



RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S
COLLEGE OF PHARMACY (B.Pharm.)

Approved by PCI, AICTE, Govt. of Maharashtra & DTE
Affiliated to Savitribai Phule Pune University, Pune
DTE Code:- 6382 University Code:- CPHPO13150



Certified by ISO 9001-2015,
ISO : 14001-2015

Recognised as Green Educational
Campus

Hon. Shri. Vilasrao V. Lande
President

Hon. Shri. Sudhir V. Mungase
Secretary

Hon. Shri. Ajit D. Gavhane
Treasurer

Dr. Kishor S. Jain
Principal

1.3.1

Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human values, Environment and Sustainability into the curriculum



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Crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum are as shown in the following table matrix

Sr. No.	Subjects	Cross-cutting issues relevant to Professional Ethics & outcome through course curriculum
1.	Pharmaceutics	Professional way of handling prescriptions, Impart a fundamental knowledge on the preparatory Pharmacy with arts and science of preparing the different conventional dosage forms.
2.	Pharmacology	Care of laboratory animals, importance of GLP, the information about the drugs, mechanism of action, physiological and biochemical effects (Pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and route of administration of different classes of drugs.
3.	Analytical Pharmacognosy & Extraction Technology	Extraction & isolation of active constituents along with its identification & analysis for research
4.	Industrial Pharmacy	Understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product. Manufacturing various dosage form, QC & QA
5.	Pharmaceutical Jurisprudence	Educates laws to be obeyed during pharmaceutical manufacturing, sales and distribution, import and export processes
6.	Pharmaceutical Analysis	Fundamentals of analytical chemistry and principles of electrochemical analysis of drugs, instrumental methods in qualitative and quantitative analysis of drugs, emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.
7.	Biostatistics And Research Methodology	Descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.
8.	Pharmaceutical Business Management & Disaster Management	Understand the pharmaceutical business & management strategy, marketing research, product management, human resource and development needs.

Sr. No.	Events & days organized	Cross-cutting issues relevant to Professional Ethics Gender, Human Values, Environment and Sustainability through corresponding events & days
9.	NPW & National P'cist day	Understand the role & responsibilities of the profession towards society, also creates awareness
10.	Industrial Visit	Industrial visits give students a major exposure to real working environments along with a practical perspective of a theoretical concept relevant to their domain. Industrial visits bridge the widening gap between theoretical learning and practical exposure by giving students the first-hand exposure to identify the inputs and outputs for different business operations and processes performed at the workplace.
11.	Gender sensitization cell	The Cell was formed in accordance with the guidelines on sexual harassment prevention in the workplace, issued by the Honorable Supreme Court of India in 1997 and in accordance with the VISHAKHA guidelines of Supreme Court and endorsed in SAKSHAM report of the University Grants Commission. The cell aims to sensitize and create awareness about gender justice among the academic and non-academic community in this educational institution. The Cell is responsible for looking into any complaints filed by students and staff about sexual harassment if any happening inside the college premises.
12.	Celebration of International Women Day	Encourage women, organization of women empowerment programs, Nirbhay kanya abhiyan
13.	Extracurricula , co-curricular activities	Equal opportunity given to all
14.	Vidhyarthi Vyaktimatva Vikas Yojna	Students personality development
15.	NSS camp	Equal participation of boys & girls, Adopt village , organize various programs to encourage, create awareness amongst the village people
16.	NSS extension activities	Pulse Polio Camp, Blood Donation camp, Health check-up camp, Swachha Bharat Abhiyan, Swachha Nirmal Wari
17.	Environmental sciences	Helps to create awareness about the ecosystem, biodiversity, natural resource conservation, waste management and pollution.
18.	AECC- environment studies	




PRINCIPAL
 Rajmata Jijau Shikshan Prasarak Mandal's
COLLEGE OF PHARMACY
 Dadulgaon, Pune-412 105.

SAVITRIBAI PHULE PUNE UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY



Syllabus of Third Year B. Pharmacy

2018 PATTERN (Revised)

(EFFECTIVE FROM ACADEMIC YEAR 2020-2021)



Scope: This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Objectives: Upon completion of this course the student should be able to:

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

Course Content:

UNIT – I

10 Hours

- **Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

UNIT – II

10 Hours

- **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
- **Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques



BP109P. PHARMACEUTICS I (Practical)

4 Hours / week

1. Syrups

- a) Syrup IP'66
- b) Compound syrup of Ferrous Phosphate BPC'68

2. Elixirs

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

3. Linctus

- a) Terpin Hydrate Linctus IP'66
- b) Iodine Throat Paint (Mandles Paint)

4. Solutions

- a) Strong solution of ammonium acetate
- b) Cresol with soap solution
- c) LugOL'S SOLUTION

5. Suspensions (Any two experiments)

- a) Calamine lotion
- b) Magnesium Hydroxide mixture
- c) Aluminium Hydroxide gel

6. Emulsions

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

7. Powders and Granules (Any three experiments)

- a) ORS powder (WHO)
- b) Effervescent granules
- c) Dusting powder
- d) Divided powders

8. Suppositories (Any two experiments)

- a) Glycero gelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

8. Semisolids (Any two experiments)

- a) Sulphur ointment
- b) Non staining-iodine ointment with methyl salicylate
- c) Carbopol gel



9. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash

Recommended Books:

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. F.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.



**FINAL YEAR B. PHARM
SEMESTER – VII**

BP701T

INSTRUMENTAL METHODS OF ANALYSIS (Theory)

45 Hours

Scope:

This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives:

Upon completion of the course the student shall be able to:

1. Upon completion of the course the student shall be able to
2. Illustrate the interaction of matter with electromagnetic radiations and justify its applications in drug analysis
3. Classify the chromatographic separation methods and choose appropriate technique for analysis of drugs.
4. Design methods for performing quantitative & qualitative analysis of drugs using various analytical instruments.

Course Content:

UNIT –I

10 Hours

UV Visible spectroscopy

Introduction to spectroscopy, Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations.

Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.

Applications - Spectrophotometric titrations, Single component and multi component Analysis

Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

UNIT –II

10 Hours

FTIR spectroscopy

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations

Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector, FTIR instrument, sample handling attachments –DRS and ATR and applications

Flame Photometry



Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy

Principle, interferences, instrumentation and Applications

Nepheloturbidimetry

Introduction

10 Hours

UNIT –III

Introduction to chromatography -

Adsorption and partition column chromatography:

Methodology, advantages, disadvantages and applications.

Paper chromatography:

Introduction, methodology, development techniques, advantages, disadvantages and applications

Thin layer chromatography:

Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

HPTLC:

Introduction, Instrumentation and applications

08 Hours

UNIT –IV

Theory of Chromatography

Plate theory, Rate theory, System suitability parameters

Gas chromatography

Introduction, theory, instrumentation, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)

Introduction, theory, instrumentation, advantages and applications.

07 Hours

UNIT –V

Ion exchange chromatography-

Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography-

Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction

Recommended Books (Latest Editions):

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein.



SAVITRIBAI PHULE PUNE UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY



RULES & SYLLABUS

**FIRST YEAR BACHELOR OF PHARMACY (B. Pharm.) COURSE –
2019 pattern (EFFECTIVE FROM ACADEMIC YEAR 2019-2020)**



Scope

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.

Objectives

Upon completion of the course a student shall be able to understand -

- The principles of volumetric and electrochemical analysis.
- Carry out various volumetric and electrochemical titrations.
- Develop analytical skills.

COURSE CONTENT**UNIT-I**

- a) **Pharmaceutical analysis** - Definition and scope
- i. Different techniques of analysis
 - ii. Methods of expressing concentration
 - iii. Primary and Secondary standards.
- b) **Errors** : Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures

05 hours

UNIT-II

- a) **Acid base titration**: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves. Preparation and standardization of sodium hydroxide, hydrochloric acid, sulphuric acid, Estimation of ammonium chloride
- b) **Non aqueous titration**: Solvents, acidimetry and alkalimetry titrations, and estimation of sodium benzoate.

10 hours

UNIT-III

- a) **Precipitation titrations**: Mohr's method, Volhard's method, Modified Volhard's method, Fajans method, and estimation of Sodium Chloride I.P.
- b) **Complexometric titration**: Classification, metal ion indicators, masking and demasking reagents, and estimation of Calcium gluconate I.P.
- c) **Gravimetry**: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, and estimation of Barium sulphate I. P.

12 hours

UNIT-IV**Redox titrations**

- i. Concepts of oxidation and reduction
- ii. Preparation and standardization of Potassium Permanganate I. P., Ceric Ammonium Sulphate I. P./B. P. and Sodium Thiosulphate I. P./B. P.
- iii. Types of redox titrations (Principles and applications) : Permanganometry,

08 Hours



Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titrations with Potassium Iodate I. P.

UNIT-V

a) Electrochemical methods of analysis

- i. **Conductometry** - Introduction, Conductivity cell, Conductometric titrations, applications.
- ii. **Potentiometry** - Electrochemical cell, construction and working of reference (Standard Hydrogen Electrode, Silver Chloride Electrode and Calomel Electrode) and Indicator Electrodes (Metal electrodes and Glass Electrode), methods to determine end point of potentiometric titration and applications.
- iii. **Polarography** - Principle and Ilkovic Equation.

10 hours

- b) Refractometry** - Introduction, refractive index, specific and molar refraction, measurement of RI, Abbe's refractometer and applications.



I. Preparation and standardization of

- (1) Aq. Sodium Hydroxide I. P.
- (2) Aq. Sulphuric Acid I. P./ Aq. Hydrochloric Acid I. P.
- (3) Aq. Sodium Thiosulfate I. P.
- (4) Aq. Potassium Permanganate I. P.
- (5) Aq. Ceric Ammonium Sulphate I. P.

3 turns

II. Assay of the following compounds along with Standardization of Titrant

- (1) Ammonium chloride by acid-base titration
- (2) Sodium benzoate I. P. by non-aqueous titration
- (3) Sodium chloride I. P. by precipitation titration
- (4) Calcium gluconate I. P. by complexometry
- (5) Hydrogen peroxide I. P./B. P. by Permanganometry
- (6) Ferrous sulphate I. P. by cerimetry
- (7) Copper sulphate I. P. by iodometry

8 turns

III. Determination of Normality by electro-analytical methods

- (1) Conductometric titrations of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base (Using Sigmoidal and First order derivative plot)

3 turns

IV. Measurement of refractive index of some samples

(Glycerol, Water, Rectified Spirit, Castor Oil I. P.)

1 turn



Recommended Books

1. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Controller of Publications Edition, New Delhi.
2. British Pharmacopoeia, British Pharmacopoeia Commission, London, 2015.
3. Beckett, A.H. and Stenlake J. B., Practical Pharmaceutical Chemistry, Vol I, Stahlome Press, University of London.
4. Vogel, A. I., A Textbook of Quantitative Chemical Analysis, Thames Polytechnic, London, Longman Group, UK Ltd.
5. Connors K. A., A Textbook of Pharmaceutical Analysis, Third Edition, John Wiley and Sons.
6. Christian G. D., Analytical Chemistry, 6/Ed, John Wiley & Sons.
7. Mahadik K. R., Wadodkar S.G., More H. N, Pharmaceutical Analysis, Vol. I and II, Nirali Prakashan.
8. Kar Ashutosh, Pharmaceutical Drug Analysis, Minerva Press, New Delhi.
9. Day R. A. & Underwood A. L. Quantitative Analysis. 5/Ed., Prentice Hall of India Pvt.Ltd. New Delhi.
10. Skoog, A. D. West, D. M. et al. Fundamentals of Analytical Chemistry. 8/ Ed. Thomson Brookscole.
11. Willard Merit. Dean Settle, Instrumental Methods of Analysis, 7/Ed, CBS Publisher & Distributor.
12. Sharma, B. K. Instrumental Methods of Chemical Analysis, Goel Publishing House.



SAVITRIBAI PHULE PUNE UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY



Syllabus of Final Year B. Pharmacy
2018 Pattern (Revised)
(Effective from Academic Year 2021-2022)



BP702T

INDUSTRIAL PHARMACY -II (Theory)

45 Hours

Scope:

This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market.

Objectives: Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

Course Content:

UNIT-I

Pilot plant scale up techniques:

General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology.

10 Hours

UNIT-II

Technology development and transfer:

WHO guidelines for Technology Transfer (TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoU's, legal issues

10 Hours

UNIT-III

Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals

Regulatory requirements for drug approval:

Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical

10 Hours



Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

07 Hours

UNIT-IV

Indian Regulatory Requirements:

Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

08 Hours

UNIT-V

Quality management systems:

Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http://en.wikipedia.org/wiki/Regulatory_Affairs.
2. International Regulatory Affairs Updates, 2005. available at <http://www.iraup.com/about.php>
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs a Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at <http://www.cgmp.com/ra.htm>.



SEMESTER – VIII

BP801T

BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope:

To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives:

Upon completion of the course the student shall be able to

1. Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
2. Experiment)
3. Know the various statistical techniques to solve statistical problems
4. Appreciate statistical techniques in solving the problems.

Course content:

UNIT-I

10 Hours

Introduction:

Statistics, Biostatistics, Frequency distribution

Measures of central tendency:

Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion:

Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation:

Definition, Karl Pearson's coefficient of correlation, Multiple correlation -
Pharmaceuticals examples

UNIT-II

10 Hours

Regression:

Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$,
Multiple regression, standard error of regression- Pharmaceutical Examples

Probability:

Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties – problems, Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard



error of mean (SEM) - Pharmaceutical examples

Parametric test:

t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

UNIT-III.

10 Hours

Non Parametric tests:

Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research:

Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs:

Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology:

Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

UNIT-IV

08 Hours

Blocking and confounding system for Two-level factorials

Regression modeling:

Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

UNIT-V

07 Hours

Design and Analysis of experiments:

Factorial Design:

Definition, 2^2 , 2^3 design. Advantage of factorial design

Response Surface methodology:

Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery



Industrial Pharmacy-I

Objectives:

Upon completion of the course the student shall be able to

1. illustrate various pharmaceutical dosage forms and their manufacturing techniques.
2. describe various factors to be considered in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:

3 hours/ week

UNIT-I

03 Hours

Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

UNIT-II

14 Hours

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, preformulation and Formulation of tablets, granulation methods, compression and processing problems, Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.

c. Quality control tests: In process and finished product tests

Liquid orals: Preformulation, Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

UNIT-III

08 Hours

Capsules:

a. Hard gelatin capsules: Introduction, Production of hard gelatin capsule shells. Size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.



b. Soft gelatin capsules: Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

UNIT-IV

10 Hours

Parenteral Products:

- a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity
- b. Production procedure, production facilities and controls, aseptic processing
- c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.
- d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products. Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

UNIT-V

10 Hours

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; preformulation, formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.



Recommended Books: (Latest Editions)

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B. Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E. Aulton, Churchill livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

BP503.T. PHARMACOLOGY-II (Theory)

45 Hours

Scope:

This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.

Objectives: Upon completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases



Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,

Tannins: Catechu, Pterocarpus

Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

Glycosides: Senna, Aloes, Bitter Almond

Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

UNIT-III

06 Hours

Isolation, Identification and Analysis of Phytoconstituents

a) Terpenoids: Menthol, Citral, Artemisin

b) Glycosides: Glycyrrhetic acid & Rutin

c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine

d) Resins: Podophyllotoxin, Curcumin

UNIT-IV

06 Hours

Industrial production, estimation and utilization of the following phytoconstituents:

Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT V

12 Hours

Basics of Phytochemistry

Methods of extraction (Soxhlet, Maceration, Percolation, Supercritical fluid extraction, Microwave assisted extraction, Ultrasound assisted extraction, Solid Phase Extraction)

Application of latest techniques like Spectroscopy, Chromatography and electrophoresis in the isolation, purification and identification of crude drugs

Non-chromatographic separation techniques: Fractional distillation, fractional liberation, sublimation, chemical derivatization, fractional crystallization, centrifugation, Froth floatation technique.

BP 505 T. PHARMACEUTICAL JURISPRUDENCE (Theory)

45 Hours

Scope:

This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.



UNIT-III

10 Hours

Pharmacy Act –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and 122 Penalties

Medicinal and Toilet Preparation Act –1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.

Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV

08 Hours

Study of Salient Features of Drugs and Magic Remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties

National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)



common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention.

Recommended Books:

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

BP 404 T. PHARMACOLOGY-I (Theory)

45Hours

Scope:

The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs, mechanism of action, physiological and biochemical effects (Pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and route of administration of different classes of drugs.

Objectives: Upon completion of the subject, student shall be able to –

1. Understand the pharmacological actions of different categories of drugs.
2. Explain the mechanism of action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effects of drugs on animal by simulated experiments.



Drug discovery and clinical evaluation of new drugs:

Introduction to drug discovery, Preclinical evaluation and Clinical trials.

Introduction to Pharmacovigilance

Unit III

Pharmacology of drugs acting on Peripheral Nervous System **08 Hrs**

Introduction to Autonomic Nervous System, Parasympathomimetics, 01

Parasympatholytics, Sympathomimetics and Sympatholytics.

Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). 02

Local anaesthetic agents. 03

Drugs used in myasthenia gravis and glaucoma 02

Unit-IV

Pharmacology of drugs acting on central nervous system **10Hrs**

Neurohumoral transmission in the C.N.S.- 01

Special emphasis to be given on Importance of various neurotransmitters like with GABA, Glutamate, Glycine, Serotonin, Dopamine.

General anaesthetics and pre-anaesthetics 02

Sedatives, Hypnotics and Centrally acting muscle relaxants 03

Anti-epileptics 02

Alcohol and Disulfiram 02

Unit-V

Pharmacology of drugs acting on Central Nervous System **09Hrs**

Psychopharmacological agents: Antipsychotics, Antidepressants, Anti-anxiety agents, anti-manics and Hallucinogens 03

Drugs used in Parkinson's disease and Alzheimer's disease 02

CNS stimulants and Nootropics 02

Opioid analgesics and antagonists (including addiction, abuse, tolerance and dependence) 02



15. Advanced practical Medicinal Chemistry by Ashutosh Kar, 1st edition, New Age International Publications.
16. Vogel's Elementary Practical Organic Chemistry Small Scale Preparation by Arthur I., 2nd Edition, Part-I, CBS Publication.
17. Spectrometric identification of organic compounds by R. M. Silverstein, John Wiley and sons USA.
18. A Textbook of Pharmaceutical Chemistry by Chatten LG, Vol I & II, Marcel Dekker New York.
19. Analytical profiles of drug substances by Klaus Florey(All Volumes)

3.5.4 T Pharmacology-II

(3 hrs / week)

Topic No	Name of the topic and contents	Hrs
	<p><i>Pharmacology of drug shall includes : classification, mechanism of action, pharmacological actions, pharmacokinetics, therapeutic uses, adverse effects, drug interactions, contraindications, dosages, treatment of poisoning (if any)</i></p> <p><i>Pharmacotherapy shall include: Pharmacology of drug/s used for clinical management of diseases/ disorders</i></p>	
	SECTION I	
1	<p>Autonomic Nervous system:</p> <p>General Considerations: Sympathetic and Parasympathetic Nervous system with neurotransmitters and their receptors with Signal Transduction mechanisms</p>	03
2	<p>Cholinergic system and drugs:</p> <p>Biosynthesis, Storage, Release and Metabolism of Acetylcholine(ACh)</p> <p>Cholinergic receptors,</p> <p>Parasympathomimetics: Pharmacology of ACh and Anticholinesterase</p> <p>Organophosphorus Poisoning and its treatment</p> <p>Pharmacotherapy of Galucoma and Myasthenia gravis</p>	06



12	Androgens, Antiandrogens, and Anabolic Steroids	03
13	Estrogens, Progestins, <i>contraceptives</i> and Specific Estrogen Receptor Modulators (SERMs), Aromatase Inhibitors, <i>antiprogesterin</i>	03

Recommended Books:

1. Craig, C.R. and Stitzel, B.E.; Modern Pharmacology, Little Brown and Co, Boston
2. Crossland, James and; Lewis, S Pharmacology Basis of Therapeutics, (Pergamon Press, New York)
3. Goodman and Gilman; Pharmacological Basis of Therapeutics, McGraw-Hill
4. Katzung, B.G; Basic and Clinical Pharmacology, Lange Medical Publisher, USA
5. Rang, H.P. and Dale, M.M.; Pharmacology, Churchill Livingstone, UK
6. Satoskar, R.S. and Bhandarkar S.D. Pharmacology and Pharmacotherapeutics (Popular Prakashan, Bombay)
7. Sharma H.L. Sharma K. K. General Pharmacology Basic Concepts. Paras Publication.
8. Tripathi K. D. Essentials of Medical Pharmacology, Jaypee Publication.
9. Harrison's Principle and Practice of Medicine, 18th Edition, Churchill, Livingstone, London
10. Roger and Walker. Clinical Pharmacy and Therapeutics, Churchill, Livingstone, London.
11. Dipiro Joseph L. A pathophysiological Approach, Elsevier.
12. Davidson's Principle of Internal Medicine, Mc Graw-Hill companies.
13. Vyawahare N. S., and Vora S., General Pharmacology, Nirali Publication, Pune
14. Mycek M. J, Harvey, RA and Champe PC Lippincott's Illustrated Reviews: Pharmacology Lippincott Williams & Wilkins. Philadelphia.

3.5.4 P Pharmacology-II

(3 hrs / week)

Sr. No	Title of the Experiment
1	Introduction to commonly used instruments in experimental pharmacology.
2	Care and handling of common laboratory animals, animal welfare and introduction of CPCSEA and its guidelines, OECD guidelines.
3	Introduction to animal physiology with their biochemical reference values in various



5. Sheth UK, Dadkar NK and Kamat UG. selected topics in experimental pharmacology, (Kothari Book Depot, Mumbai)
6. Chatterjee, C.C., Human Physiology. Medical Allied Agency, Kolkata.
7. Ganong, W.F., Review of Medical Physiology. Prentice-Hall International, London.
8. Guyton, A.C., Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA.
9. Perry W.L.M. Pharmacological Experiments on Isolated Preparation, E&S Livingstone, London
10. Goyal R. K., Practicals in Pharmacology, B. S. Shah Prakashan, Ahmedabad

3.5.5 T Analytical Pharmacognosy & Extraction Technology

(3 hrs / week)

Learning objectives:

A) Knowledge: on completion of theory, learner should be able to:

1. Comprehend & explain underlying principle of mass transfer process in extraction, effect of various factors, specific care in herbal material, & various approaches in extraction processes with their theoretical consideration, methodological steps, & applications.
2. Understand & explain principle & applications of chromatographic & nonchromatographic separation methods.
3. Explain source material & extraction methods of phytochemicals specified; draw schematic representation of such processes;
4. Explain need of analysis of natural products & explain their significance; Understand & explain various parameters with their principles, significance & applications.

B) Skill: on completion of laboratory experiments, learner should be able to:

1. Explain & demonstrate correct handling of inflammable solvents & corrosive chemicals.
2. Generate micrometric data & identify the crude drugs.
3. Conduct successive extraction & qualitative tests to ascertain chemical nature of crude drugs.
4. Apply theoretical knowledge obtained for extraction of phytochemicals, set extraction assembly, process material before extraction; explain significance of use of various chemicals/solvents/ conditions; undertake extraction, verify extracted material by qualitative tests & report yield.



3	<p>3. Herbal drug analysis:</p> <p>A] Analysis: Types & need; meaning of identity, purity, potency & safety; social relevance of natural product analysis; difficulties in analysis of natural products; proximate phytochemical analysis: meaning, significance & method; adulteration: definition & types of adulteration.</p> <p>B] Sampling techniques: Principle & procedure of sampling</p> <p>C] Quality control (efficacy) parameters of herbal drugs: Principle, procedure & significance involved in determination of foreign matters, ash values, extractable matters, moisture content, volatile matters, volatile oil, bitterness value, haemolytic activity, tannin content, swelling index, foaming index (as per WHO).</p> <p>D] Quality control (safety) parameters of herbal drugs: Principle, procedure & significance involved in determination of pesticide residues, arsenic and toxic metals, microorganisms, aflatoxins, radioactive contamination.</p> <p>E] Overview of 'Good practices for pharmaceutical quality control laboratories' (as per WHO).</p>	15
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Recommended Books:

1. Evans W. C., Trease G. E., **Trease and Evan's Pharmacognosy**. W.B. Saunders, 2002. 16th Ed. ISBN-10: 0702029335.
2. Handa S. S., Suman Preet Singh Khanuja, Gennaro Longo, Dev Dutt Rakesh, **Extraction technologies for medicinal & aromatic plants**, International centre for science and high technology, Trieste, Italy, 2008.
3. Hans-Jörg Bart & Stephan Pilz, **Industrial Scale Natural Products Extraction**, Wiley-VCH Verlag & Co., Germany, 2011. ISBN: 978-3-527-32504-7.
4. Jean Bruneton, Caroline K. Hatton, **Pharmacognosy, Phytochemistry, Medicinal plants**. Lavoisier, 1999. ISBN 1898298637.
5. Kokate C. K., Gokhale S.B. and Purohit A.P., **Textbook of Pharmacognosy**, Nirali Prakashan, Pune, 2008, ISBN: 8185790094.
6. Mukherjee Pulok K., **Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals**. Business Horizons, 2002. ISBN 8190078844.
7. Otto Sticher, **Natural product isolation**. Natural Product Reporter, 25, 517-554, 2008. ([http://disruptechno2.free.fr/FMS/Natural%20product%20isolation%20\(Otto20Sticher\).pdf](http://disruptechno2.free.fr/FMS/Natural%20product%20isolation%20(Otto20Sticher).pdf))



3. Khandelwal K. R., **Practical Pharmacognosy**, Pragati Books Pvt. Ltd. ISBN8185790302.
4. Kokate C. K., **Practical Pharmacognosy**, VallabhPrakashan, 1993.
5. **Quality control methods for medicinal plant materials**, World HealthOrganization, Geneva, 1998. ISBN 9241545100.
6. Wallis T. E., **Practical Pharmacognosy**. J.A. Churchill Ltd., London, 1953.

3.5.6 T Pharmaceutical Business Management & Disaster Management

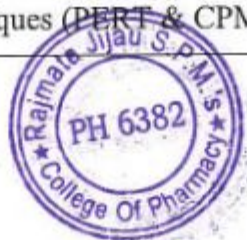
(3 hrs / week)

Learning Objective:

On completion of following theory topics learner should be able to: Know the fundamental of management theories.

1. To learn the Pharmaceutical business and management strategy.
2. To gain knowledge of marketing research, product management.
3. To learn about human resource and development needs.
4. To learn about the disaster management and preparedness, mitigation

Sr.no	Topic	Hrs.
1	Fundamentals of management: Management basic concepts: definition, need for management, function of management. Management thoughts, contribution of Taylor, Fayol, Peter Drucker in modern management. Functions and responsibilities of a manager	3
2	Planning: Nature and purpose of planning, important steps in planning, types of planning, planning process, advantages and limitations.	3
3	Objectives: Types of objectives, importance of objective, management by objectives, advantages and limitations.	2
4	Organizing: Organizational structure, basic principles of organization, departmentalization, delegation, decentralization, staffing, line & staff organization.	2
5	Decision making: Types of decision, Definition and Importance of decision making, Decision making process	2
6	Controlling: Concepts and purpose of control techniques, budgetary and non budgetary control, management audit, management information system, break even analysis, network techniques (PERT & CPM), profit including numerical	5



<p>Disaster preparedness for people and infrastructure, Community based disaster preparedness plan.</p> <p>Disaster Mitigation: meaning and concept, disaster mitigation strategies.</p> <p>The Disaster Management cycle.</p>	
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Recommended Books:

- 1) Peter Drucker; The Practice of management, Harper and Row, New York, 1954.
- 2) Harold Koontz, Cyril O'Donnel & Heinz Weihrich; Management, 7th edition, 1980.
- 3) P.C. Tripathi & P.N. Reddy; Principals of Management, Tata McGraw Hill publishing Co/ Ltd, 2nd edition, New Delhi.
- 4) Koontz H. & Weihrich H.; Essentials of Management, Tata McGraw Hill publishing Co/ Ltd, 5th edition, New Delhi, 1998.
- 5) Satya Saran Chatterjee; An Introduction to Management, The world Press Pvt. Ltd, 12th Edition, Calcutta, 1998.
- 6) G. Vidyasagar; Pharmaceutical Industrial Management, Pharma book Syndicate, Hyderabad, 2005.
- 7) Philip Kotler & Gary Armstrong; Principles of Marketing, Pearson Education Pvt. Ltd., 10th Edition, Singapore, 2005.
- 8) Mickey Smith; Principles of Pharmaceutical Marketing, CBS Publisher & Distributors, 3rd Edition, New Delhi, 2001.
- 9) J.C. Gandhi; Marketing A Managerial Intoduction, Tata McGraw Hill publishing Co/ Ltd, 8th Edition New Delhi, 1995.
- 10) Mickey Smith; Pharmaceutical Marketing in the 21th Century, Viva Books Pvt. Ltd., New Delhi, 2001.
- 11) Horngren, Sundem & Stratton; Introduction to Management Accounting, Prentice Hall of India Pvt. Ltd., 11th Edition, New Delhi, 2000.
- 12) Cost Accounting & Management Accounting: Everest Publication, New Delhi.
- 13) Principles and Methods of Pharmacy Management by Harry Smith.
- 14) Marketing Management by Philip Kotlar.
- 15) Marketing in New Millennium by Dr. M. J. Xavier, 1998.
- 16) Principles and Management: Koonz O' Donnel.
- 17) Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
- 18) Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.



Glucosidase inhibitors: Acarbose, Voglibose.

DPP IV inhibitors -Sitagliptin, Tenzeligliptin

SGLT2 inhibitors – Empagliflozin, Canagliflozin

b) **Local Anesthetics:** SAR of Local anesthetics

Benzoic Acid derivatives; Mepylcaine, Cyclomethycaine, Piperocaine.

Amino Benzoic acid derivatives: Benzocaine, Procaine, Butacaine, Propoxycaine, Tetracaine.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.

Miscellaneous: Phenacaine

[Tolbutamide, Benzocaine]

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Graham L. Patrick's An Introduction to Medicinal Chemistry
4. Burger's Medicinal Chemistry, Vol I to IV.
5. Introduction to principles of drug design- Smith and Williams.
6. Remington's Pharmaceutical Sciences.
7. Martindale's extra pharmacopoeia.
8. Organic Chemistry by I.L. Finar, Vol. II.
9. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. I to 5.
10. Indian Pharmacopoeia.
11. Text book of practical organic chemistry-A.I.Vogel.

BP 502 T. Industrial Pharmacy I (Theory)

45 Hours

Scope:

Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.



Syllabus for

Ability Enhancement Compulsory Course (AECC – Environment Studies)(2 credit) for under graduate

(For All Faculties - Second Year - Semester III)

It is as per UGC guidelines and framing -

Unit 1 : Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

(2 lectures)

Unit 2 : Ecosystems

• What is an ecosystem? Structure and function of ecosystem ; Energy flow in an ecosystem : food chains, food webs and ecological succession. Case studies of the following ecosystems :

- a) Forest ecosystem
- b) Grassland ecosystem
- c) Desert ecosystem
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(8 lectures)

Unit 3 : Natural Resources : Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over-exploitation of surface and ground water, floods, droughts conflicts over water (international & inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

(10 lectures)

Unit 4 : Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity : Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services : Ecological, economic, social, ethical, aesthetic and Informational value.

(10 lectures)

References :

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.



3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339 : 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics : An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology : Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York : Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.



Syllabus for

Ability Enhancement Compulsory Course (AECC – Environment Studies)(2 credit) for under graduate

(For All Faculties - Second Year - Semester IV)

It is as per UGC guidelines and framing -

Unit 5 : Environmental Pollution

- Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management : Control measures of urban and industrial waste.
- Pollution case studies.

(10 lectures)

Unit 6 : Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

(9 lectures)

Unit 7 : Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management : floods, earthquake, cyclones and landslides.
- Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).

(6 lectures)

Unit 8 : Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.



- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

(Equal to 5 lectures)

References :

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339 : 36-37.
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9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
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12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.
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19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York : Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.



[Handwritten Signature]
PRINCIPAL
 Rajmata Jijau Shikshan Prasarak Mandal's
COLLEGE OF PHARMACY
 Dudulgaon, Pune-412 105.

Scope: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Objectives: Upon completion of the course the student shall be able to:

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

COURSE CONTENT

Unit-I

The Multidisciplinary nature of environmental studies Natural Resources Renewable and non-renewable resources:

10hours

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources

Unit-II

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

10hours

Unit-III

Environmental Pollution: Air pollution; Water pollution; Soil pollution

10 hours

Recommended Books:

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment





RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S COLLEGE OF PHARMACY (B.Pharm.)

Approved by PCI, AICTE, Govt. of Maharashtra & DTE
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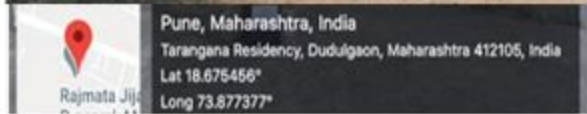
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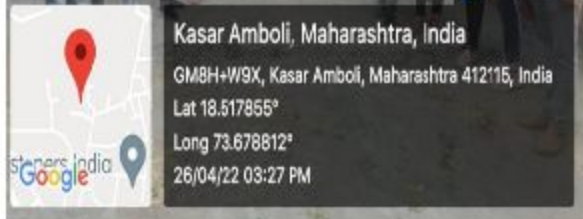
Professional Ethics



**Celebration of "World Pharmacist Day"
Organizing Pharma Rally for Public awareness**



**Events organized during National
Pharmacist Week**



**Industrial Visit At
Chakan Life Sciences Pvt. Ltd.**



Industrial Visit At NULIFE Pharmaceutical



RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S COLLEGE OF PHARMACY

Affiliated to Savitribai Phule Pune University

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Gat No. - 101 / 102, At - Dudulgaon, Post - Alandi, Tal. - Haveli, Dist. - Pune - 412105

Fax : 020-20280544 Email : rjspmcp123@gmail.com Web : www.rjspmpharmacy.com

Hon. Shri. Vilasrao Lande (Ex. M.L.A.)
President

Hon.Mr. Vishwanath Korde
Secretary

Hon.Mr. Ajit Gavhane
Treasurer

CONSTITUTION OF GENDER SENSITIZATION CELL

A.Y. 2020-21

Name of the College:

RJSPM's College of Pharmacy, A/P- Dudulgaon, Alandi, Tal: Haveli, Pune-412105

Name of the managing society:

Rajmata Jijau Shikshan Mandal, Landewadi, Bhosari, Pune-411039

The committee constitution is as follows:

Sr. No.	Designation	Name of committee member	Representation
1	Presiding Officer	Prof. Archana K. Thikekar	Assistant Professor
2	Member	Prof. Chaitali C. Dongaonkar	Assistant Professor
3	Member	Prof. Priyanka S Deorankar	Assistant Professor
4	Member	Prof. Jeevan Dhumal	Assistant Professor
5	Member	Mr. Girme Mahesh	Non-teaching staff
6	Member	Ms.Komal Thakur	Non-teaching staff
7	Member	Ms. Prajakta Borate	Student Representative
8	Member	Ms. Nidhi Makadiya	Student Representative
9	Member	Ms. VimalaChoudhary	Student Representative
10	Member	Ms. Sanchita Patole	Student Representative
11	Member	Mrs. Smita Jadhav	External member

Date: 16/07/2020

Place: Dudulgaon



PRINCIPAL

Rajmata Jijau Shikshan Prasarak Mandal's
COLLEGE OF PHARMACY
Dudulgaon, Pune-412 105.



RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S COLLEGE OF PHARMACY (B.Pharm.)

Approved by PCI, AICTE, Govt. of Maharashtra & DTE
Affiliated to Savitribai Phule Pune University, Pune
DTE Code:- 6382 University Code:- CPHPO13150



Certified by ISO 9001-2015,
ISO : 14001-2015

Recognised as Green Educational
Campus

Hon. Shri. Vilasrao V. Lande
President

Hon. Shri. Sudhir V. Mungase
Secretary

Hon. Shri. Ajit D. Gavhane
Treasurer

Dr. Kishor S. Jain
Principal

Gender Equality



Pune, Maharashtra, India
Tarangana Residency, Dudulgaon, Maharashtra 412105, India
Lat 18.675456*
Long 73.877377*



MVGG-6M5, Dudulgaon, Maharashtra 412105, India
Latitude 18.675495* Longitude 73.877006*
LOCAL 14:21:43 GMT 08:51:43 TUESDAY 04.12.2022 ALTITUDE 508 METER

Celebration of Cultural Events



Pune, Maharashtra, India
Tarangana Residency, Dudulgaon, Maharashtra 412105, India
Lat 18.675456*
Long 73.877377*

Outdoor Sports competition



MIT COLLEGE ALANDI
Indryani nagar
Maharashtra
India 28°C
2020-02-15(Sat) 11:07(AM) 82°F

Indoor Sports competition

Active participation in NirbhayKanya Abhiyan





RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S COLLEGE OF PHARMACY (B.Pharm.)

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Secretary

Hon. Shri. Ajit D. Gavhane
Treasurer

Dr. Kishor S. Jain
Principal



Celebration of International Women's Day celebration

Human Values



Blood donation Camp



Health Check-up Camp





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Secretary

Hon. Shri. Ajit D. Gavhane
Treasurer

Dr. Kishor S. Jain
Principal



Street play & Rally in NSS camp



NSS Camp



Participation in Pulse Polio Campaign



Awareness about International Day of Person with Physical Disability





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Treasurer

Dr. Kishor S. Jain
Principal

Environment and Sustainability



Pune, Maharashtra, India
Tarangana Residency, Dudulgaon, Maharashtra 412105, India
Lat 18.675456°
Long 73.877377°

Tree Plantation



Latitude 18:14:24.6690999999992...
Longitude 73:58:26.4133000000148...
Altitude 0

Swachata Abhiyan at Tulapur



Pune, Maharashtra, India
Tarangana Residency, Dudulgaon, Maharashtra 412105, India
Lat 18.675456°
Long 73.877377°

Ecofriendly Ganapati Visarjan



Pune, Maharashtra, India
Tarangana Residency, Dudulgaon, Maharashtra 412105, India
Lat 18.675456°
Long 73.877377°
23/10/21 03:27 PM

Organization of Plastic free campus drive



Sudhir
PRINCIPAL
Rajmata Jijau Shikshan Prasarak Mandal's
COLLEGE OF PHARMACY
Dudulgaon, Pune-412 105.



Certificate of Registration

Rajmata Jijau Shikshan Prasarak Mandal's EDUCATION CAMPUS

Institute of Computer & Management Research (MBA)
Institute of Pharmacy (D. Pharm), College of Pharmacy (B.Pharm)
School of Nursing (GNM), Dnyanbhakti Junior College (ACS)
Dnyanbhakti International School

Gat No. 101/102, Moshi Alandi Road, Dudulgaon,
PCMC, Pune- 412 105, Maharashtra, India.

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Scope of Registration
For Preventing Pollution, Conserving Natural Resources
and Complying Environmental Regulatory Requirements.

Certificate Date : 08 October 2020

Valid Until : 07 October 2023

CERTIFICATE NO.: 1571552586



S. P.
AUTHORISED
SIGNATORY

IPQC Certification (info@ipqc.co.uk/www.ipqc.co.uk)

Corporate Office : 7, Merry Terrace Woking, London FU21 3EH, UK

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before due date of audit (Incase if surveillance audit is not conducted, this certificate shall be suspended/withdrawn)

The validity of this certificate can be verified at www.ipqc.co.uk

ISO 14001:2015

Certificate of Registration

This is to Certify that
Environmental Management System of

**RAJMATA JIJAU SHIKSHAN PRASARAK MANDAL'S
EDUCATION CAMPUS**

INSTITUTE OF COMPUTER & MANAGEMENT RESEARCH (MBA), COLLEGE OF PHARMACY (B. PHARM)
INSTITUTE OF PHARMACY (D. PHARM), SCHOOL OF NURSING (GNM), DNYANBHAKTI
JUNIOR COLLEGE (ACS) DNYANBHAKTI INTERNATIONAL SCHOOL.

GAT NO. 101/102, MOSHI ALANDI ROAD, DUDULGAON, PUNE- 412105,
MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

PROVISION OF EDUCATIONAL SERVICES IN MBA (SPPU), B.PHARM.(SPPU),
D.PHARM.(MSBTE), GNM (MSBNPE), XI, XII, ARTS, COMMERCE & SCIENCE
(HSC BOARD, PUNE) AND PRE-PRIMARY, PRIMARY & SECONDARY
EDUCATION (SSC/CBSE)

Certificate No.	: 201EFE45	Issuance Date	: 06/10/2020
Initial Registration Date	: 06/10/2020		
Date of Expiry*	: 05/10/2023		
1st Surve. Due	: 06/09/2021	2nd Surve. Due	: 06/09/2022

Director



ACCREDITED
Management Systems
Certification Body
MSCB-119



AQC MIDDLE EAST FZE

Head Office: E1-1401 E Amber Gem Tower, Shree Jijau Bldg, Sayed Road, 2, Ajman, UAE. e-mail: info@aqcworld.com

Key Location: 403, Madhuban Building, 55, Nehru Place, New Delhi-110019, India.

*Validity of the Certificate is subject to successful completion of surveillance audits on or before of due date. (In case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawn.)

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D.PHARM.(MSBTE), GNM (MSBNPE), XI, XII, ARTS, COMMERCE & SCIENCE
(HSC BOARD, PUNE) AND PRE-PRIMARY, PRIMARY & SECONDARY
EDUCATION (SSC/CBSE)

Certificate No	: 20IQFS37	Issuance Date	: 06/10/2020
Initial Registration Date	: 06/10/2020		
Date of Expiry*	: 05/10/2023		
1st Surve. Due	: 06/09/2021	2nd Surve. Due	: 06/09/2022


Director



ACCREDITED
Management Systems
Certification Body
MSCB-119



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