Second Year B. Pharm (2013 Pattern) SEM-III

**Physical Pharmaceutics 1:**

Student should be able to

No.	Course Outcomes
1	Know basic phenomena and concepts of solubility and distribution, partition phenomena, etc. and interrelationships between physiochemical properties of a drug, its dosage form, route of administration and bioavailability.
2	Understand Physical principles of states of matter and phase rule, compare one, two and three component system, pharmaceutical applications, various laws and theories of gases and correlate them into formation of aerosols.
3	Know about crystallization, crystal analysis, polymorphism, Non-electrolytic, Electrolytic solutions, their types and various properties and applications of thermodynamics in the pharmacy.
4	Calculate critical solution temperature (CST), construct ternary phase diagram for three-component system and determine the effect of electrolyte on CST of phenol water system.
5	Predict solubility at different temperature, solvents, determine the effect of pH & Cosolvent on solubility of given compound, determine molecular weight & understand the principle of Rast Camphor method.
6	Determine partition coefficient & effect of pH on it of given compound, determine the normality of acid by conductometric titration.

*[Signature]*  
 U.P. Laddhy  
 (Sub. Incharge)

**Pharmaceutical Microbiology & Immunology:**

Student should be able to

Course	Course Outcomes
1	Classify microbes into various categories, the recent advances in microbiology, compare the microbes, know the modes of reproduction in bacteria, identify the causes and basis of microbial spoilage.
2	Know the sterilization processes, sterility testing as per I.P. and its importance, Mechanism of action & its evaluation, disinfectants. Student should know basics behind various reactions of antigen and antibody
3	learn how to prepare and sterilize nutrient broth, nutrient agar, slants, stabs and plates, adopt the skills required for maintaining strictly aseptic condition and handling inoculating loop, its sterilization and inoculation procedure.
4	Perform Isolation of microbes by Streak plate, Pour plate techniques, morphology studies, staining techniques.

*[Signature]*  
 S.P. Kaked



Second Year B. Pharm (2013 Pattern) SEM-III

**Pharmaceutical Biochemistry:**

Student should be able to

No.	Course Outcomes
1	Understand biochemical processes, cell metabolism and clarification of the concept of enzyme structures, their functions, mechanism for enzymatic activity, applications of enzymes.
2	Understand and explain basics like chemistry, function, classification, biological importance, metabolism and applications of various bio molecules e.g. proteins, carbohydrates and lipids, nucleic acid etc
3	Understand the types, structures, biochemical functions & importance of fat-soluble and water-soluble vitamins.
4	Detect and identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative tests. Separate, identify and characterize proteins from various samples like milk, and understand principle behind the technique.
5	Understand principle behind electrophoresis experiment for the separation of proteins by SDS-page method.
6	Estimate quantity of ascorbic acid in a given sample and understand action of salivary amylase on starch.

*S. Patil*  
S. D. Patil  
(Subject etc)

**Pharmaceutical Organic Chemistry-III:**

Student should be able to

No.	Course Outcomes
1	Clarify Isomerism & apply that knowledge in understanding the structure property relationship.
2	Understand the stereo chemical aspects of the organic compounds.
3	Understand mechanism and applications of rearrangement of electron deficient and electron rich systems.
4	Comprehend and explain basic concepts in pericyclic reactions.
5	Understand the chemistry of amino acids and underlying concepts like isoelectric point.
6	Understand synthesis and reaction of Polycyclic Compounds.

*Subject: ischarge*

*Dr. S. K. Kote*

Dr. S. K. Kote




Second Year B. Pharm (2013 Pattern) SEM-III

**Pharmacology – I:**

Student should be able to


No.	Course Outcomes
1	Know Introduction to the basics of pharmacology like history, scope & general principles.
2	Understand different types of drugs including their use, knowledge of various routes of administration with advantages and disadvantages.
3	Understand new drug discovery and development process.
4	Know pharmacokinetic and pharmacodynamic parameters, knowledge of receptors and correlate them to various proteins present in the body.
5	Know Introduction to the principles, site, mechanisms and factors modifying drug action.
6	Knowledge of basic principles of drug therapy for Pediatrics, geriatrics and Pregnant as well as lactating Women.

  
P.B. Udavant  
Subject-IC

**Pharmacognosy & Phytochemistry –I:**

Student should be able to

Course	Course Outcomes
1	Understand the significance of Pharmacognostic parameters and its analysis.
2	Comprehend and understand primary and secondary metabolites, to identify drugs with qualitative and quantitative parameters.
3	Understand general processes of preparation of semi - synthetic products and their properties.
4	perform extractions and quality control of various crude drugs
5	Identify the difference between organized and unorganized drugs.
6	Handle various equipments as per SOPs (such as spectrophotometer, Tintometer, simple / compound / digital microscope, Abbe's Refractometer, Melting point apparatus) & judge the quality of material.

  
P.B. Pawar  
(subject III)

Second Year B. Pharm (2013 Pattern) SEM-III

**Environmental Sciences:**

Student should be able to

No.	Course Outcomes
1	Know the basics of Environmental Sciences.
2	Know social Issues and the Environment.
3	Know about environmental issues related to the specific discipline for Pharmacy Course.
4	Understand the types, characteristic features, structure and function of the ecosystems.
5	Understand the basic, causes, effects and control measures of air, water, soil, marine, thermal and noise pollution.
6	Understand the natural resources and their conservation.



Dr. R. S. Kankate.



Second Year B. Pharm (2013 Pattern) SEM-IV

**Physical Pharmaceutics-II:**

Student should be able to

No.	Course Outcomes
1	Know about phenomena, concept principles and its measurement of surface and interfacial tension
2	Understand the properties of particles and pharmaceutical powders, their significance in formulation, and methods for characterization
3	Understand the different types of flow to identify and choose suitable flow characteristics for the formulation, applications of rheology. Study properties and applications of colloids in the formulations
4	Study reaction kinetics and order, degradation and stabilization of medicinal agents and accelerated stability testing.
5	Determine physical properties like surface tension, viscosity, adsorption and solubility, composition of binary mixture by viscosity method, particle size and distribution.

*[Signature]*  
J.O. Ladakhy  
(Sub I/C)

**Pathophysiology and Clinical Biochemistry:**

Student should be able to

No.	Course Outcomes
1	Understand biochemical mechanisms and pathophysiological processes responsible for common biochemical disorders.
2	Understand the role of clinical biochemistry in clinical diagnosis.
3	Study basic principles of pathophysiology of different organ Systems
4	Handle and know the correct use of the instrument /equipment like colorimeter, UV-spectrophotometer, centrifuge, microscope, flame photometer & various instruments used in pathology laboratory.
5	Perform qualitative tests for determination of abnormal constituents, liver function test, cardiac profile tests and kidney function test for given samples.
6	Distinguish the colours while performing various chemical tests like urine analysis.

*[Signature]*  
P.B. Ulavant  
Subject F/C

Second Year B. Pharm (2013 Pattern) SEM-IV

**Pharmaceutical Organic Chemistry-IV:**

Student should be able to

No.	Course Outcomes
1	Sketch the structure with numbering and illustrate chemistry, methods of preparation and chemical reactions of five and six membered rings and fused heterocyclic rings.
2	Explain the application of combinatorial chemistry in the speedy synthesis of organic compounds and peptides.
3	Construct retro-synthesis important pharmaceutical compounds.
4	Understand uses of nanochemistry and microwave assisted synthesis of compounds.
5	Perform qualitative analysis of solid-liquid and liquid-liquid organic binary mixtures and synthesis of derivatives.

Subject in charge  
Pr. R. S. Kulkarni

**Pharmaceutical Analysis-II:**

Student should be able to

No.	Course Outcomes
1	Know modern methods of analysis..
2	Learn principle, application of electro analytical techniques.
3	Learn basic principle, instrumentation & applications of polarography, amperometry, coulometry, polarimetry, potentiometry & conductometry.
4	Learn calibration & titration of pH meter, conductometer & measurement of R.I.

Subject Incharge  
Pr. R. S. Kulkarni

(Pr. R. S. Kulkarni)



Second Year B. Pharm (2013 Pattern) SEM-IV

**Pharmacognosy & Phytochemistry-II:**

Student should be able to

No.	Course Outcomes
1	Study and draw basic heterocyclic system present in alkaloids, definition and classification of alkaloids and terpenoids along with their source, name, chemical structures and biosynthetic pathways.
2	Describe methods of extraction, qualitative & quantitative analysis, historical significance and contribution of alkaloids, terpenoids & resins in modern drug discovery, their currently marketed semisynthetic derivatives.
3	Know the skill of plant materials sectioning, staining, mounting and focusing; decide on staining reagents, draw and label morphological & microscopical diagrams.
4	Perform extractions/ isolations of given drugs, identify unorganized crude drugs using morphological, chemical, physical characteristics, study analytical parameters and judge quality of volatile oils.
5	Handle various equipments as per SOPs (such as spectrophotometer, simple / compound / digital microscope, polarimeter, Abbe's refractometer, hydrodistillation/microwave distillation assembly).
6	Judge the quality of crude drugs by different means and know the significance of same in industry, understand rationale during field visits and prepare brief report for evaluation.

  
P. B. Pawar  
(Subject Hc)

Second Year B. Pharm (2013 Pattern) SEM-IV

**Pharmaceutical Engineering:**

Student should be able to

No.	Course Outcomes
1	Understand molecular diffusion in gases and liquids.
2	Define drying and know the mechanism, COs & factors affecting it, classify and compare various dryers with respect to their applications in pharmacy.
3	Know various heat transfer techniques including their mechanism and applications in pharmacy, define crystallization and illustrate types of crystallizers, evaporation and describe the types of evaporator with their mechanism, instrumentation and applications.
4	Develop an understanding of pharmaceutical engineering by studying advance modules that are relevant to the changing priorities and requirements of the modern pharmaceutical industries.
5	Know product manufacturing, study the principle, COs, mechanism, working and construction of equipments of different unit operations. (Filtration, centrifugation, drying, heat transfer.)
6	Study the different materials used in the pharmaceutical plant constructions, illustrate fundamentals and facts about flow of fluids. Student should able to describe types of distillation, their mechanisms with appropriate diagrams, define drying and classify different types of dryers.

  
Bhanuben D.S.  
Subject I/c.



Third Year B. Pharm (2013 Pattern) SEM-V

**Industrial Pharmacy-I:**

Student should be able to

No.	Course Outcomes
1	Understand the concept of dosage form design & formulation strategies.
2	Understand solid unit dosage form; tablets as a dosage form, physico-chemical principles guiding tablet formulation, various tablet additives, manufacture & evaluation, equipments, defects in tableting & remedies.
3	Learn the concept of tablet coating, its types, pharmacopoeial specifications, techniques & equipments used in tablet coating.
4	Learn the different equipments used in tablet compression, tablet coating and evaluation of tablets.
5	Describe capsules, its types, additives, size selection, manufacturing and evaluation, equipments used in capsule filling and empty gelatin shell formulation and defects.
6	Explain the official standards used in evaluation of tablets and capsules, formulation, evaluation, packaging and labelling of tablets & capsules.

*Dr. Anwar S.P.*  
Sub J/c

**Pharmaceutical Analysis-III:**

Student should be able to

No.	Course Outcomes
1	Learn fundamental of instrumental analysis
2	Learn various sampling techniques, principle, instrumentation & applications of flame photometry, UV-Visible spectrometry, Atomic absorption & Atomic emission spectrometry, fluorometry & turbidometry
3	Determine Sodium, potassium & calcium by using flame photometry.
4	Calculate $\lambda_{max}$ by using wood-ward fisher rule.

*Subject Incharge*  
*P. W.*  
*(P. W. S. D.)*

Third Year B. Pharm (2013 Pattern) SEM-V

**Medicinal Chemistry-I:**

Student should be able to

No.	Course Outcomes
1	Understand significance and establish relevance of Medicinal Chemistry in Pharmaceutical Sciences.
2	Establish correlation of physicochemical properties affecting drug action and pharmacokinetics.
3	Explain general aspects of the design & development of drugs including classification, nomenclature, structure activity relationship, mechanism of action, adverse effects, therapeutic uses and recent developments in diuretics and drugs acting on cardiovascular and autonomic nervous system.
4	Learn salt formation of NCEs/drugs
5	Learn reactions like condensation, benzylation
6	Learn purification techniques like recrystallization

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**Pharmacology-II:**

Student should be able to

No.	Course Outcomes
1	Able and Endocrine system.
2	explain commonly used instruments in experimental pharmacology. Care and handling of common laboratory animals, animal welfare and introduction of CPCSEA, OECD and its guidelines.
3	explain animal physiology, various routes of drug administration, anaesthetics and techniques of Euthanasia, PSS, various methods for collection of blood, body fluids and urine sample from experimental animals.
4	explain computer simulations of experiments through computerized simulated software programme using software such as X-Pharma, X-cology etc.
5	Perform Bioassays, Synergism and Antagonism effects of Acetylcholine and Histamine using suitable isolated tissue preparations.

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H. L. Doshi  
(S.I.)



Third Year B. Pharm (2013 Pattern) SEM-V

**Analytical Pharmacognosy & Extraction Technology:**

Student should be able to

No.	Course Outcomes
1	Comprehend & explain principle of extraction, effect of various factors, specific care in herbal material & various approaches in extraction processes, methodological steps & applications & qualitative chemical tests & report yield.
2	Understand & explain principle & applications of chromatographic & nonchromatographic separation methods.
3	Apply theoretical knowledge of various quality control parameters studied in theory; explain significance of use of various chemicals and conditions; undertake various estimations; infer from results obtained & report evaluation results.
4	Generate micrometric data & identify the crude drugs.
5	handle various equipments as per SOPs & learn various demonstrations (of experiments). Understand meaning & significance of 'Good Laboratory Practices' learn in theory & demonstrate through laboratory behavior.
6	Listen carefully, raise logical query, draw information, understand rationale during field visits & prepare brief report for evaluation.

*Dr. S.N. Lypre*  
Sub I/C

**Pharmaceutical Business Management & Disaster Management:**

Student should be able to

Course	Course Outcomes
1	Understand the fundamental of management theories.
2	Learn the Pharmaceutical business and management strategy.
3	Gain knowledge of marketing research, product management.
4	Learn about human resource and development needs.
5	Learn about the disaster management and preparedness, mitigation.


*Dr. D. S. Bhambere*  
(Subject I/C)

Third Year B. Pharm (2013 Pattern) SEM-V

**Active Pharmaceutical Ingredients Technology:**

Student should be able to

No.	Course Outcomes
1	Know overview of Active Pharmaceutical Ingredients (API) and fine chemical industry.
2	Understand basics of chemical process kinetics, some classes of reactions with examples of API for each unit process.
3	Understand process of synthetic routes and optimization of reactions, raw material & reagent selection, scale up techniques for APIs, Quality control aspects, material safety data sheet.
4	Explain principle, industrial process, scale up techniques, Industrial manufacturing process, flow charts of some important APIs.
5	Explain Chirality in API industry with some examples.
6	Know Quality assurance and quality control of APIs and GMP Guidelines in API manufacturing like ICH Q7, Q7A and Q11

  
Dr. S. Kulkarni  
(Subject in Charge)



Third Year B. Pharm (2013 Pattern) SEM-VI

**Industrial Pharmacy-II:**

Student should be able to

No.	Course Outcomes
1	Explain disperse systems, its classification, theories of disperse systems, thermodynamic v/s kinetic stability considerations.
2	Explain suspensions, types, formulation development, manufacturing, excipients used, evaluation of suspensions.
3	Explain emulsions, their physico-chemical properties, theory of emulsification, formulation & evaluation of emulsions and instabilities of emulsions
4	Explain semi-solids, anatomy & physiology of skin, selection of bases; penetration enhancers, formulation development and percutaneous absorption

*Dr. Anil S.P.  
Sub FIC*

**Pharmaceutical Analysis-IV:**

Student should be able to

Course	Course Outcomes
1	learn principle, instrumentation and applications of thermal, X-ray diffraction and radiochemical techniques employed in the analysis of APIs and formulations
2	With Analytical method validation, handle QC data and implement the principle and theory of method validation in routine validation procedures as per ICH and USP guidelines. Know the calibration and its importance, gain thorough knowledge of IQ, OQ, PQ related to the calibration and performance verification of analytical instruments.
3	Gain knowledge about theory and principle of chromatography and come to know the different chromatographic techniques with their implementation.
4	Operate and calibrate UV-VIS spectrophotometer for assay of various APIs and formulations and perform analytical method validation using UV-VIS spectrophotometer
5	Prepare and activate TLC plates, prepares samples for chromatographic analysis.
6	Process, interpret the data obtained through experimentation and report the results as per regulatory requirements

*Subject Incharge  
Patil  
(Patil S.O.)*

Third Year B. Pharm (2013 Pattern) SEM-VI

**Medicinal Chemistry-II:**

Student should be able to

No.	Course Outcomes
1	Learn generalised aspects of the design and development of few classes of drugs; Local anesthetics, Oral Anti-hyperglycemics and drugs acting on Central nervous system.
2	Learn classification, nomenclature, SAR and MOA few classes of drugs; Local anesthetics, Oral Anti-hyperglycemics, Diagnostics and drugs acting on Central nervous system.
3	Learn detail fate of drugs and xenobiotics metabolism, particularly toxic metabolites or bioactivation (prodrugs) and significance in drug discovery.
4	Learn planning and synthesis of compounds via few reaction like; Schotten-Bowman Reaction, oxidation, Esterification reaction, Benzillic acid rearrangement, Diazotization.
5	Learn purification of synthesized compounds which is one of the important aspect of synthesis.
6	Know that different solvents may contain impurities and or stabilizer; hence solvents is therefore necessary to be purified for synthetic as well analytical purposes.

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 sub. analysis

**Pharmacology-III:**

Student should be able to

No.	Course Outcomes
1	Explain pharmacology of drug for following diseases/ disorders: Central nervous system, Non-steroidal anti-inflammatory drugs, Rheumatoid Arthritis, Osteoarthritis, Gout, Respiratory tract and Gastrointestinal tract disorders
2	Demonstrate Matching bioassay, Bracketing bioassay, Interpolation bioassay method of Acetylcholine and Histamine using suitable isolated tissue preparations
3	Demonstrate analgesic activity of drugs using Eddy's hot plate analgesiometer, Locomotor activity of drug using actophotometer and muscle relaxant property using Rotarod.

*Handwritten note:*  
 H.L. Dolkh  
 (SI)



Third Year B. Pharm (2013 Pattern) SEM-VI

**Natural Product Chemistry:**

Student should be able to

No.	Course Outcomes
1	Understand & explain various physical, chemical, spectroscopic means and methods used in structural elucidation of natural products, interpret data generated from above techniques.
2	Understand and explain tools and techniques used in study of biosynthetic pathways in plants.
3	Explain source, chemistry and applications of drugs from marine origin, compare and contrast marine & terrestrial sources of medicinal materials.
4	Explain difficulties in elucidation of biosynthetic pathways in plant and explain approaches used with their merits and demerits.
5	Understand and explain underlying reasons as why natural products are appropriate material in discovering new drugs, also explain their contribution in modern drug discovery. Explain isolation, detection, characterization of natural products.
6	Explain source, extraction, processing, chemistry and applications of natural products used in pharmaceutical and allied industry such as coloring and sweetening agents.

*Dr. S. N. Surve*  
Sub J/C

**Bioorganic Chemistry & Drug Design:**

Student should be able to

No.	Course Outcomes
1	Understand the significance of Bioorganic Chemistry and establish its relevance in drug design and discovery.
2	Explain approaches in rational drug design.
3	Understand various drug targets, their biochemical features, physiological and pathophysiological roles and significance in drug design.
4	Explain biotransformation of pro-drug design aspect in drug design.


*B. A. Bhairav*  
(subject J/C)

Third Year B. Pharm (2013 Pattern) SEM-VI

Pharmaceutical Biotechnology:

Student should be able to

No.	Course Outcomes
1	Learn the basic functions of the elements of molecular biotechnology and pharmaceutical applications.
2	Explore scientific and biotechnological methods to create and develop innovative drugs.
3	Know the method of genetic engineering for production of rDNA products including monoclonal antibodies.
4	Know the information about the application of genetic engineering in animals.
5	Have a knowledge of enzymes and their uses by immobilization.
6	Illustrate use of Fermenter for production of fermentation products and information.

  
Dr. R.S. Kankate  
(Subject etc)




Final Year B. Pharm (2013 Pattern) SEM-VII

**Sterile Products:**

Student should be able to


No.	Course Outcomes
1	Learn preformulation, general requirements, packaging materials used, types, choice of containers, official quality control tests and methods of evaluation for sterile products.
2	Describe the GMP-Design of Parenteral Production Facility including layout of Production Facility, environmental control zones, heating ventilation air conditioning (HVAC), HEPA
3	Explain classification, formulation principle, processing, manufacturing and Quality control of SVP, types and selection of excipients, special types of SVPs and Pilot plant scale up.
4	Explain classification, formulation principle, processing, manufacturing and Quality control of LVP, types and selection of excipients, special types of LVPs such as Parenteral Nutrition, intravenous admixture, Peritoneal dialysis fluid and Pilot plant scale up.
5	Describe classification, general requirements, formulation, and evaluation of ophthalmic product along with contact lens and lens care products
6	Understand the basic concept of Blood Products and Surgical Dressings

  
Dr. N. A. Thombre  
Subject IIC

**Pharmaceutical Analysis -V:**

Student should be able to

No.	Course Outcomes
1	Understand principle, instrumentation of IR (including FTIR, NIR and Raman spectroscopy) with their applications
2	Understand the principle, instrumentation of chromatographic techniques like, gas chromatography, flash chromatography, supercritical fluid chromatography with their applications. atomic emission spectroscopy, electron microscopy with their applications
3	Learn the principle and instrumentation of atomic emission spectroscopy, electron microscopy and their applications
4	Record and interpret the IR spectra for compounds containing different functional groups.
5	Acquire skill for quantification of two drugs in formulations by simultaneous equation method and Q-method.
6	Understand and learn appropriate safety measures while handling instruments, chemicals and apparatus.

  
Dr. S. S. Sawane  
(Subject IIC)



Final Year B. Pharm (2013 Pattern) SEM-VII

**Medicinal Chemistry – III:**

Student should be able to

No.	Course Outcomes
1	Know general aspects of classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as NSAIDs, steroidal anti-inflammatory drugs, narcotic & non-narcotic analgesics, antipyretics, autacoids
2	Know general aspects of classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in therapeutic categories such as drugs acting on respiratory & GI tract
3	Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.
4	Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory.
5	Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography
6	Interpret the spectral characterizations made by IR and <sup>1</sup> H-NMRs of synthesized compounds.

*[Signature]*  
D.D. Rishipathole  
(subject t/c)

**Natural Drug Technology:**

Student should be able to

No.	Course Outcomes
1	Understand & explain various issues in standardization of herbal material, Comprehend & explain various factors affecting on level of secondary metabolites; post harvesting manipulations, and changes during storage; guidelines issued by WHO in relation with cultivation, collection, storage etc
2	Understand & explain concept of health & pathogenesis, philosophical basis, diagnosis & treatment aspects of Ayurveda, Unani, Siddha & Homoeopathic system of medicine; Understand & explain method of preparation of Ayurvedic dosage forms
3	Significance of novel drug delivery of natural products; Explain & classify natural products used as dietary supplements; natural pesticides; herbs used in cosmetic preparation & methods of their formulations
4	Explain source, extraction, processing, chemistry & applications of natural products used in pharmaceutical & allied industry such as bioavailability & skin permeation agents; wound healing agents, biofuels.
5	Perform Preparation of herbal formulations and evaluation of it and marketed preparations, in-vitro assays and preformulation studies
6	Handle various equipments as per SOPs & learn various demonstrations

*[Signature]*  
Dr. S.N. Suresh  
sub t/c.



Final Year B. Pharm (2013 Pattern) SEM-VII

**Pharmacology-IV:**

Student should be able to

No.	Course Outcomes
1	Get in-depth knowledge about pharmacology and pharmacotherapy of drugs used in infectious diseases and Cancer
2	Understand the Pharmacology of drugs acting on cardiovascular System, Kidneys and immune system etc.
3	Understand the involvement of oxidative stress and role of antioxidants along with some safety issues in pharmacology
4	Understand the importance of isolated preparation, mechanism of action of drugs on isolated tissues, expertise in performing bioassay of drugs.
5	Analyze the rational and irrational fixed dose combinations based on various parameters.
6	Understand the prescription pattern and rational use of drugs by performing case study or doing hospital visit.

**Biopharmaceutics & Pharmacokinetics:**

Student should be able to

No.	Course Outcomes
1	Gain knowledge on New designs of drug dosage forms based on pharmacokinetics and pharmacodynamic behavior of drug can be planned.
2	Design of dosage regimen based on the concept of individualization to avoid adverse effects in renal and hepatic failure.
3	Understand Modifications in the pharmacokinetic profile, drug targeting and time and conditions based release predictions could be helpful to avoid adverse effects and to achieve maximum beneficial effects of drug.
4	Know Clinical significance of bioavailability and bioequivalence, Bio waivers, bio-similar can be drawn.
5	Know Technical knowledge on Dissolution profile comparison, dissolution method development, kinetic release patterns and predictions of drug and dosage form behaviour.
6	Explain Mathematical and theoretical predictions of drug behaviour in body based on calculations applied.

*P.B. Uslavant*  
Subject = IC

*Dr. Deshpande*  
Subject = IC

Final Year B. Pharm (2013 Pattern) SEM-VII

**Pharmaceutical Jurisprudence:**

Students will be able to

No.	Course Outcomes
1	Understand the Basic principles, purpose and dimensions of the laws; understand the significance and relevance of Pharmaceutical laws in India
2	Know the Important rules and regulations and procedures made to execute the laws; discuss the purpose of the Board and To explain the definitions in the Act;
3	Understand the Learner knowledge about Patents, procedure for patent application and IPR.; understand the regulatory system for safety and effectiveness of medicine and quality of product
4	Describe the qualifications for membership and the make-up of the Board; explain the rule-making authority of the Board;
5	Discuss the responsibilities of the Board; and To discuss inspections by the Board or its representative
6	Learn the various laws governing the manufacturing, sale, research & usage of drugs; understand significance of Schedule M and Schedule Y related Manufacturing & clinical trials; know the Identify potential fraud and abuse legal issues of narcotic & psychotropic substance; study quality & prices of essential medicine

  
Dr. M. P. Achil



Final Year B. Pharm (2013 Pattern) SEM-VIII

**Advanced Drug Delivery System:**

Students will be able to

No.	Course Outcomes
1	Express fundamental concept of Modified drug release with various approaches and classification.
2	Describe classification, types including environment responsive polymers, parameters affecting selection of polymers, application and examples.
3	Explain, merits, demerits, and application of fundamental concept of Novel Drug Delivery Systems.
4	Understand concept of microencapsulation, merits, demerits, types, preparation method and application.
5	Perform formulation and processing of therapeutic aerosols including recent advances, fundamentals, formulation design and stability, manufacturing techniques, product evaluation will be understood by the students.
6	Understand basic concepts and apply optimization techniques in pharmaceuticals and perform optimization of formulations.

**Cosmetic Science:**

Students should be able to:

No.	Couse Outcomes
1	Understand the concepts of cosmetics, anatomy of skin v/s hair, general excipients used in cosmetics, Explain formulation of cosmetics for skin, manufacturing, equipments & evaluation of creams like cold cream, vanishing cream etc. & powder cosmetics.
2	Explain formulation of cosmetics for hair, manufacturing & evaluation of hair shampoos, tonics etc., Describe formulation of cosmetics for eyes, manufacturing & evaluation of eye mascara, shadow etc.
3	Understand formulation of manicure products like nail lacquer, remover etc., Learn formulation, manufacture & evaluation of baby cosmetics like baby oils, powders etc, Explain the concept of cosmeceuticals, history, difference between cosmetics & cosmeceuticals & cosmeceutical agents.
4	State the correct use of various equipments in Pharmaceutics laboratory relevant to cosmetics, Perform formulation, evaluation and labelling of cosmetics like moisturising cream, vanishing cream etc.
5	Perform formulation, evaluation of eye cosmetics, nail lacquer & shampoo, Perform formulation, evaluation & labelling of shaving cream, after shave & baby products.
6	Describe use of ingredients in formulation and category of formulation.

Do <sup>NO</sup> NA Thumble  
subject I/c

  
Bhanu D.S.  
subject I/c.




Final Year B. Pharm (2013 Pattern) SEM-VIII

**Pharmaceutical Analysis-VI:**

Students should be able to:


No.	Course Outcomes
1	Learn the principle, instrument and applications of nuclear magnetic resonance (NMR) spectroscopy, Electron spin resonance (ESR) with their applications
2	Learn the principle, instrumentation and applications of mass spectrometry
3	Understand the principle, instrumentation of chromatographic techniques like, HPLC, UPLC, ion exchange chromatography and capillary electrophoresis with their applications
4	Learn the analytical method validation using HPLC and UV-vis spectrophotometry as per ICH guidelines and USP
5	Study and learn the system suitability test as per IP/BP/USP protocol and to learn the quantitation techniques in HPLC (% area/ area normalization, internal standard and external standard)
6	Learn and understand the interpretation of UV, IR, NMR, MS spectra of simple organic compounds for their structure elucidation

  
Dr. S. S. Sonawane  
(Subject etc)

**Medicinal Chemistry-IV:**

Student should be able to

No.	Course Outcomes
1	Know general aspects of the design & development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in categories such as chemotherapeutic agents, antibiotics.
2	Know general aspects of the design & development of drugs including history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, adverse effects, therapeutic uses and recent developments in categories such as hormones & anti-fertility agents.
3	Synthesize, recrystallize and understand reaction mechanisms involved in synthesis of medicinally important organic compounds.
4	Develop skills involved in thin layer chromatography techniques and purification of synthesized compounds by column chromatography
5	Make correct use of various equipments & take safety measures while working in medicinal chemistry laboratory.
6	Interpret the spectral characterizations made by IR and <sup>1</sup> H-NMRs of synthesized compounds.

  
D. D. Rishipethale  
(Subject etc)



Final Year B. Pharm (2013 Pattern) SEM-VIII

**Pharmacology-V:**

Student should be able to

No.	Course Outcomes
1	Understand various drug-drug interaction, mechanism involved and its predisposing factors.
2	Understand the mechanism of adverse drug reactions, risk factors and pharmacovigilance.
3	Get knowledge about recent development in pharmacology
4	Understand the in vivo and in vitro experiments in experimental Pharmacology.
5	Use of software for the study of preclinical experiments.
6	Know Brief idea about statistics, its applications and how to solve problems using various statistical tests.

*P. B. Udavant*  
P.B. Udavant  
Subject FIC

**Quality Assurance Techniques:**

Student should be able to

No.	Course Outcomes
1	Understand significance of quality in pharmaceutical manufacturing.
2	Understand Current Good Manufacturing Practices.
3	Describe various aspects of documentation, SOPs and records.
4	Elaborate on the role of validation in assurance of quality in pharmaceutical industry.
5	Understand about quality by design.
6	Understand ICH guidelines in stability testing and QMS.


*Dr. Deobhai G.*  
Dr. Deobhai G.  
Subject FIC.

Final Year B Pharm (2013 course) SEM-VIII

**Natural Products: Commerce, Industry & Regulations:**

Student should be able to

No.	Course Outcomes
1.	Explain the significance of natural products in daily life. He/she should be able to classify different segments in market, demand & supply position; export & import potential; position of Indian herbal drug industry in global contest; government organizations & policies for promotion; their regulation in India & other countries, various regulatory guidelines, ethical issues etc.
2.	Realize the market potential of natural products & explore entrepreneurship skills to grab these opportunities.
3.	Explain safe use of natural products, possible toxicities & interaction
4.	Explain need & significance of pharmacovigilance systems; WHO guidelines in this regard.

  
Mr. P. B. Pawar  
(Subject In-charge)