INSTITUTE OF PHARMACY

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NAAC CRITERIA 02: Teaching-Learning and evaluation

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Course Outcomes (COs)

CONTENTS

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2018 course) SEM-I

Pharmaceutics- I:

Student should be able to

No.	Course Outcomes
1	Know the history of profession of pharmacy
2	Understand the basics of different dosage forms,
3	Know Pharmacopoeias and their development
4	Understand Pharmaceutical incompatibilities and pharmaceutical calculations
5	Understand the professional way of handling the prescription
6	Prepare various conventional dosage forms

Mr. U.D. Laddha

Pharmaceutical Analysis- I:

Student should be able to

No.	Course Outcomes
1	Understand the fundamental concept of analytical chemistry and principles of electrochemical analysis of drugs
2	Learn the concept and principles of volumetric and electrochemical analysis
3	Understand the correct use of various principle of data treatment and data handling in Pharmaceutics laboratory
4	Perform pharmaceutical calculations to determine volumetric and electrochemical titrations.
5	Study fundamental aspects of qualitative & quantitative analysis.
6	Understand the Standardisation & assay procedures for pharmaceutical components including principle and procedure used in aqueous, non-aqueous, precipitation, complexometric, Redox titration methods.

D.D. Rajhipathak

MET's Institute of Pharmacy ★ Bhujbal Knowledge City ★ ADGAON, NASIK - 3

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2018 course) SEM-I

Pharmaceutical Inorganic Chemistry:
Student should be able to

No.	Course Outcomes
1	Able to explore Pharmacopoeia
2	Determine the impurities in inorganic drugs and pharmaceuticals
3	Understand the medicinal and pharmaceutical importance of inorganic compounds
4	Estimate the role of buffers in pharmaceutical system.
5	Explain the Functions of major physiological ions
6	Understand the pharmaceutical application of radioactive substance

Patil.
Mr. S. D. Patil

Human Anatomy & Physiology-I:
Student should be able to

No.	Course Outcomes
1	Recall the basic anatomical terminologies.
2	Understand the anatomy, physiology and functions of various organs and organ system of the human body.
3	Explain the disorder of various organ system.
4	Describe the various homeostatic mechanism.
5	Determine the blood cells count and haemostatic parameter.
6	Estimate the cardiovascular parameter. (Blood pressure, Heart rate and pulse rate)

Ms. N. L. Deshpande.

MET's Institute of Pharmacy ADGAON NASIK-3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2018 course) SEM-II

Pharmaceutical Organic Chemistry-I:
Student should be able to

No.	Course Outcomes
1	Write the structure, name and type of isomerism of organic compounds
2	Write the reaction , name the reaction and orientation of the reaction
3	Account for reactivity and stability of compounds
4	Identify and conform the identification of organic compounds

Dr-S-S-Chhajed.

Human Anatomy & Physiology –II:
Student should be able to

No.	Course Outcomes
1	Explain the gross morphology, structure and functions of various organs of the human body.
2	Identify the various tissues and organs of different systems of human body.
3	Recall the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
4	Perform respiratory function test and record the body temperature and BMI.
5	Demonstrate reflex activity, visual acuity, and olfactory function.
6	Remember Family planning devices and pregnancy diagnostic test

Mrs- M-C-Dashpuhre

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2018 course) SEM-II

Biochemistry:

Student should be able to

No.	Course Outcomes
1	Know the scope of Biochemistry in Pharmacy& role of biochemical processes in cell metabolism; the concept of bioenergetics like free energy, enthalpy, entropy and energy reach compounds
2	Understand chemistry, function, classification, biological importance, qualitative tests & applications of various bio-molecules. e.g. Carbohydrates, lipids, amino acids, proteins and nucleic acids
3	Know the enzyme types, structures, their functions, mechanism for enzymatic activity, enzyme inhibition and applications of enzymes.
4	Understand different biochemical metabolism like carbohydrate, lipid, amino acid and nucleic acid metabolism, their location, function, diseases and bioenergetics of respective metabolism.
5	Identify carbohydrates, proteins, unwanted constituents in urine and blood glucose by various qualitative as well as quantitative chemical tests.
6	Separate, identify and characterize proteins from various samples ; Study the enzymatic hydrolysis, effect of different temperature, pH, substrate concentration on enzyme activity and standard curve determination by various colour reactions.

Patil
Mr. S. D. Patil

Pathophysiology:

Student should be able to

No.	Course Outcomes
1	Remember basic principles of Cell injury and Adaptation.
2	Explain the types and mechanism of inflammation.
3	Classify and enlist the etiology of various diseases.
4	Recall the signs diagnostic test and symptoms of the diseases.
5	Understand pathophysiology and complications of the diseases
6	Define various basic terminologies in pathophysiology

Dr. P. B. Udavant

MET's Institute of Pharmacy ADGAON NASHIK Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik
Second Year B Pharm (2018 course) SEM-III

Physical Pharmaceutics-I:

Student should be able to

No.	Course Outcomes
1	Understand the mechanism of solubility and interaction between solute and solvent along with various factors affecting solubility
2	Know various properties of solute that can affect development of dosage form
3	Understand the concept of surface tension and interfacial phenomenon along with its correlation in development of pharmaceuticals and working of surfactants
4	Know the concept of protein-drug complex formation and its application
5	Be Aware of concept of pH- buffered system, isotonicity and its practical applications.

Mr. UD Laddha

Pharmaceutical Microbiology& Immunology:

Students should be able to

No.	Couse Outcomes
1	Understand methods of identification, cultivation and preservation of various microorganisms. Staining methods and isolation of pure culture of micro-organisms.
2	Use of different equipments and processing, used in experimental microbiology
3	Understand the importance and implementation of sterilization in pharmaceutical processing and industry. Sterilization of glassware, preparation and sterilization of media.
4	Learn sterility testing of pharmaceutical products and Microbiological assay of antibiotics
5	Carry out microbiological standardization of Pharmaceuticals. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations. Motility determination, Bacteriological analysis of water and Biochemical test.
6	Understand the cell culture technology and its applications in pharmaceutical industries.

Dr. D. S. Bhambare.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2018 course) SEM-III

Pharmaceutical Organic Chemistry-II:

Student should be able to

No.	Course Outcomes
1	Write the structure, name, uses and type of the organic compound
2	Write the reaction, name the reaction and orientation of reactions
3	Explain reactivity of organic compounds /stability of compounds
4	Perform synthesis of organic compounds
5	Explain the chemistry of fats and oils and the significance of and principle involved in analytical constant determination
6	Explain general methods of preparation and reactions of some organic compounds like Benzene, phenols, aromatic amines and acids.

Dr. R.S. Kankate.

Pharmaceutical Engineering:

Student should be able to

No.	Course Outcomes
1	Know various unit operations used in Pharmaceutical industries.
2	Understand the material handling techniques.
3	Perform various processes involved in pharmaceutical manufacturing process.
4	Carry out various test to prevent environmental pollution.
5	Appreciate and comprehend significance of plant lay out design for optimum Use of resources.
6	Appreciate the various preventive methods used for corrosion control in Pharmaceutical Industries

Mr. S.B. Ugale.

MET Institute of Pharmacy ADGAON NASIK-3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2015 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 Compendia.
2	Understand Concept of drug and dosage forms. Various solid and liquid dosage forms and excipients required in formulation and evaluation
3	Understand Concept of Preformualtion, aspects of bulk drug characterization, solubility and stability studies
4	Know History and general principles of alternative system of medicines

Bhavkar D.S.
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

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2015 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.

R. S. Ahire
(Subject IIC)

Pharmaceutical Organic Chemistry I:

Student should be able to

No.	Course Outcomes
1	Clarify different reagents in Organic Reactions and explain different Reaction Intermediates & their application in reaction mechanism.
2	Explain the factors affecting strength of acid & base.
3	Comprehend & explain how Addition & Elimination Reactions are performed with respect to Alkenes and alkynes.
4	learn planning and synthesis of NCEs
5	learn purification and physical constants recording
6	learn different chemical tests required for qualitative analysis

Dr. S. S. Chhajed.
(Subject IIC)

First Year B Pharm (2015 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

M. L. Dalbhide
(CSI)

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.

(CSSD)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2015 course) SEM-II

Pharmaceutics- II:

Student should be able to

No.	Course Outcomes
1	Understand the importance of packaging, packaging materials as well as types of packaging for various dosage forms like liquid, solids and semisolid dosage forms.
2	Understand the significance and concept of unit operations like mixing, filtration, size reduction, size separation required in the processing of finished dosage forms.
3	Understand the principle, construction and working of various equipments used in unit operations like mixing, filtration, size reduction, size separation required in the processing of finished dosage forms.
4	Understand the importance of Good manufacturing practices (GMP) described as per schedule M.
5	Understand the concept of Bioavailability and bioequivalence. Concepts and mechanisms related to absorption, distribution, metabolism and excretion.
6	Understand the various departments in pharmaceutical manufacturing unit. Flow of materials in manufacturing unit by studying plant layout design.

V. D. Laddha
(Sub. I/C)

Dosage Form Design:

Student should be able to

No.	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	Know Evaluation parameters for liquids include organoleptic properties.

S. P. Kalkad.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2015 course) 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

Dr. S.S. Chhajed
(Subject HOD)

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, cooks arneth Index and osmotic fragility count.

H.L. Pohl
(SI)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

First Year B Pharm (2015 course) 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	Understand 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. Supe
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

Patil S.S

Second Year B Pharm (2015 course) SEM-III

Physical Pharmaceutics-I:

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.

U.D. Ladekar
(Sub. I/C)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-III

Pharmaceutical Microbiology& Immunology:

Students should be able to

No.	Couse Outcomes
1	Classify microbes into various categories and aware about historical developments and contributions of scientists in the field of microbiology. Students should know the recent advances in microbiology, compare and contrast the various structural features, biology & characteristics of microbes, know the modes of reproduction in bacteria, growth characteristics, requirements and illustrate use of microorganism in pharmacy.
2	Demonstrate various basic aspects of immunology like microbial virulence, defense mechanism antigen, and antibody. Antigen- antibody reactions and their application. know the application, production and quality control of vaccines and seras.
3	Identify the causes and basis of microbial spoilage, the sources & types of microbial contamination, an importance of microbial limit tests, preservative efficacy test & standardization processes.
4	Know Mechanism of action and effectiveness of various sterilization processes, know the sterility testing as per I.P. and its importance, Classify disinfectants & be able to illustrate mechanism of action & its evaluation.
5	Explain the principle, construction and working of various instruments and perform their operations, handle microscope for observation of microbes. Student should able to learn how to prepare and sterilize nutrient broth, nutrient agar, slants, stabs and plates, adopt the skills required for maintaining strictly aseptic condition while inoculation and handling microbes.
6	Perform isolation and inoculation microorganism by streak plate technique & count them by pour plate technique, observe motility of bacteria, identify morphology bacteria by simple staining, negative staining & Gram staining, determine minimum inhibitory concentration by broth dilution method, should perform antibiotic assay.

S.P. Kakad.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-III

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	Clarify mechanism and applications of rearrangement of electron deficient & electron rich systems.
3	Comprehend & explain basic concepts in pericyclic reactions.
4	Understand the chromatographic techniques in organic chemistry.
5	Understand the principle behind various qualitative tests and analyze the given unknown binary organic compounds having different functional groups.
6	Explain synthesis recrystallisation, filtration and precipitation techniques of organic compounds along with reaction & mechanism.

(Dr. R.S. Kookate)

Pharmaceutical Biochemistry:

Student should be able to

No.	Course Outcomes
1	Know the scope of Biochemistry in Pharmacy& role of biochemical processes in cell metabolism
2	Know the enzyme structures, their functions, mechanism for enzymatic activity and applications of enzymes.
3	Understand chemistry, function, classification, biological importance, qualitative tests & applications of various bio-molecules. e.g. proteins, carbohydrates, lipids, nucleic acids and vitamins
4	Understand types, their structures, biochemical functions & importance of fat-soluble and water-soluble vitamins
5	Identify proteins, amino acids and carbohydrates by various qualitative as well as quantitative chemical tests.
6	Separate, identify and characterize proteins from various samples like egg, milk, etc and understand principle behind the technique.

Subject Incharge

Patil S.D.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-III

Pharmacology – I:

Student should be able to

No.	Course Outcomes
1	Know the basics of pharmacology like history, scope &, general principles
2	Understand the nature and sources of drugs and route of drug administration
3	Know the process of drug discovery and development
4	Understand pharmacokinetic and pharmacodynamics of drugs
5	Understand receptor, drug receptor interaction, drug toxicity, drug interaction and adverse drug reactions
6	Know basic principles of drug therapy for Pediatrics, geriatrics and Pregnant as well as lactating Women

P.B. Udavant

Subject I/c

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-III

Pharmacognosy & Phytochemistry–I:

Student should be able to

No.	Course Outcomes
1	Explain meaning & significance of Pharmacognostic parameters & Pharmacognostic study of crude drugs.
2	Explain primary and secondary metabolites, to identify drugs with qualitative and quantitative parameters.
3	Identify unorganized crude drugs & samples of powders of organized & unorganized crude drugs using morphological, chemical, physical & microscopical characteristics.
4	Conduct extractions/isolations & explain significance of use of various chemicals & physical conditions.
5	Identify the parts of plants from its morphological & microscopical features by applying experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.

mr. P.B. Pawar
(Subject Hc)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-IV

Physical Pharmaceutics-II:

Students should be able to

No.	Couse 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.

(U.D. Laddha)
(Sub. I/C)

Pharmaceutical Organic Chemistry-IV:

Students should be able to

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

Dr. R.S. Kokate
(Subject Incharge)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-IV

Pharmaceutical Analysis-II:

Students should be able to

No.	Couse Outcomes
1	Understand the basic principles, instrumentation and applications of various analytical techniques mentioned below which are used in Pharmaceutical industry for quality control of chemicals, drug intermediates, APIs, excipients, Pharmaceutical formulations and cosmetic products.
2	Independently operate and calibrate various analytical instruments for the separation/isolation and assay of various chemicals, drug intermediates, APIs and formulations as per Pharmacopoeial standards.
3	Independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
4	Take appropriate safety measures while handling instruments, chemicals and apparatus.
5	Demonstrate the required level of professional competence in the planning, conducting, evaluation and reporting of the results of investigations, including the appropriate use of literature and secondary data.
6	Understand the basic principles, instrumentation and applications of various analytical techniques mentioned below which are used in Pharmaceutical industry for quality control of chemicals, drug intermediates, APIs, excipients, Pharmaceutical formulations and cosmetic products.

S. D. Patil
(Subject I/C)

Pharmaceutical Engineering:

Students should be able to

No.	Couse Outcomes
1	Student should able to understand molecular diffusion in gases and liquids.
2	Student should able to define drying and know the mechanism, COs & factors affecting it classify & compare various dryers with respect to their applications in pharmacy.
3	Student should able to know various heat transfer techniques including their mechanism and applications in pharmacy, define crystallization and illustrate types of crystallizers, know about evaporation and describe the types of evaporator with their mechanism, instrumentation and applications.
4	Student should able to 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	Student should able to foster the knowledge of product manufacturing, study the principle, COs, mechanism, working and construction of equipments of different unit operations. (Filtration, centrifugation, drying, heat transfer.)
6	Student should able to 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.

D. S. Bhamare
Subject I/C.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-IV

Pharmacognosy & Phytochemistry–II:

Student should be able to

No.	Course Outcomes
1.	Explain underlying reason of evolutionary significance of alkaloids formation in plants & other organisms & deduce their significance as medicinal molecules.
2.	Explain & draw basic heterocyclic system present in alkaloids, define & classify alkaloids, explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence in formation of major group of alkaloids; describe methods of their extraction & explain underlying rationale of qualitative & quantitative analysis of alkaloids.
3.	Explain historical significance & contribution of alkaloids in modern drug discovery, & their currently marketed semisynthetic derivatives/ analogues.
4.	Explain source, name & draw chemical structures, identify from the structure, organize the biosynthetic sequence, and describe methods of extraction & underlying rationale of qualitative & quantitative analysis of terpenoids & resins.
5.	Explain historical significance & contribution of terpenoids/ resins in modern drug discovery, & their currently marketed semisynthetic derivatives/ analogues.
6.	Conduct various analytical parameters of volatile oils & judge the quality of volatile oil

Mr. P.B. Pawar
(Subject I/C)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Second Year B Pharm (2015 course) SEM-IV

Pathophysiology and Clinical Biochemistry:

Students should be able to:

No.	Couse Outcomes
1	Understand the biochemical mechanisms and pathophysiological processes responsible for common biochemical disorders
2	Understand the role of clinical biochemistry in clinical diagnosis
3	Understand 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 as well as kidney function test for given samples
6	Distinguish the colours while performing various chemical tests like urine analysis

P.B. Udavant
Subject I/C

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2015 Pattern) SEM-V

Industrial Pharmacy-I:

Student should be able to

No.	Course Outcomes
1	Understand the concepts of solid dosage form design & formulation strategies, To Explain tablets as a dosage form, physico-chemical principles guiding tablet formulation, various tablet additives, manufacture & evaluation, equipments, defects in tabletting & remedies.
2	Learn the concept, types, Pharmacopoeial specifications, techniques & equipment's used in tablet coating and to describe capsules, types, additives, size selection, manufacturing & evaluation, equipment, &defects.
3	Understand the correct use of various equipment in Pharmaceutics laboratory relevant to tablets, capsules &coating and Explain formulation, evaluation and labelling of tablets & capsules.
4	Perform pharmaceutical calculations to determine evaluation parameters like Hausner ratio, Heckel plot & Kawakita plot of preparations and to understand rational behind use of formulation ingredients
5	Learn the equipment and apparatus needed for the preparation as per SOP.
6	Select the suitable packaging material (container-closure) for the preparation.

Dr. Aniwas S.P.
Sub I/c

Pharmaceutical Analysis –III:

Students should be able to:

No.	Couse Outcomes
1	Learn the different types of instrumental analytical techniques available for quality control of APIs & Pharmaceutical dosage forms.
2	Learn various sampling techniques employed in analysis of solid, semisolid and liquids dosage forms
3	Understand principles, instrumentation and applications of UV-VIS, Flourimetry, Atomic absorption, atomic emission, Spectroscopies, Flame photometry, Phosphorimetry and Nepheloturbidimetry.
4	Learn to independently operate, calibrate various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
5	Learn to independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
6	Learn safety measures while handling instruments, chemicals and apparatus.

Subject Incharge
Patil S.D.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik
Third Year B. Pharm (2015 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 drugs acting on cardiovascular and autonomic nervous system.
4	learn salt formation of NCEs/drugs
5	learn reactions like condensation, benzoylation
6	learn purification techniques like recrystallization

Pharmacology-II:

Student should be able to

Course	Course Outcomes
1	Explain the Neurotransmitters involved in the autonomic nervous system, there synthesis, metabolism, various adrenoreceptors and cholinoceptor, their subtypes and the clinical spectrum of their general and selective agonist and antagonist.
2	Explain the agents that stimulate cholinergic and adrenergic agonists and antagonists, also essential pharmacotherapy and pharmacological features of common and important drugs used in cardiovascular diseases respiratory and renal disorders.
3	Explain commonly used instruments in experimental pharmacology. Care and handling of common laboratory animals, animal welfare and introduction of CPCSEA and its guidelines.
4	Explain animal physiology, various routes of drug administration, anesthetics employed for animals and techniques of Euthenesia, physiological salt solutions, drug solution and use of molar and various methods for collection of blood, body fluids and urine from experimental animals.
5	Perform isolated experiments using various isolated preparation and the effects of different drugs on the concentration response curves.
6	Explain computer simulations of following experiments using suitable computerized simulated software effect of various drugs on heart rate, blood pressure in heart, effect of various drugs on rabbit eye.

M.L. Dalhat (SI)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2015 Pattern) SEM-V

Analytical Pharmacognosy & Extraction Technology:

Students should be able to:

No.	Couse 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	Able to 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. Surse
sub I/c

Pharmaceutical Business & Disaster Management:

Students should be able to:

No.	Couse Outcomes
1	Nature and purpose of planning, Important steps in planning, types of planning, Planning process, advantages and limitations, Types of objectives, importance of objective
2	Management by objectives, advantages and limitations, Organizational structure, basic principles of organization, departmentalization, delegation, Decentralization, staffing, line& staff organization with respect to production and QC/QA department.
3	Types of decision, Definition and Importance of decision making, Decision making process (explain giving example from pharma industry, Introduction to drug store, Introduction to Hospital.
4	Role of drug store and hospitals related to patient care management, Difference between marketing and selling
5	Channels of distribution, wholesale, retail, departmental, Medical Reps.
6	Disaster Management

Dr. S.N. Surse
sub I/c

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2015 Pattern) SEM-V

Active Pharmaceutical Ingredients Technology:

Students 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. R. S. Kookate

(Subject incharge)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik
Third Year B. Pharm (2015 Pattern) SEM-VI

Industrial Pharmacy-II:
Students should be able to:

No.	Course Outcomes
1	Explain disperse systems, its classification, theories of disperse systems, thermodynamic v/s kinetic stability considerations, to Explain suspensions, types, formulation development, manufacturing, excipients used, evaluation of suspensions etc.
2	Describe emulsions, their physico-chemical properties, theory of emulsification, HLB value & phase inversion temperature, Kraft point, cloud point, excipients, formulation & evaluation of emulsions; cracking, coalescence, stability & stress testing and Explain semi-solids, anatomy & physiology of skin, selection of bases; penetration enhancers, formulation development, Percutaneous absorption, flux measurement & evaluation.
3	Describe layout for manufacturing of suspensions, emulsions & semi-solis asper schedule M and State the correct use of various equipment in Pharmaceutics laboratory relevant to suspensions, emulsions & semi-solids, prepare BMR.
4	Explain & carry out formulation of Suspensions like Calamine lotion, Milk of Magnesia, Paracetamol Suspension, Antacid Suspension & carry out Evaluation. To Formulate emulsions: Liquid paraffin oral Emulsion, Turpentine Liniment, Formulation of Emulsion with HLB Consideration &evaluation
5	Describe use of ingredients in formulation and category of formulation and Prepare semisolids: Pain balm, Antifungal ointment/cream, Medicated Gel, Antiacne preparation, Non staining Iodine ointment with Methyl Salicylate & evaluation.
6	Prepare the labels so as to suit the regulatory requirements.

Dr. Abhinav S.P.
(Subject)

Pharmaceutical Analysis-IV:

Students should be able to:

No.	Course Outcomes
1	Understand principles, instrumentation and applications of various chromatographic, thermal, X ray Diffraction and radio chemical techniques employed for the analysis of APIs and formulations.
2	Learn validation of analytical instruments & methods as per ICH/USP guidelines.
3	Learn to independently operate and calibrate various analytical instruments for the assay of various APIs and formulations as per Pharmacopoeial standards.
4	Learn to independently process, interpret the data obtained through experimentation and report the results as per regulatory requirements.
5	Learn to independently validate UV-VIS Spectrophotometric assay method as per ICH guidelines.
6	Take appropriate safety measures while handling instruments, chemicals and apparatus.

Subject Incharge
Patil S.D.

Third Year B. Pharm (2015 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 and drugs acting on Central nervous system.
2	learn classification, nomenclature, SAR and MOA few classes of drugs:, Local anesthetics 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.

(SSC)
Sub-Incharge

Pharmacology-III:

Students should be able to:

No.	Course Outcomes
1	Explain pharmacology of drug for following diseases/ disorders: Central nervous system, opioid agonist and antagonist, Non-steroidal anti-inflammatory drugs, Rheumatoid Arthritis, Osteoarthritis, Gout and Gastrointestinal tract disorders
2	Record 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 using suitable computerized simulated software programme.

M. L. Dalkhat
(SI)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2015 Pattern) SEM-VI

Natural Product Chemistry:

Students should be able to:

No.	Course Outcomes
1	Understand & explain tools & techniques used in study of biosynthetic pathways in plants; role of natural products in drug discovery
2	Explain source, chemistry and applications of drugs from marine origin, compare and contrast marine & terrestrial sources of medicinal materials.
3	Explain source, extraction, processing, chemistry and applications of natural products used in pharmaceutical and allied industry such as coloring, sweetening agents and natural polymers
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, dietary supplements and natural pesticides
5	Extract & subsequently conduct experiments to derive various physical constants required in characterization of natural products, Charge, elute & gather pure material using column chromatography.
6	Perform the evaluation of isolated phytoconstituents by chemical, chromatographic and spectral means.

Dr. S.N. Surve
Sub I/c

Pharmaceutical Biotechnology:

Students 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. Kookate
(Subject Incharge)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) SEM-VII

Sterile Products:

Students should be able to:

No.	Course Outcomes
1	Learn preformulation, general requirements, packaging materials used, types, choice of containers, devices for administration, 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:

Students 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, high performance liquid chromatography (HPLC), UPLC and to learn various applications.
3	Learn the principle, instrumentation and applications of scanning electron microscopy (SEM) and transmission electron microscopy (TEM)
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 lean appropriate safety measures while handing instruments, chemicals and apparatus.

Dr. S. S. Sonawane
(Subject IIC)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) SEM-VII

Medicinal Chemistry – III:

Students should be able to

No.	Course Outcomes
1	Know the general aspects of design of the drugs, history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, therapeutic uses, adverse effects and recent developments in the antibiotics.
2	Know the general aspects of design of the drugs, history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, therapeutic uses, adverse effects and recent developments in the anti-infective agents
3	Know the general aspects of design of the drugs, history, classification, nomenclature, structure activity relationship (SAR), mechanism of action, therapeutic uses, adverse effects and recent developments in the antineoplastic agents
4	Make correct use of various equipments and take safety measures while working in Medicinal Chemistry Laboratory.
5	Synthesize medicinally important compounds and purify them using column Chromatography and Characterize the synthesized compounds using IR and NMR spectra
6	Purify the solvents using fractional and vacuum distillation and Explain reaction mechanisms involved in synthesis of medicinally important compounds.

D.D. Rajhpathak
(subject Ic)

Natural Drug Technology:

Students should be able to

No.	Course Outcomes
1	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 &Homoepatic system of medicine; Understand & explain method of preparation of Ayurvedic dosage forms
3	Significance of novel drug delivery of natural products;; herbs used in cosmetic preparation & methods of their formulations
4	Understand & explain various physical, chemical, spectroscopic means and methods used in structural elucidation of natural products, interpret data generated from above techniques.
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

Dr. S.N. Supe
Sub Ic

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik
Final Year B Pharm (2015 course) SEM-VII

Pharmacology-IV:

Students 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 Knowledge of Various endocrine hormones, its types, receptors involved and mechanisms involved; understanding the Pharmacology of drugs acting on Endocrine System.
3	Understand Biosynthesis, Secretion, Mechanism of action, Pharmacology of insulin and glucagon and Pharmacotherapy of Diabetes Mellitus.
4	Understand the Use of isolated tissue preparations for bioassay methods.
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.

P.B. Udavant
Subject I/C

Biopharmaceutics & Pharmacokinetics:

Students 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	Understand 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.

Dr. Deokar G.S
Subject I/C.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) SEM-VII

Pharmaceutical Jurisprudence

Students should 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 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

Subject I/c
Dr. Ahirrao S.P.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) 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.

N.P. Thawbre
(Subject I/C)

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.

Bhawbre N.P.
Subject I/c.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) SEM-VIII

Pharmaceutical Analysis-VI:

Students should be able to

No.	Course Outcomes
1	Learn the basic principle and theory of nuclear magnetic resonance with instrumentation and their applications with respect to ^{1}H and ^{13}C NMR
2	Learn the principle, instrumentation and applications of electron spin resonance (ESR) spectroscopy and mass spectrometry
3	Understand the principle, instrumentation and applications of ion exchange chromatography, flash chromatography and supercritical fluid chromatography
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 IIC)

Medicinal Chemistry-IV:

Students should be able to

No.	Course Outcomes
1	Know the general aspects of design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects and recent developments in the Antihistaminics, proton pump inhibitors
2	Know the general aspects of design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects and recent developments in the Serotonergic agents, Autacoids.
3	Know the general aspects of design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects and recent developments in the NSAIDs, analgesics & antipyretics, Narcotic agents, Steroidal Drugs, Hormones.
4	Know the general aspects of design of the drugs, history, classification, nomenclature, SAR, mechanism of action, therapeutic uses, adverse effects and recent developments in the Insulin & Oral Anti-hyperglycemic drugs and Diagnostic agents.
5	Make correct use of various equipments and take safety measures while working in Medicinal Chemistry Laboratory
6	Synthesize medicinally important compounds and purify them, Characterize the synthesized compounds using IR and NMR spectra and Explain reaction mechanisms involved in synthesis of medicinally important compounds

D. D. Rishipathak
(Subject IIC)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 course) SEM-VIII

Pharmacology-V:

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	Know Functioning and role of hospital pharmacy and practice of rational drug therapy and methods of assessment of patient compliance and non-compliance
4	Know the details of Clinical trials, ethics and practice of Good Clinical Practice involved in clinical trials.
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. Wavare
Subject IIC

Quality Assurance Techniques:

Students should be able to

No.	Course Outcomes
1	Learn the significance of quality in Pharmaceutical manufacturing.
2	Understand Role of Regulatory Agencies in deciding Quality Standards.
3	Understand significance of validation in Quality Assurance.
4	Understand significance of following cGMP, GLP and GDP while working in Pharmaceutical industry.
5	Know Significance of the concept of QbD.
6	Understand the importance of calibration and qualifications to maintain the quality standards.

Dr. Deokar Gs
sub Incharge.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B Pharm (2015 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.
5.	Explain Regulation & Patenting aspects of Herbal drugs

Mr. P. B. Pawar
(Subject I/C)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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
(Subject Tc)

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.C
Sub. Incharge

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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

H. L. Dalkhura
(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.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

U.D. Laddha (Sub I/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.

S. P. Kalaval

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. Incharge

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, cooks ameth Index and osmotic fragility count.

H. L. Dalkhat
(SI)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. Surse

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

Patil S.D.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

U.D. Laddha (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.

S.P. Takeel

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 behinds electrophoresis experiment for the separation of proteins by SDS-page method.
6	Estimate quantity of ascorbic acid in a given sample and understood action of salivary amylase on starch.

Patil
S.D. Patil
(Subject IIC)

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-Incharge

Dr. R. S. Kookate

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 I/C

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 I/C)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

J.O. Ladekar (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-spectophotometer, 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.

P.B. Wavgut
Subject I/C

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 incharge

(Dr. R. S. Kaokade)

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

Patil S.D.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 HOD)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

Bhaveen 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 tabletting & 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 H/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, flourometry & turbidometry
3	Determine Sodium, potassium & calcium by using flame photometry.
4	Calculate λmax by using wood- ward fisher rule.

Subject Incharge
Paul
(Paul S.D.)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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, benzoylation
6	Learn purification techniques like recrystallization

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.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.Lyne
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)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. R. S. Kokate
(Subject in charge)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. Ahirrao S.P.
Sub I/c

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 S.D.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

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, Osteoartritis , 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.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. Supe
Sub I/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 I/C)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 HOD)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 lean appropriate safety measures while handing instruments, chemicals and apparatus.

Dr. S.S. Sonawane
(Subject IIc)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 1H-NMRs of synthesized compounds.

D.D. Rishipathak
(subject I/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 &Homoepatic 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

Dr. S.N. Supe
sub I/c.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

P.B. Utavant
Subject I/c

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.

Dr Deokar S.
Subject I/c

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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. Patil

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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.

Dr. N.A. Thawale
Subject I/C

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.

Bhanudas
Subject I/C.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 I/c)

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 ^{1}H-NMRs of synthesized compounds.

D. D. Rajpethale
(Subject I/c)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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
Subject I/C

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 Deokar G
Subject I/C.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

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 HC)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B. Pharm (2008 Pattern)

Pharmaceutics-III

Student should be able to

No.	Course Outcomes
1	Learn preformulation, general requirements, packaging, GMP-Design, Q.C. of SVPs, LVPs, ophthalmic products.
2	Learn and perform (aseptic area) validation of sterilization techniques including basic concepts, types of validation, VMP, equipment; process validation.
3	Explain, merits, demerits, and application of fundamental concept of modified drug release and Novel Drug Delivery Systems.
4	Understand concept of microencapsulation, merits, demerits, types, preparation method and application
5	Understand 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.

Dr. N.A. Thombre
(Subject I/C)

Biopharmaceutics and Pharmacokinetics

Student should be able to

No.	Course Outcomes
1	Understand the concept of biopharmaceutics and its applications in formulation development.
2	Study pharmacokinetic processes and their relevance in efficacy of dosage form.
3	Learn the concepts of bioavailability and bioequivalence studies.
4	Learn various compartmental models and non-compartmental analysis methods.
5	Understand concept and mechanisms of dissolution and in vitro in vivo correlation.
6	Learn Mathematical and theoretical predictions of drug behavior in body based on calculations applied.

Dr Deokar. Cs.
subject I/c.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B. Pharm (2008 Pattern)

Medicinal Chemistry – II

Student should be able to

No.	Course Outcomes
1	Understand the principles of drug design and discovery, the phases of the drug discovery and its significance in Medicinal Chemistry.
2	Understand the Structure activity relationships, mechanism of action, indications and drug interactions of antibiotics, synthetic antibacterials, antimycobacterials, antineoplastic agents, antifungal, antimalarial, antiviral, agents etc.
3	Understand the Structure activity relationships, biological activities, mechanism of action, indications and agonists, antagonists of Steroid hormones, NSAIDs, Opioid analgesics, Antihistaminics, antithyroidal agents.
4	Understand & able to explain basic synthetic schemes of drugs from various therapeutics categories.
5	Make correct use of various equipments and practice safety measures in Medicinal Chemistry laboratory.
6	Do efficiently the synthetic procedures of few drug intermediates or medicinally important compounds including their isolation and purification techniques.

D. D. Rajhpathale
(Subject I/c)

Pharmaceutical Analysis-III

Student should be able to

No.	Course Outcomes
1	Understand instrumentation and applications of *e* IR, NMR, Mass, XRD, AES, ESR, HPLC, GC, SCFC and hyphenated techniques like GC-MS, LC-MS and MS-MS etc.
2	Read, explain and analyze spectral data and implement the same to solve structure elucidation problems.
3	Handle QC data and implement the principle and theory of method validation in routine validation procedures.
4	Perform UV calibration which would make them aware about calibration protocol and test parameters.
5	Perform assay of tablets and determine the label claimed in combined dosage forms using simultaneous and Q absorbance methods.
6	Achieve expertise in data handling of spectral problems and perform structure elucidation of unknown organic compound.

Dr. S. S. Sonawane
(Subject I/c)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B. Pharm (2008 Pattern)

Pharmacology-III

Student should be able to

No.	Course Outcomes
1	Study Introduction to Pharmacology of drugs used in; Cancer treatment, Cardio-vascular system diseases, Kidney diseases. Study Immunopharmacology and principles of Toxicology.
2	Know various aspects of hospital pharmacy like: Hospital drug Policy, Hospital Documentation, Drug distribution in Hospitals, Patient compliance and counseling.
3	Know various types, risk factors and mechanisms of Adverse Drug reactions
4	Learn various types, risk factors and mechanisms of Drug interactions
5	Know of detail of various aspects of clinical research
6	Learn various aspects of Bioavailability, bioequivalence and Therapeutic Drug Monitoring.

P.B. Wavant
Subject I/c

Pharmacognosy III

Student should be able to

No.	Course Outcomes
1	Define, classify and explain Pharmacognostic characteristics, name, draw and identify chemical structures, organize the biosynthetic sequence in formation of major groups, describe extraction methods of alkaloids and flavonoids.
2	Develop the knowledge about regulatory requirement for infrastructure and quality of herbal drugs.
3	Know traditional plants, their uses, ayurvedic formulations and evaluation, marine drugs and herbal cosmetics which are applicable in herbal drug technology.
4	Explain mechanism, preparation and applications of plant allergens and plant allergenic extracts, explain mechanism and examples of herbal toxicity and interaction.
5	Explain scheme for extraction, evaluation and structural elucidation of few important phytoconstituents with instrumentation techniques and design procedure for standardisation of herbal drugs with phytochemical investigation.

Dr. S.N. Sune
Sub I/c

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Final Year B. Pharm (2008 Pattern)

Pharmaceutical Jurisprudence

Student should be able to

No.	Course Outcomes
1	Know regulations governing the Pharmacy profession, activities under the profession and working of different statutory bodies under the regulations
2	Become familiar with various regulatory agencies and their modus operandi for the benefit of the society.
3	Know the processes and requirements for registration of drugs throughout the world.
4	Know different types of intellectual property rights and their benefits for the welfare of individual as well as society at large.
5	Protect the interest of society while conducting professional activities.
6	Learn principles of ethics in professional and social activities.

Dr. M. P. Patil

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2008 Pattern)

Pharmaceutics-II

Student should be able to

No.	Course Outcomes
1	Explain physico-chemical principles, formulation, additives, manufacture & evaluation, equipments, coating and defects in solid dosage forms.
2	Explain the official standards used in evaluation of tablets and capsules, formulation, evaluation, packaging and labelling of tablets and capsules.
3	Describe capsules, its types, additives, size reduction, manufacturing and evaluation, equipments used in capsule filling and empty gelatine shell formulation and defects
4	Explain disperse systems, it's classification, theories of disperse system, thermodynamic vs kinetic stability consideration. Explain suspension, types, formulation development, manufacturing, excipients used, evaluation of suspension
5	Explain emulsion, their physico-chemical properties, theories of emulsification, formulation and evaluation, instabilities in emulsion
6	Explain semisolid, anatomy and physiology of skin, selection of bases, penetration enhancers, formulation development and percutaneous absorption.

Dr. D. S. Bhambere
(Subject I/c)

Pharmaceutical Biotechnology

Student should be able to

No.	Course Outcomes
1	Explore scientific and biotechnological methods to create and develop innovative drugs.
2	Comprehend the knowledge of molecular biology techniques.
3	Learn the basic functions of the elements of molecular biotechnology and pharmaceutical applications.
4	Know of enzymes and their uses by immobilization.
5	Know how In vitro cultivation of cells will solve the problems of source availability of drugs.
6	Understand the gene therapy concept.

Subject incharge

(Dr. R. S. Kokate)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2008 Pattern)

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, benzoylation
6	Learn purification techniques like recrystallization

D. D. Rokhpathak
(subject TLC)

Pharmaceutical Analysis-II

Student should be able to

No.	Course Outcomes
1	Learn various analytical methods including GM,TM with application to understand the advantages & disadvantages of instrumental analysis of various instruments including Atomic absorption &Atomic emission spectrometry, polarography, flourometry & turbidometry
2	Determine RI by Abbe's rectractometer of few oils, flourometric estimation of quinine sulphate & riboflavin by fluorimeter
3	Understand the about chromatography & to learn various chromatographic techniques like TLC, paper & HPTLC.
4	Learn various techniques involved in analysis including DSC,TGA,DTA.

Dr. S.S. Sonawane
(Subject TLC)

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2008 Pattern)

Pharmacology-II

Student should be able to

No.	Course Outcomes
1	explain pharmacology of drug for following system/diseases/ disorders: Autonomic Nervous system, Endocrine system, NSAIDs, Rheumatoid Arthritis, Osteoarthritis , Gout, Respiratory tract and GIT *disorders.*
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 Bioassay of Acetylcholine and histamine using suitable isolated tissue preparation.
6	Demonstrate analgesic activity, locomotor activity, muscle relaxant property, Haloperidol induced catalepsy, sleeping time, anticonvulsant activity, local anaesthetics effects, mitotic and mydriatic effects on rabbit eye.

P.L. Dashput
(CSI)

Pharmacognosy II

Student should be able to

No.	Course Outcomes
1	Identify the biological source, morphology, cultivation, collection, drying, packing, storage, and medicinal well as nonmedicinal uses of medicinal plants containing glycosides, lipids, terpenoids and tannins.
2	Explain general biosynthetic pathway for primary and secondary metabolites with structures and its elucidation techniques.
3	Explain drugs obtained from minerals, enzymes, proteins and, their sources and applications. Define plant pesticides, its classification and sources. Understand the techniques and applications of plant tissue culture.
4	perform plant material sectioning, staining, mounting & focusing; decide on staining reagents required for specific part of plant. Identify the parts of plants from its morphological &microscopical features by applying experimental & theoretical knowledge of morphology & anatomy obtained in theory classes. Draw morphological &microscopical diagrams & able to label component/parts.
5	Identify organised and unorganised drugs in powder forms with the help of microscopical and chemical evaluation techniques
6	Detect adulteration of fixed oils and to perform quality control tests for other herbal drugs.

Dr. S.N. Sune
Sub I/c

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

Third Year B. Pharm (2008 Pattern)

Pharmaceutical Business Management

Student should be able to

No	Course Outcomes
1	Know fundamental concepts of management like planning, forecasting, organising, decision making, communicating, motivating and controlling.
2	Study importance of leadership, interview techniques, presentation skill, group discussion, recruitment, training and performance appraisal.
3	Know about pharmaceutical industry and operation management like clinical research organisation, new drug discovery, product life cycle, quality control, quality assurance and research and development in pharma industry and material management.
4	Understand pharmaceutical marketing including market research, advertising, branding, pricing, pharmaceutical export.
5	Know about industrial relations with Factories act, Labour laws, Industrial Disputes Act, lock outs, strikes, tribunals, trade unions.

Dr. S.N. Surse
(Subject I/C)

Project Work:

Student should be able to

No	Course Outcomes
1	Develop research aptitude.
2	Sharpen communication & presentation skills.
3	Provide exposure to literature survey as well as research methodology.
4	Develop and improve logical, creative, Interpretational and analytical abilities

Dr. S.P. Ahirrao

Dr. S.N. Surse
Sub I/C

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem I)

Quality Control & Quality Assurance

Student should be able to

No.	Course Outcomes
1	Understand the cGMP aspects in a pharmaceutical industry.
2	Understand the importance of documentation.
3	Understand the scope of quality certifications applicable to pharmaceutical industries.
4	Understand the responsibilities of QA and QC departments

Dr. G S Deokar

Quality Assurance Practical I

Student should be able to

No	Course Outcome
1	Understand the concept of analysis of drugs by compendial methods using UV, HPLC, GC, Fluorimetry, Flame Photometry Etc
2	Understand the concepts of Total Quality management, six sigma, Change control, out of specifications, out of trend, Corrective and preventive actions, deviations etc through design of case reports
3	Understand the concept and significance of stability studies
4	Understand pharmaceutical process, in-process quality control and the concept of process capability indices.
5	Understand the concept behind various parameters like solubility, pH,cosolvency, surfactants, Pka ,log P etc during design of dosage form

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Dr. G. S. Deokar

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem I)

Modern Pharmaceutical Analytical Techniques

Student should be able to

No	Course Outcome
1	To learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, spectrofluorometry, flame emission and atomic absorption spectroscopy
2	To learn principle, instrumentation and applications of NMR Spectroscopy, Mass spectrometry
3	To lean the principle and theory of chromatography and study the applications of TLC, ion exchange chromatography, column chromatography, GC, HPLC and affinity chromatography, UPLC and gel chromatography
4	To learn the principle, instrumentation of electrophoresis and study the applications of paper electrophoresis, zone electrophoresis, moving boundary electrophoresis and isoelectric focusing.
5	To learn the principle, working and applications of potentiometry and various thermal methods of analysis.

Dr. S.S. Sonawane

Quality Management System

Student should be able to

No	Course Outcome
1	Understand the quality parameters and quality attribute in Pharmaceutical industry sectors
2	Study and practice the guidelines ISO, NABL and other regulatory agencies student will predicts the current need of changes
3	Provide the idea in the customers' expectations in the quality pharmaceutical product
4	Know the importance of the quality of medicines in the public.
5	The subject will afford methodology in the regulatory body requirements for the import and export pharmaceutical products

MET's Institute of Pharmacy ★ ADGAON, NASIK - 3 ★ Bhujbal Knowledge City

Mr. J. B. Ugale

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem I)

Product Development and Technology Transfer

Student should be able to

No	Course Outcome
1	Understand the new product development process
2	Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D
3	Elucidate necessary information to transfer technology of existing products between various manufacturing place
4	Know the preformulation studies and its application in designing of new dosage forms
5	Understand the documentation, Development report, technology transfer plans

MET's Institute of Pharmacy ADGAON NASIK - 3 Bhujbal Knowledge City

Dr. D. S. Bhamber
subject I/C.

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem II)

Pharmaceutical Validation

Student should be able to

No	Course Outcome
1	Understand the concept of Calibration, Qualification, Validation
2	Understand the Qualification of various equipments and instruments.
3	Understand the concept of process validation of various dosage forms.
4	Understand the concept of analytical method validation for estimations of various drugs.
5	Understand the concept of cleaning validation of equipments employed in manufacture of pharmaceuticals

Dr. G. S. Deokar

Quality Assurance Practical II

Student should be able to

No	Course Outcome
1	Understand the concept of estimation of organic and metallic contaminants coming across pharmaceutical manufacturing by various analytical methods.
2	Understand the concept of calibration, qualification as well as process and analytical method Validation of various dosage forms and drugs respectively
3	Understand the Qualification of various equipments and instruments.
4	Understand the concept of process validation of various dosage forms
5	Understand the concept of cleaning validation of equipments employed in manufacture of pharmaceuticals.
6	Understand the concept of preparation of documents like checklist, design layout case studies etc

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Dr. G. S. Deokar

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem II)

Hazards and Safety Management:

Student should be able to

No	Course Outcome
1	Impart basic knowledge about the environment along with environmental and its allied problems
2	Develop an attitude of concern for the industry environment and ensure safety standards in pharmaceutical industry
3	Provide comprehensive knowledge on the safety management
4	Empower an ideas to clear mechanism and management in different kinds of hazard management system
5	Teach the method of hazard assessment, procedure, methodology to provide safe industrial atmosphere

Dr. S. N. Surse

Pharmaceutical Manufacturing Technology:

Student should be able to

No	Course Outcome
1	Understand the common practice in the pharmaceutical industry developments, plant layout, and production planning
2	Be familiar with the principles and practices of aseptic process technology, non-sterile manufacturing technology, and packaging technology
3	Have a better understanding of principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing
4	Have a better understanding of principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing.
5	Be familiar with The legal requirements and Licenses for API and formulation industries
6	Have a better knowledge of Tablet manufacturing

Dr. Anirrao S.P.
Subject I/c.

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Quality Assurance Techniques) 2018 Pattern (Sem II)

Audit and Regulatory Compliance:

Student should be able to

No	Course Outcome
1	Gain knowledge on the importance of auditing in pharmaceutical preparation
2	Know the various forms of auditing are and how an audit process happens are briefed to the students.
3	Learn preparation of various audit checklist for the auditing.
4	Understand when and what are the areas the auditing to be carried is taught to the student
5	Know the Reporting form of the auditing process is taught to the student.
6	Know practice of the auditing process and reporting process.

Mr. J. B. Ugale.

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem I)

Advanced Medicinal Chemistry
Student should be able to

No.	Course Outcomes
1	Know Stages of drug discovery, lead discovery; biological drug targets (receptors) and artificial enzymes
2	Understand Basic concepts of bioprecursor and carrier linked prodrugs , rationale of prodrug design
3	Know Causes of drug resistance and strategies to combat drug resistance; classical and non- classical analogue design
4	Understand SAR, MOA & synthesis of new generation molecules from antihypertensive, psychoactive, Antihistaminics, COX inhibitors, antineoplastic agents etc.
5	Know the concept of Stereochemistry and drug action; enzyme kinetics and principles of enzyme inhibitors
6	Know Therapeutic values and design of petidomimetics

Dr. D. D. Rishipathak

Pharmaceutical Chemistry Practical I
Student should be able to

No.	Course Outcomes
1	Perform Beckmann rearrangement, Hoffmann rearrangement Mannich reaction
2	Carry out experiments based on UV spectrophotometer, HPLC , GC, Flame photometry, Fluorimetry
3	Perform microwave assisted reactions of synthetic importance
4	Synthesize medicinally important compound involving more than one step
5	Perform isolation and characterization like mixed melting point, molecular weight determination , functional group analysis in organic natural compounds
6	Perform Degradation reactions on selected plant constituents

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Dr. D. D. Rishipathak

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem I)

Chemistry of Natural Products:

Student should be able to

No	Course Outcome
1	Understand different types of natural compounds and their chemistry and medicinal importance.
2	Understand the importance of natural compounds as lead molecules for new drug discovery
3	Explain the importance of rDNA technology tool for new drug discovery
4	Understand the methods of structural elucidation of compounds of natural origin
5	Understand isolation, purification and characterization of simple chemical constituents from natural source

Dr. R. S. Kankate.

Advanced Organic Chemistry I

Student should be able to

No.	Course Outcomes
1	Know various name reactions
2	Know protection of various functional groups(masking of groups)
3	Know few heterocyclic synthesis like Debus–Radziszewski imidazole synthesis, Knorr Pyrazole Synthesis, Pinner Pyrimidine Synthesis and Combes Quinoline Synthesis
4	Know synthon approach and retrosynthesis

Dr. S. S. Chhajed.

MET's Institute of Pharmacy ★ ADGAON, NASIK - 3 ★ Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem I)

Modern Pharmaceutical Analytical Techniques:

Student should be able to

No	Course Outcome
1	To learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, spectrofluorometry, flame emission and atomic absorption spectroscopy
2	To learn principle, instrumentation and applications of NMR Spectroscopy, Mass spectrometry
3	To lean the principle and theory of chromatography and study the applications of TLC, ion exchange chromatography, column chromatography, GC, HPLC and affinity chromatography, UPLC and gel chromatography
4	To learn the principle, instrumentation of electrophoresis and study the applications of paper electrophoresis, zone electrophoresis, moving boundary electrophoresis and isoelectric focusing.
5	To learn the principle, working and applications of potentiometry and various thermal methods of analysis.

Dr. S. S. Sonawane

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem II)

Advanced Organic Chemistry II

Student should be able to

No.	Course Outcomes
1	Know principles of green chemistry and concept of Microwave assisted reactions and Ultrasound assisted reactions
2	Understand principles of solid phase synthesis, strategies of solution phase synthesis , side reaction in peptide synthesis
3	Know basic principles of photochemical reactions and mechanism , types of pericyclic reactions
4	Understand types, preparation, examples and uses of homogenous. and heterogeneous catalysts
5	Know Transition metal; Organo catalysis, Biocatalysis and Phase transfer catalysis.
6	Know basic concepts of stereochemistry and methods of asymmetric synthesis

Dr. D. D. Rishipathak

Pharmaceutical Chemistry Practical II

Student should be able to

No.	Course Outcomes
1	Perform synthesis of organic compounds involving oxidation , reduction , nitration
2	Prepare 4- chlorobenzhydrylpiperazine , 4-iodotoluene, Umbelliferon , Triphenyl imidazole; compare synthetic routes of APIs
3	Perform microwave assisted reactions of synthetic importance
4	Determine pharmacokinetic parameters of drug molecules by using softwares
5	Perform QSAR and docking based experiments
6	Interpret organic compounds by FT-IR, NMR, MS

Dr. D. D. Rishipathak

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem II)

Pharmaceutical Process Chemistry:

Student should be able to

No	Course Outcome
1	Understand The strategies of scale up process of APIs and intermediates
2	Understand The various unit operations and various reactions in process chemistry
3	Learn different unit process and its application
4	Learn Case studies of some scale up process of APIs
5	Understand Safety data: MSDS (Material Safety Data Sheet),Fire hazards and Occupational Health & Safety Assessment Series (OHSAS-1800)

Dr. R.S. Kankate.

Advanced Spectral Analysis

Student should be able to

No.	Course Outcomes
1	Know about various spectroscopic techniques
2	Know in detail about 1D and 2D NMR technique for analysis of complex structure of compounds
3	Know about hyphenated techniques for analysis
4	know in detail about mass and infrared spectra interpretation of compounds
5	Know about interpretation NMR spectra of organic compounds

(Dr. S.S. Sonawane)

MET's Institute of Pharmacy ADGAON, NASIK-3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutical Chemistry) 2018 Pattern (Sem II)

Computer Aided Drug Design:

Student should be able to

No	Course Outcome
1	Understand role of CADD in drug discovery
2	Understand Different CADD technique and their applications
3	Understand Various strategies to design and develop new drug like molecules
4	Understand Working with Molecular modelling softwares
5	Know In silico virtual screening protocols

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Dr. D. D. Rishipathak

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutics) 2018 Pattern (Sem I)

Regulatory affairs

Student should be able to

No.	Course Outcomes
1	Learn advance knowledge and skills required to learn the concepts of generic drugs and its development & learning various regulatory filings in different countries.
2	Know the different phases of clinical trials and submitting regulatory documents and filing, approval process, documents required, and regulatory importance of IND, NDA and ANDA.
3	Clarify the concepts of Innovator and Generic drugs and regulatory guidances and guidelines for filing & approval process of IND, NDA and ANDA.
4	Know Dossier preparation and its submission to regulatory agencies in different countries & Post approval requirements for API and drug product.
5	Understand Submission of global documents in CTD and eCTD formats.
6	Know Requirements for clinical trials for approval Pharmacovigilance and process of monitoring in clinical trials.

P.S. Ahire

Dr. M. P. Patil

Modern Pharmaceutical Analytical Techniques

Student should be able to

No	Course Outcome
1	To learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, spectrofluorometry, flame emission and atomic absorption spectroscopy
2	To learn principle, instrumentation and applications of NMR Spectroscopy, Mass spectrometry
3	To lean the principle and theory of chromatography and study the applications of Paper chromatography, TLC, ion exchange chromatography, column chromatography, GC, HPLC and affinity chromatography
4	To learn the principle, instrumentation of electrophoresis and study the applications of paper electrophoresis, zone electrophoresis, moving boundary electrophoresis and isoelectric focusing.
5	To learn the theory , instrumentation and applications of x-ray crystallography and radioimmunoassay

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Dr. S. S. Jamdade

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutics) 2018 Pattern (Sem I)

Drug Delivery system

Student should be able to

No.	Course Outcomes
1	Understand various approaches for development of novel drug delivery systems.
2	Understand criteria for selection of drugs and polymers for the development of delivering system
3	Understand formulation and evaluation of Novel drug delivery systems.
4	Express fundamental concept, approaches, merits, demerits, and application of Novel drug delivery system with various approaches and classification

Dr. N. A. Thombre.

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutics) 2018 Pattern (Sem I)

Modern Pharmaceutics:

Student should be able to

No.	Course Outcomes
1	Be familiar with preformulation concept related to conventional and novel drug delivery system.
2	Provide the knowledge related to validation, GMP and industrial management
3	Make the students competent in use of optimization techniques for development of dosage form
4	Be acquire the knowledge of compression, compaction, diffusion and dissolution

Dr. M. P. Patil

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutics) 2018 Pattern (Sem II)

Advanced Biopharmaceutics & Pharmacokinetics

Student should be able to

No.	Course Outcomes
1	Study the concept of Biopharmaceutics and pharmacokinetics
2	Provide the knowledge of pharmacokinetic models for prediction of ADFME of drug
3	Make the students competent for bioavailability and bioequivalence studies.
4	provide the insight of clinical pharmacokinetics

Dr. M. P Patil

MET's Institute of Pharmacy ADGAON, NASIK - 3 Bhujbal Knowledge City

Bhujbal Knowledge City MET's Institute of Pharmacy, Nashik

M. Pharm (Pharmaceutics) 2018 Pattern (Sem II)

Cosmetics and Cosmeceuticals

Student should be able to

No.	Course Outcomes
1	Know Key ingredients used in cosmetics and cosmeceutical products.
2	Know Key building blocks for various cosmetics formulations
3	Know Current technologies in market.
4	Understand Various key ingredients and basic science to develop cosmetics and cosmeceuticals.
5	Understand Scientific knowledge to develop cosmetics and cosmeceutical products with desired safety, efficacy and stability.

Mrs. S. P. Kakad.

Computer Aided Drug Development:

Student should be able to

No.	Course Outcomes
1	Know computer applications in pharmaceutical research and development.
2	Understand computational modelling in drug disposition
3	Be Aware of role of computer in preclinical study and clinical development
4	Know optimization of formulation with the help of computer, legal protection to computer related innovation and ethics to be followed while using computer in research and development.
5	Understand development and application of artificial intelligence in correlation to pharmacy

Mr. V. D. Laddha.

MET's Institute of Pharmacy ★ ANGAON, NASIK - 3 ★ Bhujbal Knowledge City

M. Pharm (Quality Assurance Techniques) 2013 Pattern (Sem I)

Advanced Analytical Techniques

Student should be able to

No.	Course Outcomes
1.	Understand Meaning and objective of research, types of research and to study preparation of research proposals and different methods of Literature survey.
2.	Study Technical writing like Research report, Research papers, Review papers, thesis writing and to acquire Presentation skills.
3.	Learn Cost analysis of the project, research organizations and procurement of research grants.
4.	Understand basic definitions/concepts of statistics like Variables and variation, sample and population, precision, accuracy and bias along with concept of Experimental design and types.
5.	Understand various parameters of Descriptive Data Analysis like and Inferential data analysis statistical measures, normal distribution, measures of relative position, measures of relationship.
6.	Learn inferential data analysis with reference to Statistical inference, the central limit theorem, parametric tests, testing statistical significance, decision making sample Z test, student's distribution (t), crossover design, variance (ANOVA), multiple regression and correlation and nonparametric tests.

Dr. S. S. Sonawane
(Subject I/c)

Research Methodology

Student should be able to

No	Course Outcome
1	Learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, Nuclear Magnetic Spectroscopy, Mass spectrometry, HPLC, GC, UPLC, SCFC, LC-MS and GC-MS
2	Learn the principle, instrumentation and applications of various thermal methods of analysis and electron microscopy
3	Elucidate the structure using UV, IR, NMR and MS spectral data.
4	Study and understand the effect of various solvents on absorption maxima of drugs and to learn the Beer's law limit of drugs in suitable solvent.
5	Learn and understand various multicomponent analysis technique by UV spectrophotometry for estimation of drugs in combined dosage form.
6	Perform assay of drugs official in various pharmacopoeias by UV spectrophotometry, titrimetry and HPLC. To perform validation of assay method as per USP and ICH guidelines.

(Dr. S. N. Sune)
Sub I/c

M. Pharm (Quality Assurance Techniques) 2013 Pattern (Sem I)

Advanced Quality Assurance Techniques

Student should be able to

No.	Couse Outcomes
1	Post graduate students will be able to work efficiently in Quality units of Pharmaceutical industry
2	Students will have basic understanding of total quality management and regulatory aspects fulfilling cGMP compliance.
3	Students will be more versatile candidates to work in the departments like production, research and development, quality assurance and quality control, documentation etc.
4	Student coming out of the Quality Assurance department will be self sustained making them stand differently in any associated field as entrepreneurs.

Yes
Dr Dhotas Cs
Subject I/c.

Sterile Products Formulation & Technology

Student should be able to

No.	Course Outcomes
1.	Learn preformulation, general requirements, formulation principles, packaging materials used, types, choice of containers, official quality control tests and methods of evaluation for sterile products such as SVPs, LVPs.
2.	Describe classification, general requirements, formulation, and evaluation of ophthalmic product along with ocular inserts, particulate and liposome drug delivery, protein and peptide delivery
3.	Explain merits, demerits, and application of fundamental concept of Sustained Release Parenterals
4.	Acquire the knowledge and understand the layouts of parenteral and BFS /FFS is an advanced aseptic processing technology
5.	Know the different Parenteral devices with its applications and understand the number of Hazards associated with Parental Therapy
6.	Adapt the knowledge of Good manufacturing Practices and regulatory guidelines and different process involved in Large-scale sterilization, development and validation

(Dr Thombre NA)
Subject I/C

M. Pharm (Quality Assurance Techniques) 2013 Pattern (Sem II)

Drug Regulatory Affaires

Student should be able to

No.	Couse Outcomes
1	Be familiar with Indian regulatory agencies and their modus operandi for the benefit of the society.
2	Provide knowledge of regulations governing the pharmacy profession, activities under the profession and working of different statutory bodies under the regulations.
3	Understand various certification system with special emphasis on quality, safety and efficacy.
4	Know the dug regulatory aspects for drug registration in National and International market
5	Study the different types of intellectual property rights and their benefits for the welfare of individual as well as society at large.
6	Learn American and European patent systems and treaties for intellectual property rights.

Dr. M. P. Patil

Pharmaceutical validation

Student should be able to

No.	Course Outcomes
1.	Work efficiently in Quality units of Pharmaceutical industry
2.	Understanding of concepts like prospective process validation, concurrent validation, and retrospective validation and revalidation aspects
3.	Become more compatible to work in analytical development laboratories, process development and validation departments etc.
4.	Work in the departments like production, research and development, validation, regulatory, quality assurance and quality control etc.

Dr. Deotare. A.
Subject I/c.

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Quality Assurance Techniques) 2013 Pattern (Sem II)

Quality Planning and Analysis:

Student should be able to

Course	Course Outcomes
1.	Learn basic concepts and perspective on quality, quality problems and need for quality improvement, causes of poor quality and high cost with remedy for improving quality
2.	Describe continuous process regulation for the quality control including goal, sensor, measurement of actual performance, interpretation difference between actual performance and the goal, action taken
3.	Understand culture required for the development of healthy qualitative technology with motivation, awareness, management
4.	Explain manufacturing planning for quality, responsibilities with self control- self inspection, process quality audits, statistical process control
5.	Be aware of the basics of Inspection including planning, importance of inspection, errors of measurement; testing sampling plans with sampling risks, evaluation parameters, characteristics of a good acceptance plan
6.	Know quality assurance concept; importance, planning, factors affecting, errors, reporting of quality audit and reporting results of product audit.

Dr. N. A. Thombre
(Subject I/c)

Pharmaceutical Plant Design and Operations

Student should be able to

No.	Course Outcomes
1.	Study design, layout and operational facilities considered in the manufacturing of Pharmaceutical dosage forms like Tablets, Capsules, Liquid orals, Ointments and Dry syrups.
2.	Understand cGMP Regulatory requirements of Pharma facilities, basic requirements of Factory Act and Rules and also regulations included in revised schedule M.
3.	Know the importance of different utility services required in pharmaceutical unit operations like different types of Water, steam, Compressed air and other inert gases and also various support services required in Pharmaceutical Industries.
4.	Learn the designing and operation of Quality Control lab and related parameters like effective QMS (Quality Management System), validation protocol etc.
5.	Study the basic design of effluent treatment plant (ETP) and various treatment methods required for recycling/recovery of industrial effluent/ waste products.

Dr. Ahmad S.P.

(Subject I/c)

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutical Chemistry) 2013 Pattern (Sem I)

Advanced Analytical Techniques

Student should be able to

No	Course Outcome
1	Learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, Nuclear Magnetic Spectroscopy, Mass spectrometry, HPLC, GC, UPLC, SCFC, LC-MS and GC-MS
2	Learn the principle, instrumentation and applications of various thermal methods of analysis and electron microscopy
3	Elucidate the structure using UV, IR, NMR and MS spectral data.
4	Study and understand the effect of various solvents on absorption maxima of drugs and to learn the Beer's law limit of drugs in suitable solvent.
5	Learn and understand various multicomponent analysis technique by UV spectrophotometry for estimation of drugs in combined dosage form.
6	Perform assay of drugs official in various pharmacopoeias by UV spectrophotometry, titrimetry and HPLC. To perform validation of assay method as per USP and ICH guidelines.

Dr. S. S. Sonawane
(Subject I/c)

Research Methodology

Student should be able to

No.	Course Outcomes
1.	Understand Meaning and objective of research, types of research and to study preparation of research proposals and different methods of Literature survey.
2.	Study Technical writing like Research report, Research papers, Review papers, thesis writing and to acquire Presentation skills.
3.	Learn Cost analysis of the project, research organizations and procurement of research grants.
4.	Understand basic definitions/concepts of statistics like Variables and variation, sample and population, precision, accuracy and bias along with concept of Experimental design and types.
5.	Understand various parameters of Descriptive Data Analysis like and Inferential data analysis statistical measures, normal distribution, measures of relative position, measures of relationship.
6.	Learn inferential data analysis with reference to Statistical inference, the central limit theorem, parametric tests, testing statistical significance, decision making sample Z test, student's distribution (t), crossover design, variance (ANOVA) , multiple regression and correlation and nonparametric tests.

Dr. S. N. Sune
Sub I/c

M. Pharm (Pharmaceutical Chemistry) 2013 Pattern (Sem I)

Advanced Pharmaceutical Chemistry

Student should be able to

No.	Couse Outcomes
1	Learn Stereochemistry & Chiral Techniques including Principles of stereochemistry, Racemic modification and their resolution, Asymmetric Synthesis
2	Understand Mechanisms, stereochemistry and applications of Molecular Rearrangements of electron deficient systems, migration to oxygen, nitrogen, and carbon;
3	Understand Reactions of importance including Hydrogenation, Reduction, Oppeneur oxidation, Free radical reaction, Allylic Bromination, Use of diazomethane and peracids in synthesis, Grignard Reaction, Ozonolysis etc. and Multi-component synthesis
4	Learn Synthon approach; Green Chemistry including Water as solvent, ionic liquids, supercritical fluids, Supported reagents and catalysts, Solvent free reactions, Microwave and Ultrasound assisted reactions; and Environment protection and effluent treatment aspects
5	Learn Experimental techniques like Fractional distillation, Vacuum distillation, Preparative chromatography
6	Perform Synthesis of different compounds and Isolation and characterization of phytochemical principles from natural origin.

D.D. Rajhipathak
(Subject I/C)

Sterile Products Formulation & Technology

Student should be able to

No.	Course Outcomes
1.	Learn preformulation, general requirements, formulation principles, packaging materials used, types, choice of containers, official quality control tests and methods of evaluation for sterile products such as SVPs, LVPs.
2.	Describe classification, general requirements, formulation, and evaluation of ophthalmic product along with ocular inserts, particulate and liposome drug delivery, protein and peptide delivery
3.	Explain merits, demerits, and application of fundamental concept of Sustained Release Parenterals
4.	Acquire the knowledge and understand the layouts of parenteral and BFS /FFS is an advanced aseptic processing technology
5.	Know the different Parenteral devices with its applications and understand the number of Hazards associated with Parental Therapy
6.	Adapt the knowledge of Good manufacturing Practices and regulatory guidelines and different process involved in Large-scale sterilization, development and validation

(Dr. N A Thombre)
Subject I/C

M. Pharm (Pharmaceutical Chemistry) 2013 Pattern (Sem II)

Drug Regulatory Affairs

Student should be able to

No.	Couse Outcomes
1	Be familiar with Indian regulatory agencies and their modus operandi for the benefit of the society.
2	Provide knowledge of regulations governing the pharmacy profession, activities under the profession and working of different statutory bodies under the regulations.
3	Understand various certification system with special emphasis on quality, safety and efficacy.
4	Know the dug regulatory aspects for drug registration in National and International market
5	Study the different types of intellectual property rights and their benefits for the welfare of individual as well as society at large.
6	Learn American and European patent systems and treaties for intellectual property rights.

Dr. M. P. Patil Dr. Deokar

Advanced Medicinal Chemistry

Student should be able to

No.	Couse Outcomes
1	Learn Microbial conversions of drugs like steroids, microbial production of antibiotics, enzymes, enzymes as catalyst and drug targets, enzyme immobilization techniques
2	Study advances in receptors of following classes, SAR studies of drugs and ligands belonging to following classes including mechanism of actions: Opioids, Adrenergics, Cholinergics, Histamine, 5-HTiA, GABA, Drugs used in Neurodegenerative disorders, CNS depressants, neuroleptics, analeptics, CNS stimulants.
3	Study advances in receptors of following classes, SAR studies of drugs and ligands belonging to following classes including mechanism of actions; Antihyperlipidemic, Cardiotonic drugs, Antianginal agents, Antiarrhythmic agents, Antihypertensive agents, Oral hypoglycemic agents.; Chemotherapeutic Agents: Antimalarials, Anti-mycobacterials, Anti-HIV, Anti-cancer, Antibacterials , Antiamoebics, Anthelmintic and Antifungal agents; Anti-inflammatory Steroids
4	Learn Synthesis of drugs describing reaction conditions mechanism and strategies involved in the synthesis of Gefitinib, Cetrizine, Fexofenadine, Linezolid, Risperidone, Ziprasidone, Alprazolam, Ethinyl estradiol, Quetiapine; Solid phase synthesis; Gene therapy: Biomolecules (human insulin, tissue plasminogen activator (TPA) etc).
5	Study Demonstration of computer aided drug design techniques using suitable software; ADMET prediction using suitable software
6	Perform Microwave assisted synthesis, Multistep synthesis, Synthesis based on ultrasonic technique.

D. D. Rishipathak
(Subject IIC)

M. Pharm (Pharmaceutical Chemistry) 2013 Pattern (Sem II)

Drug Design

Student should be able to

No.	Couse Outcomes
1	Understand the significance of drug design & discovery.
2	Explain approaches in rational drug design.
3	Understand various drug targets, their biochemical features, physiological & pathophysiological roles and significance in drug design
4	Explain biotransformation of pro-drug design aspect in drug design.
5	Study biological targets at molecular level, their 3D structure, binding energy and kinetics
6	Understand how current drugs were developed by using pharmacophore modeling and docking technique

Subject Incharge

Dr. R. S. Kookate

Pharmaceutical Plant Design and Operations

Student should be able to

No.	Course Outcomes
1.	Study design, layout and operational facilities considered in the manufacturing of Pharmaceutical dosage forms like Tablets, Capsules, Liquid orals, Ointments and Dry syrups.
2.	Understand cGMP Regulatory requirements of Pharma facilities, basic requirements of Factory Act and Rules and also regulations included in revised schedule M.
3.	Know the importance of different utility services required in pharmaceutical unit operations like different types of Water, steam, Compressed air and other inert gases and also various support services required in Pharmaceutical Industries.
4.	Learn the designing and operation of Quality Control lab and related parameters like effective QMS (Quality Management System), validation protocol etc.
5.	Study the basic design of effluent treatment plant (ETP) and various treatment methods required for recycling/recovery of industrial effluent/ waste products.

Subject - incharge

Dr. R.S. Kookate

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutics) 2013 Pattern (Sem I)

Advanced Analytical Techniques

Student should be able to

No	Course Outcome
1	Learn the principle, instrumentation and applications of various spectroscopic and chromatographic analytical techniques like UV-VIS spectroscopy, IR spectroscopy, Nuclear Magnetic Spectroscopy, Mass spectrometry, HPLC, GC, UPLC, SCFC, LC-MS and GC-MS
2	Learn the principle, instrumentation and applications of various thermal methods of analysis and electron microscopy
3	Elucidate the structure using UV, IR, NMR and MS spectral data.
4	Study and understand the effect of various solvents on absorption maxima of drugs and to learn the Beer's law limit of drugs in suitable solvent.
5	Learn and understand various multicomponent analysis technique by UV spectrophotometry for estimation of drugs in combined dosage form.
6	Perform assay of drugs official in various pharmacopoeias by UV spectrophotometry, titrimetry and HPLC. To perform validation of assay method as per USP and ICH guidelines.

Dr. S. S. Sonawane
(Subject IIc)

Research Methodology

Student should be able to

No.	Course Outcomes
1.	Understand Meaning and objective of research, types of research and to study preparation of research proposals and different methods of Literature survey.
2.	Study Technical writing like Research report, Research papers, Review papers, thesis writing and to acquire Presentation skills.
3.	Learn Cost analysis of the project, research organizations and procurement of research grants.
4.	Understand basic definitions/concepts of statistics like Variables and variation, sample and population, precision, accuracy and bias along with concept of Experimental design and types.
5.	Understand various parameters of Descriptive Data Analysis like and Inferential data analysis statistical measures, normal distribution, measures of relative position, measures of relationship.
6.	Learn inferential data analysis with reference to Statistical inference, the central limit theorem, parametric tests, testing statistical significance, decision making sample Z test, student's distribution (t), crossover design, variance (ANOVA) , multiple regression and correlation and nonparametric tests.

(1) Dr. S.N. Sure
Sub I/c

(2) Dr. Ahirrao
S.P.

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutics) 2013 Pattern (Sem I)

Advanced Pharmaceutics

Student should be able to

No.	Couse Outcomes
1	Understand the preformulation concept used in the development of effective, stable and patient friendly dosage by studying the physicochemical properties using analytical tools as well as to predict the mechanism of drug degradation
2	Learn the applications of natural, synthetic and semi synthetic polymeric material used in the development of dosage forms
3	Overview variety of functional materials used for development of dosage form, and to learn about their potential to interact with drug and packaging materials.
4	Be familiar with the concept of quality control, quality assurance and validation
5	Utilize various statistical techniques for optimization of dosage form.

Dr. M. P. Patil

Sterile Products Formulation & Technology

Student should be able to

No.	Course Outcomes
1.	Learn preformulation, general requirements, formulation principles, packaging materials used, types, choice of containers, official quality control tests and methods of evaluation for sterile products such as SVPs, LVPs.
2.	Describe classification, general requirements, formulation, and evaluation of ophthalmic product along with ocular inserts, particulate and liposome drug delivery, protein and peptide delivery
3.	Explain merits, demerits, and application of fundamental concept of Sustained Release Parenterals
4.	Acquire the knowledge and understand the layouts of parenteral and BFS /FFS is an advanced aseptic processing technology
5.	Know the different Parenteral devices with its applications and understand the number of Hazards associated with Parental Therapy
6.	Adapt the knowledge of Good manufacturing Practices and regulatory guidelines and different process involved in Large-scale sterilization, development and validation

Dr. Thombre NA
(Subject I/C)

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutics) 2013 Pattern (Sem II)

Drug regulatory Affaires

Student should be able to

No.	Couse Outcomes
1	Be familiar with Indian regulatory agencies and their modus operandi for the benefit of the society.
2	Provide knowledge of regulations governing the pharmacy profession, activities under the profession and working of different statutory bodies under the regulations.
3	Understand various certification system with special emphasis on quality, safety and efficacy.
4	Know the dug regulatory aspects for drug registration in National and International market
5	Study the different types of intellectual property rights and their benefits for the welfare of individual as well as society at large.
6	Learn American and European patent systems and treaties for intellectual property rights.

Dr. Ahirrao Dr. M. P. Patil

Formulations and Development

Student should be able to

No.	Couse Outcomes
1	Understand the concept of development of solid, liquid, semisolid and aerosol type of dosage form thoroughly including basics, formulation concept, methods of preparation and characterization
2	Incorporate concept of nutraceuticals as a medicine along with its formulation
3	Study in detail the regulatory guidelines viz. QbD and pharmaceutical development used by pharmaceutical industry.
4	Understand the concept of packaging of pharmaceuticals with regulatory perspective along with study of materials used for packaging.
5	Be Familiar with variety of veterinary dosage form used along with techniques used for administrations.

Dr. M. P. Patil

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutics) 2013 Pattern (Sem II)

Novel Drug Delivery Systems

Student should be able to

No.	Couse Outcomes
1	Describe impact of drug properties and route of administration on control and Sustained release dosage forms. To describe formulation, fabrication and evaluation of various oral controlled drug delivery systems including gastro retentive, colon targeted and pulsatile drug delivery.
2	Describe injectable controlled release, formulation of long acting contraceptive formulations; implantable drug delivery; micro spheres, liposomes & quality control. To describe buccal, sublingual, rectal, nasal, mucosal & vaginal drug delivery: formulation development, in-vitro, ex-vivo and in-vivo methods of evaluation.
3	Describe permeation through skin including mechanism, permeation enhancers, in-vitro skin permeation, technologies for developing transdermal drug delivery system & evaluation parameters. To describe biopharmaceutical classification of drugs, absorption of permeability and solubility limited drugs. Bio wavers for bioequivalence studies, strategies to enhance bioavailability.
4	Describe composition, preparation, characterisation, stability, pharmacokinetics, clinical applications, production and scale up of Liposomes; structure & classification, methods of preparation, properties, release behaviour, characterisation, pharmacokinetics & in-vivo evaluation, applications and toxicity of Niosomes; structures, theories of formation, formulation consideration.
5	Describe concept of micro particles Nanoparticles Dendrimers. To describe active & passive targeting, resealed erythrocyte, monoclonal antibodies drug targeting particulate carrier system, specific drug delivery to targeted organs like brain & colon, freeze drying of parenteral, environmental controlled parenteral manufacturing.
6	Describe ocular Topical Drug Delivery, Issues and Challenges, Drug Candidate Selection, Product Design Considerations, Product Optimization Considerations, Processing Considerations. To describe physical aspects, biochemistry of protein drug ; general methods of analysis of protein & peptide drugs, barrier to transport & pharmacokinetics, different route of delivery

Bhambere D.S.
Subject I/c.

Bhujbal Knowledge City, MET's Institute of Pharmacy, Adgaon, Nashik

M. Pharm (Pharmaceutics) 2013 Pattern (Sem II)

Pharmaceutical Plant Design and Operations

Student should be able to

No.	Course Outcomes
1.	Study design, layout and operational facilities considered in the manufacturing of Pharmaceutical dosage forms like Tablets, Capsules, Liquid orals, Ointments and Dry syrups.
2.	Understand cGMP Regulatory requirements of Pharma facilities, basic requirements of Factory Act and Rules and also regulations included in revised schedule M.
3.	Know the importance of different utility services required in pharmaceutical unit operations like different types of Water, steam, Compressed air and other inert gases and also various support services required in Pharmaceutical Industries.
4.	Learn the designing and operation of Quality Control lab and related parameters like effective QMS (Quality Management System), validation protocol etc.
5.	Study the basic design of effluent treatment plant (ETP) and various treatment methods required for recycling/recovery of industrial effluent/ waste products.

(Dr. Animas S.P.)
Subject I/C.