

ORIENTAL UNIVERSITY, INDORE
FACULTY OF PHARMACY

B. Pharm.
Program Outcomes

PO1:Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO2:Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO3:Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO4:Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO5:Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

PO6:Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. healthcare professionals, promoters of health, educators, managers, employers, employees).

PO7:Pharmaceutical Ethics: Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO8:Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO9:The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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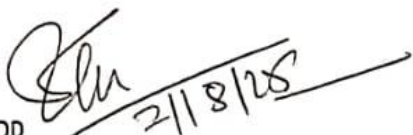
ORIENTAL UNIVERSITY, INDORE
FACULTY OF PHARMACY

B. Pharm.
Program Outcomes

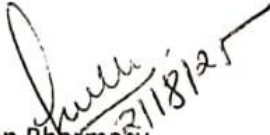
PO10:Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO11:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

HOD


Faculty of Pharmacy
Dr. Sachin Kumar Jain

Dean Pharmacy


Faculty of Pharmacy
Dr. Sudha Vengurlekar

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Human Anatomy and Physiology-I
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP101T	Human Anatomy And Physiology-I	3	1	-	4	75	15	10	100	-	-	-	100
BP107P	Human Anatomy and Physiology– Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP102T: BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

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

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system.

Course Outcomes:

CO1: Describe the gross morphology, structure, and functions of various organs and systems of the human body.

CO2: Explain homeostatic mechanisms, their physiological regulation, and the consequences of imbalances.

CO3: Identify and classify different types of cells, tissues, bones, joints, and muscles along with their structural and functional characteristics.

CO4: Interpret the composition and functions of body fluids, blood, lymph, and their related disorders, including mechanisms like coagulation and blood grouping.

CO5: Explain the anatomy and physiology of the peripheral nervous system, special senses, and cardiovascular system, including regulatory mechanisms and associated disorders.

Course Content:

UNIT-I

10 hours

- **Introduction to human body**

Definition and scope of anatomy and physiology, levels of structural organization and body system, basic life processes, homeostasis, basic life processes, homeostasis, basic anatomical terminology.

- **Cellular level of organization**

Anatomical terminology. Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine

- **Tissue level of organization**

Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

UNIT-II

10 hours

- **Integumentary system**

Structure and functions of skin

- **Skeletal system**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**

Structural and functional classification, types of joints movements and its articulation

UNIT-III

10 hours

- **Body fluids and blood**

Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.

- **Lymphatic system**

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

UNIT-IV

8 hours

- **Peripheralnervoussystem:**

Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranialnerves.

- **Specialsenses**

Structure and functions of eye, ear, nose and tongue and their disorders.

UNIT-V

7 hours

- **Cardiovascular system**

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

4 Hours/week

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Text Books:

1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
2. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
3. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterje , Academic Publishers Kolkata

Web references

1. https://scholar.google.com/scholar?q=related:1tPuOuafVWMJ:scholar.google.com/&scioq=human+anatomy+and+physiology+1&hl=en&as_sdt=0,5
2. https://scholar.google.com/scholar?cluster=7326600801335800306&hl=en&as_sdt=0,5
3. <https://miemagazine.com/sample/Psychology/PC301-400/PC350/sample-Anatomy%20and%20Physiology%20The%20Unity%20of%20Form%20and%20Function%209th%2009E.pdf>

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmaceutical analysis -I (Theory)
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP102T	Pharmaceutical analysis -I (Theory)	3	1	-	4	75	15	10	100	-	-	-	100
BP108P	Pharmaceutical Analysis I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP102T:PHARMACEUTICAL ANALYSIS -I (Theory)

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

1. understand the principles of volumetric and electro chemical analysis
2. carryout various volumetric and electrochemical titrations
3. develop analytical skills

Course Outcomes:

CO1: Understand the classification of different analytical techniques useful in drug analysis.

CO2: Integrate physicochemical and electrochemical properties of drugs with analytical methods.

CO3: Comprehend the importance of potential errors and apply strategies for their reduction.

CO4: Remember the principle, advantages, challenges, and applications of electrochemical analysis.

CO5: Describe the principle and application of titrimetric methods.

Course Content

UNIT-I

10 hours

(a) Pharmaceutical analysis- Definition and scope i) Different techniques of analysis ii) Methods of expressing concentration iii) Primary and secondary standards. iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate (b)Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures (c)Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

UNIT-II

10 hours

• 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 • Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

UNIT-III

10 hours

Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride. • Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. • Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. • Basic Principles,methods and application of diazotisation titration

UNIT-IV**8 hours**

Redox titrations (a) Concepts of oxidation and reduction (b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

UNIT-V**7 hours**

• Electrochemical methods of analysis • Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications. • Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. • Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

Text Books:

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis

Reference Books:

1. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
2. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia.

Web references

1. https://repository.stikesbcm.ac.id/id/eprint/275/1/MCU_2017_Pharmaceutical_Analysis_A_Textbook_for_Pharmacy_Students.pdf
2. <https://www.classcentral.com/course/xuetangx-pharmaceutical-analysis-369536>

List Of Experiments

I Limit Test of the following (1) Chloride (2) Sulphate (3) Iron (4) Arsenic

II Preparation and standardization of (1) Sodium hydroxide (2) Sulphuric acid (3) Sodium thiosulfate (4) Potassium permanganate (5) Ceric ammonium sulphate

III Assay of the following compounds along with Standardization of Titrant (1) Ammonium chloride by acid base titration (2) Ferrous sulphate by Cerimetry (3) Copper sulphate by Iodometry (4) Calcium gluconate by complexometry (5) Hydrogen peroxide by Permanganometry (6) Sodium benzoate by non-aqueous titration (7) Sodium Chloride by precipitation titration

IV Determination of Normality by electro-analytical

Text Books:

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis

Reference Books:

1. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
2. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia.

Web references

1. <https://svcpsondy.ac.in/wp-content/uploads/2020/12/P.ANALYSIS-lab-manual.pdf>
2. <https://cms.pharmacy.iqcity.in/wp-content/uploads/2025/04/Pharmaceutical-Analysis-I.pdf>

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmaceutics-I (Theory)
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP103T	PHARMACEUTICS-I(Theory))	3	1	-	4	75	15	10	100	-	-	-	100
BP109P	Pharmaceutics I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP103T. PHARMACEUTICS-I (Theory)

Course Objectives:

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

1. Know the history of profession of pharmacy.
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations.
3. Understand the professional way of handling the prescription.
4. Preparation of various conventional dosage forms.

Course Outcomes:

CO1: Explain the historical development of the pharmacy profession in India, its scope, related organizations, and major pharmacopoeias.

CO2: Classify and describe various dosage forms, prescriptions, posology concepts, and perform pediatric dose calculations.

CO3: Apply pharmaceutical calculations for formulation preparation, including percentage solutions, alligation, proof spirit, and isotonic solutions.

CO4: Describe the composition, preparation methods, advantages, disadvantages, and stability considerations of powders, liquid, biphasic, and semi-solid dosage forms.

CO5: Identify and resolve pharmaceutical incompatibilities and evaluate dosage forms based on established pharmacopeial standards.

Course Content:

UNIT-I

10Hours

• **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, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.

• **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

10Hours

- **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.

UNIT-III

08Hours

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**
- **Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.
- **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

UNIT-IV

08Hours

- **Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

UNIT-V

07Hours

- **Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms.

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

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

6. Emulsions

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

7. Powders and Granules

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

8. Suppositories

- a) Glycerogelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

9. Semisolids

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

10. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash

Text 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,TheScience&Dosage FormDesign,Churchill Livingstone, Edinburgh.

Reference Books:

1. IsaacGhebre Sellassie:Pharmaceutical Pelletization Technology, Marcel Dekker,INC, New York.
2. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
3. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

Web references

1. <https://pubmed.ncbi.nlm.nih.gov/30570996/>
2. <https://books.google.com/books?hl=en&lr=&id=rrtGKQxcoWIC&oi=fnd&pg=PP1&dq=pharmaceutics+1&ots=-uA9v5NIMt&sig=8PjsBZ-C5Nzufy7t8Sm56PH12rQ>
3. https://scholar.google.com/scholar?cluster=7908172288322064551&hl=en&as_sdt=0,5

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmaceutical Inorganic chemistry (Theory)
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP104T	PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)	3	1	-	4	75	15	10	100	-	-	-	100
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP104T:PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

Course Objectives:

Upon completion of course students shall be able to:

1. Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. Understand the medicinal and pharmaceutical importance of inorganic compounds

Course Outcomes:

CO1: Explain the history of pharmacopoeia, sources and types of impurities in pharmaceuticals, and perform limit tests for various inorganic contaminants.

CO2: Describe the principles, preparation, and applications of acids, bases, buffers, isotonic solutions, major electrolytes, and dental products.

CO3: Classify and explain the uses, preparation methods, and properties of inorganic compounds used as gastrointestinal agents and antimicrobials.

CO4: Discuss the properties, medicinal uses, and preparation of miscellaneous compounds including expectorants, emetics, haematinics, poisons, antidotes, and astringents.

CO5: Explain the basic concepts of radioactivity, measurement techniques, and pharmaceutical applications of radiopharmaceuticals along with their safe handling and storage.

Course Content:

UNIT I

10Hours

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate
- **General methods of preparation,** assay for the compounds superscripted with asterisk

(*),properties and medicinal uses of inorganic compounds belonging to the following classes

UNIT II

10Hour

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

UNIT III

10Hours

- **Gastrointestinal agents**
Acidifiers: Ammonium chloride and Dil. HCl
Antacid: Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate, Aluminum hydroxide gel, Magnesium hydroxide mixture
Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite
Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide, Chlorinated lime, Iodine and its preparations

UNIT IV

08Hours

- **Miscellaneous compounds**
Expectorants: Potassium iodide, Ammonium chloride*. **Emetics:** Copper sulphate, Sodium potassium tartarate
Haematinics: Ferrous sulphate, Ferrous gluconate
Poison and Antidote: Sodium thiosulphate, Activated charcoal, Sodium nitrite
Astringents: Zinc Sulphate, Potash Alum

UNIT V

07 Hours

- **Radio pharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I^{131} , Storage conditions, precautions & pharmaceutical application of radioactive substances.

BP110P.PHARMACEUTICAL INORGANIC CHEMISTRY (Practical) 4Hours/Week

I. Limit tests for following ions

- Limit test for Chlorides and Sulphates Modified limit test for Chloride and Sulphates
- Limit test for Iron
- Limit test for Heavy metals
- Limit test for Lead
- Limit test for Arsenic

II. Identification test

- Magnesium hydroxide
- Ferrous sulphate
- Sodium bicarbonate
- Calcium gluconate
- Copper sulphate

III. Test for purity

- Swelling power of Bentonite
- Neutralizing capacity of aluminum hydroxide gel
- Determination of potassium iodate and iodine in potassium Iodide

IV. Preparation of inorganic pharmaceuticals

- Boric acid
- Potash alum
- Ferrous sulphate

Text Books:

1. A.H.Beckett & J.B.Stenlake's, Practical Pharmaceutical Chemistry Vol I&II, Stahlone Press of University of London, 4th edition.
2. A.I.Vogel, Text Book of Quantitative Inorganic analysis
3. P.Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition

Reference Books:

1. M.L.Schroff, Inorganic Pharmaceutical Chemistry
2. Bentley and Driver's Textbook of Pharmaceutical Chemistry
3. Anand & Chatwal, Inorganic Pharmaceutical Chemistry

Web references

1. https://scholar.google.com/scholar?cluster=11551047516043319606&hl=en&as_sdt=0,5
2. <https://books.google.com/books?hl=en&lr=&id=fhwxZ5bGuBgC&oi=fnd&pg=PA1&dq=pharmaceutica+l+inorganic+chemistry&ots=xE1Kctvo6&sig=TKFOfnYjf7ZKGNABCFDj2dXbZYk>
3. https://books.google.com/books?hl=en&lr=&id=lyv8EAAAQBAJ&oi=fnd&pg=PR5&dq=pharmaceutic+al+inorganic+chemistry&ots=CznLMjdSJa&sig=HngUZ_Xg2uzKwjVC3IEJEXQ43P4

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Communication skills – Theory
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
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BP105T	Communication skills – Theory	3	1	-	4	35	10	5	50	-	-	-	50
BP111P	Communication skills – Practical	2	-	1	1	-	-	-	-	15	5	5	25

BP105T: Communication skills

Course Objectives:

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

Course Outcomes:

CO1: Understand the importance of English communication in the modern world, including formal/informal and directional communication networks

CO2: Grasp and apply various presentation and business correspondence formats—memos, reports, agendas, etc.

CO3: Connect English communication with industrial and societal contexts; draft professional correspondence like letters, CVs, etc.

CO4: Use technology-based communication tools like email, video conferencing, mobile, computers effectively

CO5: Communicate orally with strong soft skills emphasis

UNIT-I

Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barrierstocommunication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

UNIT-II

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

Communication Styles: Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

UNIT-III

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

Effective Written Communication: Introduction, When and When Not to Use Written Communication – Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication

Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

UNIT-IV

Interview Skills: Purpose of an interview, Do's and Dont's of an interview

Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

UNIT-V

Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

The following learning modules are to be conducted using words worth® English language lab software

Basic communication covering the following topics

Meeting People
Asking Questions
Making Friends
What did you do?
Do's and Dont's

Pronunciations covering the following topics

Pronunciation (Consonant Sounds)
Pronunciation and Nouns
Pronunciation (Vowel Sounds)

Advanced Learning

Listening Comprehension / Direct and Indirect Speech
Figures of Speech
Effective Communication
Writing Skills
Effective Writing
Interview Handling Skills
E-Mail etiquette
Presentation Skills

Text Books:

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communicationskills, SanjayKumar, Pushpalata, 1st Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen.P. Robbins, 1st Edition, Pearson, 2013
4. Brilliant-Communicationskills, Gill Hasson, 1st Edition, Pearson Life, 2011

Reference Books:

1. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5th Edition, Pearson, 2013
2. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
3. Communicationskillsforprofessionals, Konarnira, 2nd Edition, Newarrivals–PHI, 2011

Web references

1. Wikipedia
2. Delnet
3. Slideshare

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Remedial Mathematics
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP106RMT	Remedial Mathematics	2	-	-	2	35	10	5	50	-	-	-	50

BP106RMT: REMEDIAL MATHEMATICS

Course Objectives:

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Course Outcomes:

- CO1:** Simplify expressions and solve equations using logarithmic rules.
CO2: Conduct matrix operations, evaluate determinants, and solve systems of linear equations.
CO3: Execute differentiation and integration techniques on diverse functions.
CO4: Apply mathematical methods to model and resolve real-world problems.
CO5: Perform partial fraction decompositions and apply them in integration and solving ODEs.

UNIT-I Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics

Logarithms• Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

Function: Real Valued function, Classification of real valued functions,

Limits and continuity : $\delta - \epsilon$ Introduction, Limit of a function, Definition of limit of a function (n n definition), $\lim_{n \rightarrow \infty} a^{-x} = 1 - n$, $\lim_{x \rightarrow 0} 1 = \theta \sin$

UNIT-II : Matrices and Determinant:• Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix, Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley-Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations

UNIT-III Calculus

Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – Without Proof, Derivative of x^n w.r.t.x, where n is any rational number, Derivative of e^x , Derivative of $\log_e x$,

Derivative of a x ,Derivative of trigonometric functions from first principles (without Proof), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

UNIT–IV Analytical Geometry

Introduction: Signs of the Coordinates, Distance formula,

Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line

Integration: Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

UNIT–V Differential Equations : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations.**

Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Text Books:

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.

Reference Books:

1. Integral Calculus by Shanthinarayan
2. Higher Engineering Mathematics by Dr.B.S.Grewal

Web references

1. Wikipedia
2. Delnet
3. Slideshare

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Remedial Biology
B. Pharmacy 1st Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP106R BT	Remedial Biology– Theory	3	1	-	4	35	10	5	50	-	-	-	50
BP112R BP	Remedial Biology– Practical	2	-	1	1	-	-	-	-	15	5	5	25

BP106RBT : Remedial Biology

Course Objectives:

1. To know the techniques in the cultivation and production of crude drugs
2. To know the crude drugs, their uses and chemical nature
3. Know the evaluation techniques for the herbal drugs
4. To carry out the microscopic and morphological evaluation of crude drugs

Course Outcomes:

CO1: To know the classification and salient features of five kingdoms of life.

CO2: Understand the basic components of anatomy & physiology of plant

CO3: To know understand the basic components of anatomy & physiology animal with special reference to human

CO4: Know the importance and the coordinated working pattern of different organs of each system.

UNIT–I Diversity in the living world

Definition and characters of living organisms

•Living world: Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,

• Binomial nomenclature

• General Anatomy of Root, stem, leaf of monocotyledons

Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.

•Morphology of Flowering plants & Dicotylidones

UNIT–II Digestion and Absorption Digestion, absorption and assimilation of digested food• Role of digestive enzymes • Human alimentary canal and digestive glands • Breathing and respiration Human respiratory system• Mechanism of breathing and its regulation• Exchange of gases, transport of gases and regulation of respiration• Respiratory volumes

UNIT–III . Excretory products and their elimination Modes of excretion• Human excretory system-structure and function• Urine formation• Rennin angiotensin system• Neural control and coordination Definition and classification of nervous system• Structure of a neuron• Structure of brain and spinal cord• Generation and conduction of nerve impulse • Functions of cerebrum, cerebellum, hypothalamus and

medulla oblongata• Chemical coordination and regulation Functions of hormones secreted by endocrine glands• Endocrine glands and their secretions • Human reproduction Parts of female reproductive system• Parts of male reproductive system• Menstrual cycle• Spermatogenesis and Oogenesis

UNIT–IV Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation• Essential mineral, macro and micronutrients •Plants and mineral nutrition: Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting•Photosynthesis photosynthesis.

UNIT–V Plant respiration:Respiration, glycolysis, fermentation (anaerobic). Phases and rate of plant growth, Condition of growth,Introduction to plant growth•Plant growth and development regulators Structure and functions of cell and cell organelles.Cell division•Cell - The unit of life Definition, types of tissues, location and functions. •Tissues

Text Books:

1. Text book of Biology by S. B. Gokhale
2. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram

Reference Books:

- 1.A Text book of Biology by B.V. Sreenivasa Naidu
2. A Text book of Biology by Naidu and Murthy
3. Botany for Degree students By A.C.Dutta.

Web references

1. <https://rnpd.in/product/remedial-biology/>
2. <https://pharmatutor.net/remedial-biology-notes-pdf/>

BP112RBP.REMEDIAL BIOLOGY (Practical)

1. Introduction to experiments in biology a) Study of Microscope b) Section cutting techniques c) Mounting and staining d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Human Anatomy & Physiology-II
B. Pharmacy 2nd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP201T	Human Anatomy And Physiology II– Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP207P	Human Anatomy and Physiology II– Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP201T :Human Anatomy & Physiology-II

Course Objectives:

1. Explain the gross morphology, structure and functions of various organs of the human body
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body
4. Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system

Course Outcomes:

CO1: Describe the anatomy and physiology of various organ systems such as the cardiovascular, lymphatic, respiratory, digestive, urinary, endocrine, and reproductive systems.

CO2: Explain the mechanisms of regulation, control, and integration of these systems in maintaining homeostasis.

CO3: Correlate the structure of each organ with its physiological functions and understand the consequences of altered functions (pathophysiological basis).

CO4: Illustrate the processes of blood circulation, respiration, digestion, excretion, hormonal regulation, and reproduction through diagrams and flowcharts.

CO5: Apply the acquired knowledge to identify the effects of drugs, diseases, or environmental factors on the normal functioning of these systems.

UNIT-I

Nervous system

- Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

UNIT-II

Digestive system

- Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, Energetics
- movements of GIT, digestion and absorption of nutrients and disorders of GIT. Formation and role of ATP, Creatinine Phosphate and BMR.

UNIT-III

Respiratory system

- Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

Urinary system

- Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

UNIT-IV

Endocrine system

- Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

UNIT-V

Reproductive system

- Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition
- Introduction to genetics
- Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance
- .

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Text Books:

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

Web references

1. University of North Dakota – BIMD 221 (Anatomy & Physiology II)
2. Portage Learning – BIOL 252 (A&P II w/ Lab)
3. WWCC – BIOL& 242 (Human A&P II)

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
PHARMACEUTICAL ORGANIC CHEMISTRY –I
B. Pharmacy 2nd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP202T	Pharmaceutical organic chemistry I – Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP208P	Pharmaceutical organic chemistry I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP202T: PHARMACEUTICAL ORGANIC CHEMISTRY –I

Course Objectives:

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound
5. on mechanisms and orientation of reactions.

Course Outcomes:

CO1: Explain the classification, nomenclature, structure, and isomerism of organic compounds relevant to pharmaceuticals.

CO2: Describe the nature of chemical bonding, electronic effects, and reaction mechanisms (including free radical, electrophilic, and nucleophilic reactions).

CO3: Identify the chemistry and reactivity of functional groups such as alkanes, alkenes, alkynes, cycloalkanes, halogenated hydrocarbons, alcohols, ethers, and amines.

CO4: Correlate the structure–activity relationships of organic compounds with their chemical properties and biological activities.

CO5: Apply principles of organic chemistry to predict the products of organic reactions and propose synthetic pathways.

UNIT-I

Classification, nomenclature and isomerism Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds

UNIT-II

Alkanes*, Alkenes* and Conjugated dienes* SP³ hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP² hybridization in alkenes E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2

reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

UNIT-III

Alkyl halides* SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol,•Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform. chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV

Carbonyl compounds* (Aldehydes and ketones) Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

UNIT-V

Carboxylic acids* Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and• uses of Ethanolamine, Ethylenediamine, Amphetamine

BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY -I (Practical)

4 Hours / week

A. Systematic qualitative analysis of unknown organic compounds like

1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc. 2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
3. Solubility test
4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
5. Melting point/Boiling point of organic compounds
6. Identification of the unknown compound from the literature using melting point/ boiling point. 7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
8. Minimum 5 unknown organic compounds to be analysed systematically.

B. Preparation of suitable solid derivatives from organic compounds

C. Construction of molecular models

Text Books:

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Organic Chemistry by P.L.Soni

Reference Books:

1. Vogel's text book of Practical Organic Chemistry
2. Reaction and reaction mechanism by Ahluwalia/Chatwal.
3. Advanced Practical organic chemistry by N.K.Vishnoi.

Web references

1. Savitribai Phule Pune University / SIPS, Lonavala
2. SlideShare – Dr. Amit Gangwal & Ms. S. S. Chakorkar
3. JKKN College of Pharmacy – CO-PO Mapping Page

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
BIOCHEMISTRY
B. Pharmacy 2nd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP203T	Biochemistry - Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP209P	Biochemistry - Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP203T : Biochemistry – Theory

Course Objectives:

1. Describe the etiology and pathogenesis of the selected disease states.
2. Name the signs and symptoms of the diseases.
3. Mention the complications of the diseases.
4. Observe the effect of drugs on animals by simulated experiments

Course Outcomes:

- CO1:** Explain the basic principles of disease processes, including etiology and pathogenesis.
CO2 : Describe alterations in normal physiological functions associated with common diseases.
CO3: Correlate signs, symptoms, and complications of various disorders with their underlying pathophysiological mechanisms.
CO4: Differentiate between acute and chronic disease conditions and their systemic manifestations.
CO5: Interpret clinical findings and laboratory parameters in relation to pathophysiological changes.

Unit-I Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance.

- Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

UNIT-II Cardiovascular System: • Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, Renal system: Acute and chronic renal failure . • Respiratory system: Asthma, Chronic obstructive airways diseases. • infarction, atherosclerosis and arteriosclerosis).

UNIT-III . Haematological Diseases: Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: • Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones • Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalassemia, hereditary acquired anemia, hemophilia Gastrointestinal system: Peptic Ulcer • depression, schizophrenia and Alzheimer's disease.

UNIT–IV Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver Principles of Cancer: Classification, etiology and pathogenesis of Cancer • Diseases of bones and joints: Rheumatoid Arthritis, Osteoporosis, Gout • Principles of cancer: classification, etiology and pathogenesis of cancer • Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout • disease.

UNIT–V Sexually transmitted diseases: AIDS, Syphilis, Gonorrhoea

Text Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12 th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore; 1991 [1990 printing].

Reference Books:

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

Web references

A clear foundational definition: Pathophysiology (or physiopathology) is a branch of study, at the intersection of pathology and physiology, concerning disordered physiological processes that cause, result from, or are otherwise associated with a disease or injury. [Wikipedia](#)

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
 1. Study the effect of Temperature on Salivary amylase activity.
 2. Study the effect of substrate concentration on salivary amylase activity.

Text Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
Pathophysiology
B. Pharmacy 2nd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP204T	Pathophysiology- Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP108P	Pharmaceutical Analysis I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP204T : Pathophysiology- Theory

Course Objectives:

1. Describe the etiology and pathogenesis of the selected disease states.
2. Name the signs and symptoms of the diseases.
3. Mention the complications of the diseases.
4. Observe the effect of drugs on animals by simulated experiments

Course Outcomes:

- CO1:** Explain the basic principles of disease processes, including etiology and pathogenesis.
CO2 : Describe alterations in normal physiological functions associated with common diseases.
CO3: Correlate signs, symptoms, and complications of various disorders with their underlying pathophysiological mechanisms.
CO4: Differentiate between acute and chronic disease conditions and their systemic manifestations.
CO5: Interpret clinical findings and laboratory parameters in relation to pathophysiological changes.

Course content:

Unit-I Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance.

- Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

UNIT-II Cardiovascular System: • Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial Renal system: Acute and chronic renal failure . • Respiratory system: Asthma, Chronic obstructive airways diseases. • infarction, atherosclerosis and arteriosclerosis).

UNIT-III . Haematological Diseases: Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric

disorders:• Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones •Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia Gastrointestinal system: Peptic Ulcer•depression, schizophrenia and Alzheimer's disease.

UNIT–IV Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver • Principles of cancer: classification, etiology and pathogenesis of cancer • Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout •disease.

UNIT–V Sexually transmitted diseases:AIDS, Syphilis, Gonorrhoea

Text Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6 th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12 th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].

Reference Books:

1. The Journal of Pathology. ISSN: 1096-9896 (Online)
2. The American Journal of Pathology. ISSN: 0002-9440
3. Pathology. 1465-3931 (Online)
4. International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
5. Indian Journal of Pathology and Microbiology. ISSN-0377-4929.

Web references

A clear foundational definition: Pathophysiology (or physiopathology) is a branch of study, at the intersection of pathology and physiology, concerning disordered physiological processes that cause, result from, or are otherwise associated with a disease or injury. [Wikipedia](#)

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
Computer Applications in Pharmacy – Theory
B. Pharmacy 2nd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP205T	Computer Applications in Pharmacy – Theory	3	1	-	4	50	15	10	75	-	-	-	75
BP210P	Computer Applications in Pharmacy – Practical	2	-	1	1	-	-	-	-	15	5	5	25

BP205T: Computer Applications in Pharmacy – Theory

Course Objectives:

Upon completion of the course the student shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Course Outcomes: By the end of this course, students will be able to:

CO1: Explain the fundamental concepts of computer systems, software, and their applications in the pharmaceutical field.

CO2: Apply common pharmacy-related software for data entry, analysis, and documentation in drug development and patient care.

CO3: Demonstrate proficiency in using databases, spreadsheets, and presentation tools for pharmaceutical research and reporting.

CO4: Integrate internet resources and digital tools for literature search, drug information retrieval, and regulatory updates.

CO5: Evaluate the role of modern informatics and emerging technologies in improving pharmaceutical services and healthcare outcomes.

Course content:

UNIT-I

Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to

binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement

, Two's complement method, binary multiplication, binary division **Concept of Information Systems and Software** : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project.

UNIT-II

Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

UNIT-III

Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

UNIT-IV

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

UNIT-V

Computers as data analysis in Preclinical development: Chromatographic data analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMES)

Text Books:

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publisher and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)

Reference Books:

1. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
2. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002

Web references

1. **MLSU — BP205T Computer Applications in Pharmacy (Theory) Syllabus**
https://mlsu.ac.in/syllabus/ugs/11457_BP205%20T.%20COMPUTER%20APPLICATIONS%20IN%20PHARMACY%20%28Theory%29.pdf
2. **AACPA — Course Outcomes (BP205T)** <https://www.aacpa.ac.in/AQAR/Criteria-2/2.6%20-%20Student%20Performance%20and%20Learning%20Outcomes/2.6.1/2.6.1%281%29%20Course-outcome.pdf>
3. **Scribd — Computer Application in Pharmacy Syllabus (BP205T)**
<https://www.scribd.com/document/421032838/Computer-Application-in-Pharmacy-Syllabus>

BP210P. COMPUTER APPLICATIONS IN PHARMACY (Practical)

List of Experiments

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
- 3 Retrieve the information of a drug and its adverse effects using online tools
- 4 Creating mailing labels Using Label Wizard , generating label in MS WORD
- 5 Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access

Text Books:

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publisher and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)

Reference Books:

1. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
2. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

Web references

1. **MLSU — BP205T Computer Applications in Pharmacy (Theory) Syllabus**
https://mlsu.ac.in/syllabus/ugs/11457_BP205%20T.%20COMPUTER%20APPLICATIONS%20IN%20PHARMACY%20%28Theory%29.pdf
2. **AACPA — Course Outcomes (BP205T)**
<https://www.aacpa.ac.in/AQAR/Criteria-2/2.6%20-%20Student%20Performance%20and%20Learning%20Outcomes/2.6.1/2.6.1%281%29%20Course-outcome.pdf>
3. **Scribd — Computer Application in Pharmacy Syllabus (BP205T)**
<https://www.scribd.com/document/421032838/Computer-Application-in-Pharmacy-Syllabus>

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
ENVIRONMENTAL SCIENCES

B. Pharmacy 2nd Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP206T	Environmental sciences – Theory	3	-	-	3	50	15	10	75	-	-	-	75

BP206T: ENVIRONMENTAL SCIENCES (Theory)

Course 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 Outcomes:

CO1 – Explain the structure and function of ecosystems and their role in sustaining life.

CO2 – Describe the causes, effects, and control measures of major types of environmental pollution.

CO3 – Understand the importance of natural resources and strategies for their conservation.

CO4 – Discuss global environmental issues such as climate change, global warming, ozone depletion, and biodiversity loss.

CO5 – Recognize the need for sustainable development and the role of pharmacists in environmental protection.

CO6 – Interpret environmental laws, policies, and ethical responsibilities related to public health and the environment.

Course content:

UNIT-I

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

UNIT-III

Environmental Pollution: Air pollution; Water pollution; Soil pollution

Text Books:

1. Recommended Books (Latest edition): 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 Publishing Pvt. Ltd., Ahmedabad – 380 013, India,

Reference Books:

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
2. Clark R.S., Marine Pollution, Clarendon 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

Web references

- J.K.K.N. College of Pharmacy – Course Outcomes for Environmental Science:
1. <https://pharmacy.jkkn.ac.in/environmental-sciences-co-and-po/>
 2. <https://palmbeachstate.libguides.com/environmentalscience/websites>
 3. <https://libguides.tcu.edu/environmental-science/websites>

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus For
PHARMACEUTICAL ORGANIC CHEMISTRY –II
B. Pharmacy 3rd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP301T	Pharmaceutical Organic Chemistry II – Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP305P	Pharmaceutical Organic Chemistry II – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP301T : PHARMACEUTICAL ORGANIC CHEMISTRY II – Theory

Course Objectives:

1. write the structure, name and the type of isomerism of the organic compound
2. write the reaction, name the reaction and orientation of reactions
3. account for reactivity/stability of compounds
4. prepare organic compounds

Course Outcomes:

- CO1:** Write the structure, name and the type of isomerism of the organic compounds.
CO2: Write the reaction, name the reaction and orientation of reactions.
CO3: Account for reactivity/stability of compounds.
CO4: Identify/confirm the identification of organic compounds.
CO5: Understand mechanism of action of name reactions.

Course content:

UNIT-I

Benzene and its derivatives

- A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
- B. Reactions of benzene - nitration, sulphonation, halogenation reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation.
- C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
- D. Structure and uses of DDT, Saccharin, BHC and Chloramine

UNIT-II

- Phenols - Acidity of phenols, effect of substituents on acidity, qualitative
- Aromatic Acids* –Acidity, effect of substituents on acidity and
- Aromatic Amines* - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts

- tests, Structure and uses of phenol, cresols, resorcinol, naphthols important reactions of benzoic acid.

UNIT-III

- Fats and Oils

- a. Fatty acids – reactions.
- b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.
- c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

UNIT-IV

- Polynuclear hydrocarbons

- a. Synthesis, reactions
- b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

UNIT-V

- Cyclo alkanes*

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

Text Books:

1. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
2. Organic Chemistry by I.L. Finar, Volume-I
3. Organic Chemistry by Morrison and Boyd

Reference Books:

1. Advanced Practical organic chemistry by N.K. Vishnoi
2. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz
3. Organic Chemistry by P.L.Soni

Web references

1. Wikipedia
2. Delnet
3. Slideshare

BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Saponification value
- Acid value
- Iodine value

III Preparation of compounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction
- Cinnamic acid from Benzaldehyde by Perkin reaction

Oriental University, Indore
UNIVERSITY INSTITUTE OF PHARMACY
Proposed Syllabus for
PHYSICAL PHARMACEUTICS-I
B. Pharmacy 3rd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP302T	Physical pharmaceutics-I	3	1	-	4	75	15	10	100	-	-	-	100
BP306P	Physical Pharmaceutics I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP302T : PHYSICAL PHARMACEUTICS-I

Course Objectives:

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Outcomes:

- CO1:** Understand various physicochemical properties of drug molecules in the designing the dosage forms
- CO2:** Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
- CO3:** Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.
- CO4:** Appreciate correlation of Physical Pharmaceutics with related medical sciences

UNIT-I

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

UNIT-II

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid- crystalline, amorphous & polymorphism. Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

UNIT-III

Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

UNIT-IV

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

UNIT-V

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

Text Books:

1. Physical Pharmacy by Alfred Martin
2. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc
3. Physical Pharmaceutics by Ramasamy C and ManavalanR

Reference Books:

1. Physical Pharmaceutics by C.V.S. Subramanyam
2. Test book of Physical Pharmacy, by Gaurav Jain & Roop K. Khar
3. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.

Web references

1. Wikipedia
2. Delnet
3. Slideshare

BP306P. PHYSICAL PHARMACEUTICS – I (Practical)

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl₄ and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method

Oriental University, Indore
UNIVERSITY INSTITUTE OF PHARMACY
Proposed Syllabus for
Pharmaceutical Microbiology 3rd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP303T	Pharmaceutical Microbiology – Theory)	3	1	-	4	75	15	10	100	-	-	-	100
BP307P	Pharmaceutical Microbiology – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP303T: Pharmaceutical Microbiology

Course Objectives:

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterilization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

Course Outcomes:

- CO1:** Understand methods of **identification, cultivation, and preservation** of various microorganisms
CO2: Understand the importance and implementation of **sterilization** in pharmaceutical processing and the industry
CO3: Learn **sterility testing** of pharmaceutical products
CO4: Carry out **microbiological standardization** of pharmaceuticals
CO5: Understand **cell culture technology** and its applications in the pharmaceutical industry

UNIT-I

Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

UNIT-II

Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC). Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous, radiation and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods. Equipments employed in large scale sterilization. Sterility indicators.

UNIT-III

Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses.

Classification and mode of action of disinfectants Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

UNIT-IV

Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an septic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic.

UNIT-V

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research..

Text Books:

1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4 th edition, CBS Publishers & Distributors, Delhi
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology

Reference Books:

1. Rose: Industrial Microbiology.
2. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
3. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
4. I.P., B.P., U.S.P.- latest editions.

Web references

1. Wikipedia
2. Delnet
3. Slideshare

BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical) 4 Hrs/week

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Oriental University, Indore
UNIVERSITY INSTITUTE OF PHARMACY
Proposed Syllabus for
Pharmaceutical Engineering – Theory
B. pharmacy 3rd Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP304T	PHARMACEUTICAL ENGINEERING	3	1	-	4	75	15	10	100	-	-	-	100
BP308P	Pharmaceutical Engineering – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP304T:PHARMACEUTICAL ENGINEERING

Course Objectives:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course Outcomes:

CO1: Explain the principles and mechanisms involved in the reactions of various classes of organic compounds such as alcohols, phenols, ethers, and carbonyl compounds.

CO2: Illustrate the methods of preparation and chemical reactions of carboxylic acids and their derivatives, amines, and diazonium salts.

CO3: Describe the chemistry of active methylene compounds and heterocyclic compounds such as pyrrole, furan, and thiophene.

CO4: Apply knowledge of stereochemistry to understand the chirality, configuration, and conformational analysis of organic molecules.

CO5: Analyze organic reaction mechanisms and predict the products of organic reactions based on electronic effects (inductive, resonance, hyperconjugation).

CO6: Correlate structure and reactivity in organic compounds, aiding in rational drug design and synthesis in pharmaceutical chemistry.

UNIT-I

Flow of fluids: Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.

Size Reduction: Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.

Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

UNIT-II

Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator.

Distillation: Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

UNIT-III

Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

Mixing: Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

UNIT-IV

Filtration: Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.

Centrifugation: Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

UNIT-V

Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

Text Books:

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.

Reference Books:

1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
2. Remington practice of pharmacy- Martin, Latest edition.
3. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
4. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.

Web references

1. Wikipedia
2. Delnet
3. Slideshare

BP308P - PHARMACEUTICAL ENGINEERING (Practical) 4 Hours/week

- I. Determination of radiation constant of brass, iron, unpainted and painted glass.
- II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient by heat exchanger.
- IV. Construction of drying curves (for calcium carbonate and starch).
- V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
- VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots.
- IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
- X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
- XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/viscosity)
- XII. To study the effect of time on the Rate of Crystallization.
- XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

Oriental University, Indore
University Institute of Pharmacy, Indore
Proposed Syllabus For
Pharmaceutical Organic Chemistry III
B. Pharmacy, 4th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP401T	Pharmaceutical Organic Chemistry III	3	1	-	4	75	15	10	100	-	-	-	100

BP401T : Pharmaceutical Organic Chemistry III

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

1. Understand the methods of preparation and properties of organic compounds
2. Explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. Know the medicinal uses and other applications of organic compounds

Course Outcomes: On successful completion of the course, the student will be able to:

CO1. Explain the chemistry, reactivity, and synthetic methods of heterocyclic compounds containing one or more heteroatoms (O, N, S) of pharmaceutical importance.

CO2. Illustrate and apply reaction mechanisms of important name reactions in the synthesis of drug molecules.

CO3. Predict the structure, properties, and reactivity of polycyclic and condensed heterocycles used in medicinal chemistry.

CO4. Classify and describe the synthesis, properties, and uses of medicinally important heterocycles such as pyridine, quinoline, isoquinoline, and indole derivatives.

CO5. Design synthetic routes for pharmaceutically important organic compounds using retrosynthetic analysis principles.

CO6. Correlate the chemical structure of heterocyclic compounds with their pharmaceutical applications in drug development.

UNIT-I

Stereo isomerism

Optical isomerism – Optical activity, enantiomerism, diastereoisomerism, meso compounds

Elements of symmetry, chiral and achiral molecules DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers Reactions of chiral molecules Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute

UNIT-II

Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems) Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions

UNIT-III

Heterocyclic compounds: Nomenclature and classification Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene

UNIT-IV

Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

UNIT-V

Reactions of synthetic importance Metal hydride reduction (NaBH_4 and LiAlH_4), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation.

Text Books:

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal

Reference Books:

1. Organic Chemistry by Morrison and Boyd
2. Heterocyclic Chemistry by T.L. Gilchrist

Web references

1. Wikipedia
2. Delnet
3. Slideshare

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
MEDICINAL CHEMISTRY – I,
B. Pharmacy 4th Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP 402T	Medicinal Chemistry-I	3	1	-	4	75	15	10	100	-	-	-	100
BP406P	Medicinal Chemistry-I Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP402T: MEDICINAL CHEMISTRY – I

Course Objectives:

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship (SAR) of different class of drugs
4. Write the chemical synthesis of some drugs

Course Outcomes:

CO1: Understand the chemistry of drugs with respect to their pharmacological activity

CO2: Understand the drug metabolic pathways, adverse effects, and therapeutic value of drugs

CO3: Know the Structural Activity Relationship (SAR) of different classes of drugs

CO4: Understand and write the chemical synthesis of some drugs.

CO5: Understand mechanism of action of different drugs

UNIT–I Introduction to Medicinal Chemistry. History and development of medicinal chemistry.

Physicochemical properties in relation to biological action. Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.

Drug metabolism Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects.

UNIT–II Drugs acting on Autonomic Nervous System Adrenergic Neurotransmitters: Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution.

Sympathomimetic agents: SAR of Sympathomimetic agents Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline . Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. Agents with mixed mechanism: Ephedrine, Metaraminol.

Adrenergic Antagonists: Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide. **Beta adrenergic blockers:** SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

UNIT-III Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution. **Parasympathomimetic agents SAR of Parasympathomimetic agents Direct acting agents:** Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine. **Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):** Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isoflurophate, Echothiophate iodide, Parathione, Malathion **Cholinesterase reactivator:** Pralidoxime chloride. **Cholinergic Blocking agents: SAR of cholinolytic agents Solanaceous alkaloids and analogues:** Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*. **Synthetic cholinergic blocking agents:** Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

UNIT-IV Drugs acting on Central Nervous System A. Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem **Barbiturtes:** SAR of barbiturates, Barbitol*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital **Miscellaneous:** Amides & imides: Glutethimide. Alcohol & their carbamate derivatives: Meprobamate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde. **B. Antipsychotics Phenothiazines:** SAR of Phenothiazines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride. **Ring Analogues of Phenothiazines:** Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine. **Fluro buterophenones:** Haloperidol, Droperidol, Risperidone. **Beta amino ketones:** Molindone hydrochloride. **Benzamides:** Sulpiride. **C. Anticonvulsants:** SAR of Anticonvulsants, mechanism of anticonvulsant action **Barbiturates:** Phenobarbitone, Methabarbital. **Hydantoins:** Phenytoin*, Mephenytoin, Ethoin Oxazolindione: Trimethadione, Paramethadione Succinimides: Phensuximide, Methsuximide, Ethosuximide* Urea and monoacylureas: Phenacemide, Carbamazepine* **Benzodiazepines:** Clonazepam **Miscellaneous:** Primidone, Valproic acid, Gabapentin, Felbamate

UNIT-V

Drugs acting on Central Nervous System. General anesthetics: Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane. **Ultra short acting barbiturates:** Methohexital sodium*, Thiomytal sodium, Thiopental sodium. **Dissociative anesthetics:** Ketamine hydrochloride.*

Narcotic and non-narcotic analgesics Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anileridine hydrochloride Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate. **Narcotic antagonists:** Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.

.Text Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. . Burger's Medicinal Chemistry, Vol I to IV

Reference Books:

1. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
2. Indian Pharmacopoeia.
3. Text book of practical organic chemistry- A.I.Vogel.

Web references

1. Wikipedia
2. Delnet

BP406P. MEDICINAL CHEMISTRY – I (Practical)

I Preparation of drugs/ intermediates

- 1 1,3-pyrazole
- 2 1,3-oxazole
- 3 Benzimidazole
- 4 Benzotriazole
- 5 2,3- diphenyl quinoxaline
- 6 Benzocaine
- 7 Phenytoin
- 8 Phenothiazine
- 9 Barbiturate

II Assay of drugs

- 1 Chlorpromazine
- 2 Phenobarbitone
- 3 Atropine
- 4 Ibuprofen
- 5 Aspirin
- 6 Furosemide

III Determination of Partition coefficient for any two

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Physical Pharmaceutics-II
B.Pharmacy

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP 403T	Physical Pharmaceutics-II	3	1	-	4	75	15	10	100	-	-	-	100
BP407P	Physical Pharmaceutics – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP403T: Physical Pharmaceutics– II

Course Objectives:

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

Course Outcomes:

CO1: Understand various physicochemical properties of drug molecules in the designing of the dosage forms

CO2: Know the principles of chemical kinetics & amp; to use them for stability testing and determination of expiry date of formulations

CO3: Demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms.

UNIT–I: Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.

UNIT–II: Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

UNIT–III Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

UNIT–IV Micromeretics: Particle size and distribution, mean particle size, number and weight

distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties

UNIT-V

Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention.

Text Books:

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.

Reference Books:

1. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia. .
2. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
3. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

Web references

1. United States Pharmacopeia (USP)- <https://www.usp.org>
2. Indian Pharmacopoeia (IPC)- <https://ipc.gov.in>

BP407P. Physical Pharmaceutics – II (Practical)

1. Determination of particle size, particle size distribution using sieving method .
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order


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Oriental University, Indore

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmacology-I
Semester : IV
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP 404T	Pharmacology-I	3	1	-	4	75	15	10	100	-	-	-	100
BP408P	Pharmacology I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP-404T : Pharmacology-I

Course Objectives:

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug 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 effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

Course Outcomes:

- CO1:** Understand the pharmacological actions of different categories of drugs
CO2: Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
CO3: Apply the basic pharmacological knowledge in the prevention and treatment of various diseases
CO4: Observe the effect of drugs on animals by simulated experiments
CO5: Appreciate correlation of pharmacology with other bio medical sciences

UNIT-I 1. General Pharmacology a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

UNIT-II General Pharmacology a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

UNIT–III . Pharmacology of drugs acting on peripheral nervous system a. Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma

UNIT–IV Pharmacology of drugs acting on central nervous system a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants. d. Anti-epileptics e. Alcohols and disulfiram

UNIT–V Pharmacology of drugs acting on central nervous system a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens. b. Drugs used in Parkinsons disease and Alzheimer’s disease. c. CNS stimulants and nootropics. d. Opioid analgesics and antagonists e. Drug addiction, drug abuse, tolerance and dependence.

Text Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale’s Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman’s, The Pharmacological Basis of Therapeutics

Reference Books:

1. Pharmacology and Pharmacotherapeutics, R.S. Satoskar, S.D. Bhandarkar, Nirmala Rege
2. Tara V. Shanbhag & Smita Shenoy, Pharmacology: Prep Manual for Undergraduates
3. David E. Golan et al., Principles of Pharmacology: The Pathophysiologic Basis of Drug Therapy

Web references

1. <https://nptel.ac.in>
2. <https://bookboon.com/en/pharmacology-ebooks>
3. <https://www.medscape.com/pharmacology>

BP-408P –Pharmacology Practical (Practical)

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmacognosy-I
Semester : IV
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP405 T	Pharmacognosy and Phytochemistry I– Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP409P	Pharmacognosy and Phytochemistry I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP-405T : Pharmacognosy and Phytochemistry I– Theory

Course Objectives:

1. To know the techniques in the cultivation and production of crude drugs
2. To know the crude drugs, their uses and chemical nature
3. Know the evaluation techniques for the herbal drugs
4. To carry out the microscopic and morphological evaluation of crude drugs

Course Outcomes:

CO1: Understand the crude drugs, their uses and chemical nature

CO2: Understand the evaluation techniques for the herbal drugs

CO3: Understands the techniques in the cultivation and production of crude drugs

CO4: Understand Plant Tissue Culture

CO5: Understand microscopic and morphological evaluation of crude drugs.

UNIT–I Introduction to Pharmacognosy: (a) Definition, history, scope and development of Pharmacognosy (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins). Classification of drugs: Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs Quality control of Drugs of Natural Origin: Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties. Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

UNIT–II Cultivation, Collection, Processing and storage of drugs of natural origin: Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants Conservation of medicinal plants

UNIT–III . Plant tissue culture: Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible

vaccines

UNIT–IV Pharmacognosy in various systems of medicine: Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine. Introduction to secondary metabolites: Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

UNIT–V Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs Plant Products: Fibers - Cotton, Jute, Hemp Hallucinogens, Teratogens, Natural allergens Primary metabolites: General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites: Carbohydrates: Acacia, Agar, Tragacanth, Honey Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin). Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax Marine Drugs: Novel medicinal agents from marine sources.

Text Books:

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis

Reference Books:

1. “Pharmacognosy” by Trease & Evans
2. “Indian Medicinal Plants” by Kirtikar & Basu
3. “Pharmacognosy & Pharmacobiotechnology” by Ashutosh Kar

Web references

1. <https://www.amrita.edu/course/pharmacognosy-and-phytochemistry-i-theory>
- 2 <https://shashwatpublication.com/a-textbook-of-pharmacognosy-and-phytochemistry-i-bp405t-book>

BP409 P. PHARMACOGNOSY AND PHYTOCHEMISTRY I (Practical)

1. Analysis of crude drugs by chemical tests: (i) Tragacanth (ii) Acacia (iii) Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and palisade ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Recommended Books: (Latest Editions)

1. W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhale (2007), 37th Edition, Nirali Prakashan, New Delhi.

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Medicinal Chemistry II
B.Pharmacy V sem
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME						Total	
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam		Teachers Assessment*
BP501T	Medicinal Chemistry II	3	1	-	4	75	15	10	100	-	-	-	100

BP501T: Medicinal Chemistry II

Course Objectives:

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs

Course Outcomes:

- CO1:** Understand the chemistry of drugs in relation to their pharmacological activity.
CO2: Understand drug metabolic pathways, adverse effects, and the therapeutic value of drugs.
CO3: Know the structure–activity relationships (SAR) of different classes of drugs.
CO4: Study the chemical synthesis of selected drugs.

UNIT-I

Antihistaminic agents: Histamine, receptors and their distribution in the humanbody

H1-antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium

H2-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole.

Anti-neoplastic agents:

Alkylating agents: Meclorothamine*, Cyclophosphamide, Melphalan, 107 Chlorambucil, Busulfan, Thiotepea.

Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine.

Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin.

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT-II

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.

Diuretics: Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide. Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide, Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid. Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride. Osmotic Diuretics: Mannitol.

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT-III

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcanide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol.

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel.

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

UNIT-IV

Drugs acting on Endocrine system: Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandralone, Progesterones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.

Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestrel, Levonorgestrol.

Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone.

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

UNIT-V

Antidiabetic agents: Insulin and its preparations Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimpiride. Biguanides: Metformin. Thiazolidinediones: Pioglitazone, Rosiglitazone. Meglitinides: Repaglinide, Nateglinide. Glucosidase inhibitors: Acarbose, Voglibose.

. Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine.

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

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

Miscellaneous: Phenacaine, Dipiperodon, Dibucaine.*

Text Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences

.Reference Books:

1. Martindale's extra pharmacopoeia.
2. Organic Chemistry by I.L. Finar, Vol. II.
3. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
4. Indian Pharmacopoeia.
5. Text book of practical organic chemistry- A.I.Vogel.

Web references.

1. Delnet
2. Wikipedia

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Industrial Pharmacy I
B.Pharmacy V Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP502T	Industrial Pharmacy I	3	1	-	4	75	15	10	100	-	-	-	100
BP506P	Industrial Pharmacy I – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP502T : Industrial Pharmacy I

Course Objectives:

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course Outcomes:

CO1: Illustrate in detail the **pre-formulation studies** for various pharmaceutical formulations

CO2: Demonstrate the **formulation steps** for **tablets** and **liquid orals**.

CO3: Explain in detail about **capsules** and **pellets**

CO4: Explain the **formulation and evaluation** of **parenteral products** and **ophthalmic preparations**.

CO5: Summarize the **formulation principles of cosmetics, pharmaceutical aerosols, and science of packaging materials**.

UNIT-I

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

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization .

BCS classification of drugs & its significant.

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

UNIT-II

Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, 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: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia.

UNIT-III

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

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

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; 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.

BP 506 P. Industrial PharmacyI (Practical)

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Quality control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Text Books:

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)

Reference Books:

1. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
2. Pharmaceutics- The science of dosage form design by M.E. Aulton, Churchill livingstone, Latest edition
3. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005
4. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

Web references

1. Wikipedia
2. Delnet

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmacology-II – Theory
B. Pharm-5th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP503T	Pharmacology-II – Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP507P	Pharmacology-II– Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP503T: PHARMACOLOGY-II – Theory

Course Objectives:

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases.
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments.
3. Demonstrate the various receptor actions using isolated tissue preparation.
4. Appreciate correlation of pharmacology with related medical sciences.

Course Outcomes:

- CO1:** Understand the mechanism of drug action and its relevance in the treatment of different diseases.
CO2: Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments.
CO3: Demonstrate the various receptor actions using isolated tissue preparation.
CO4: Appreciate correlation of pharmacology with related medical sciences.

UNIT-I

10 Hours

1. Pharmacology of drugs acting on cardio vascular system

- a. Introduction to hemodynamic and electrophysiology of heart.
- b. Drugs used in congestive heart failure
- c. Anti-hypertensive drugs.
- d. Anti-anginal drugs.
- e. Anti-arrhythmic drugs.
- f. Anti-hyperlipidemic drugs

UNIT-II

10 Hours

1. Pharmacology of drugs acting on cardio vascular system

- a. Drug used in the therapy of shock.
- b. Hematinics, coagulants and anticoagulants.

- c. Fibrinolytics and anti-platelet drugs
- d. Plasma volume expanders
- 2. Pharmacology of drugs acting on urinary system**
- a. Diuretics
- b. Anti-diuretics.

UNIT–III

10 Hours

3. Autocoids and related drugs

- a. Introduction to autacoids and classification
- b. Histamine, 5-HT and their antagonists.
- c. Prostaglandins, Thromboxanes and Leukotrienes.
- d. Angiotensin, Bradykinin and Substance P.
- e. Non-steroidal anti-inflammatory agents
- f. Anti-gout drugs
- g. Antirheumatic drugs

UNIT–IV

08 Hours

4. Pharmacology of drugs acting on endocrine system

- a. Basic concepts in endocrine pharmacology.
- b. Anterior Pituitary hormones- analogues and their inhibitors.
- c. Thyroid hormones- analogues and their inhibitors.
- d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
- d. Insulin, Oral Hypoglycemic agents and glucagon.
- e. ACTH and corticosteroids.

UNIT– V

07 Hours

5. Pharmacology of drugs acting on endocrine system

- a. Androgens and Anabolic steroids.
- b. Estrogens, progesterone and oral contraceptives.
- c. Drugs acting on the uterus.
- 6. Bioassay**
- a. Principles and applications of bioassay.
- b. Types of bioassay
- c. Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5-HT

Text Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology..

Reference Books:

1. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
2. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
3. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert.
4. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
5. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

Web references:

1. [DigiNerve](https://www.DigiNerve.com):- [https://www. DigiNerve.com](https://www.DigiNerve.com)
2. [Picmonic](https://www.Picmonic.com)- <https://www.Picmonic.com>

BP507P: Instrumental Methods of Analysis – Practical

4 Hours/Week

1. Introduction to in-vitro pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA₂ value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD₂ value using guinea pig ileum
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Practical Books:

1. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
2. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics

Web references:

1. [Drugs.com](http://www.drugs.com)- www.drugs.com
2. [PubChem](http://www.pubchem.com)- www.pubchem.com
3. NPTEL Online Course: pharmacology II – nptel.ac.in

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
Pharmacognosy and Phytochemistry II– Theory
B. Pharm-5th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Assess ment*	
BP504T	Pharmacognosy and Phytochemistry II– Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP508P	Pharmacognosy and Phytochemistry II– Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP504T: Pharmacognosy and Phytochemistry II– Theory

Course Objectives:

1. To know the modern extraction techniques, characterization and identification of the. herbal drugs and phytoconstituents
2. To understand the preparation and development of herbal formulation.
3. To understand the herbal drug interactions 4. to carryout isolation and identification of . phytoconstituents

Course Outcomes:

CO1: To know the modern extraction techniques, characterization and identification of the. herbal drugs and phytoconstituents.

CO2: To understand the preparation and development of herbal formulation.

CO3: To understand the herbal drug interactions 4. to carryout isolation and identification of . phytoconstituents

CO4: Appreciate correlation of phytoconstituents with related medical sciences.

UNIT-I

7 Hours

Metabolic pathways in higher plants and their determination

- a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
- b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT-II

14 Hours

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,
Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta
Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis
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

10 Hours

Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

UNIT- V

0 8 Hours

Basics of Phytochemistry Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

Text Books:

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
2. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
3. Essentials of Pharmacognosy, Dr.SH.Ansari, 2nd edition, Birla publications, New Delhi, 2007

Reference Books:

1. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
2. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
3. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
4. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
5. The formulation and preparation of cosmetic, fragrances and flavours.
6. Remington's Pharmaceutical sciences.
7. Text Book of Biotechnology by Vyas and Dixit.
8. Text Book of Biotechnology by R.C. Dubey

Web references:

1. **DigiNerve**:– [https://www. DigiNerve.com](https://www.DigiNerve.com)
2. **Picmonic**– <https://www.Picmonic.com>

BP 508 P. PHARMACOGNOSY AND PHYTOCHEMISTRY II (Practical) 4 Hours/Week

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles a. Caffeine - from tea dust. b. Diosgenin from Dioscorea
- c. Atropine from Belladonna
- d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstituents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Practical Books:

1. The formulation and preparation of cosmetic, fragrances and flavours.
2. Remington's Pharmaceutical sciences.
3. Text Book of Biotechnology by Vyas and Dixit.

Reference Books:

1. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
2. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.

Web references:

4. [Drugs.com](http://www.drugs.com)– www.drugs.com
5. [PubChem](http://www.pubchem.com)– www.pubchem.com
6. NPTEL Online Course: pharmacognocoy ll – nptel.ac.in

Oriental University, Indore
University Institute of Pharmacy, Indore
Proposed Syllabus for
Pharmaceutical Jurisprudence
B. Pharmacy, 5th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME						Total	
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam		Teachers Assessment*
BP505T	Pharmaceutical Jurisprudence	3	1	-	4	75	15	10	100	-	-	-	100

BP505T: Pharmaceutical Jurisprudence

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

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

Course Outcomes:

CO1: Understand the principles and concepts of pharmaceutical jurisprudence, including the history and development of pharmacy-related laws in India.

CO2: Gain knowledge of important pharmaceutical legislation such as the Drugs and Cosmetics Act, Pharmacy Act, and related rules, enabling compliance with legal requirements.

CO3: Apply legal provisions to ensure safe, ethical, and responsible manufacturing, distribution, and dispensing of medicines.

CO4: Analyze the role of regulatory authorities, intellectual property rights, and professional ethics in pharmacy practice.

CO5: Develop the ability to interpret and implement laws to protect public health and uphold professional standards in the pharmaceutical field.

UNIT-I

Drugs and Cosmetics Act, 1940 and its rules 1945: Objectives, Definitions, Legal definitions of schedules to the Act and Rules Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT-II

Drugs and Cosmetics Act, 1940 and its rules 1945. Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA) Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties. Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III

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 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

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)

UNIT-V

Pharmaceutical Legislations – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee

Code of Pharmaceutical ethics Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath

Introduction to Intellectual Property Rights (IPR)

Right to Information Act

Medical Termination of Pregnancy Act

Text Books:

1. Forensic Pharmacy by B. Suresh 123
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.

Reference Books:

1. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
2. Narcotic drugs and psychotropic substances act by Govt. of India publications
3. Drugs and Magic Remedies act by Govt. of India publication
4. Bare Acts of the said laws published by Government. Reference books (Theory)

Web references

1. Wikipedia
2. Delnet
3. Slideshare

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Medicinal Chemistry III– Theory
B. Pharm- Semester VI
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP601T	Medicinal Chemistry III– Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP607P	Medicinal chemistry III – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP601T: Medicinal Chemistry III– Theory

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

1. Understand the importance of drug design and different techniques of drug design.
2. Understand the chemistry of drugs with respect to their biological activity.
3. Know the metabolism, adverse effects and therapeutic value of drugs.
4. Know the importance of SAR of drugs

Course Outcomes:

CO1: Understand the importance of drug design and different techniques of drug design.

CO2: Understand the chemistry of drug with respect to their biological activity.

CO3: Know the metabolism, adverse effect and therapeutic value of drug.

CO4: Know the importance of SAR of drug

UNIT-I

Antibiotics Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes. β -Lactam antibiotics: Penicillin, Cephalosporins, β - Lactamase inhibitors, Monobactams Aminoglycosides: Streptomycin, Neomycin, Kanamycin Tetracyclines: Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT-II

Antibiotics Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes. Macrolide: Erythromycin Clarithromycin, Azithromycin. Miscellaneous: Chloramphenicol*, Clindamycin. Prodrugs: Basic concepts and application of prodrugs design. Antimalarials: Etiology of malaria. Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine. Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil. Miscellaneous: Pyrimethamine, Artesunate, Artemether, Atovoquone.

UNIT-III

Anti-tubercular Agents Synthetic anti tubercular agents: Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.* Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate. Urinary tract anti-infective agents Quinolones: SAR of quinolones, Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine. Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT-IV

Antifungal agents: Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin. Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconazole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*. Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine. Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin. Sulphonamides and Sulfones Historical development, chemistry, classification and SAR of Sulfonamides: Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxazole*, Sulphadiazine, Mefenide acetate, Sulfasalazine. Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole. Sulfones: Dapsone*.

UNIT-V

Introduction to Drug Design Various approaches used in drug design. Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammett's electronic parameter, Taft's steric parameter and Hansch analysis. Pharmacophore modeling and docking techniques. Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

Text Books:

1. Text book of practical organic chemistry- A.I.Vogel.

Reference Books:

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

Web references

1. Wikipedia
2. Delnet
3. Slideshare

BP607P. MEDICINAL CHEMISTRY- III (Practical)

I Preparation of drugs and intermediates

- 1 Sulphanilamide
- 2 7-Hydroxy, 4-methyl coumarin
- 3 Chlorobutanol
- 4 Triphenyl imidazole
- 5 Tolbutamide
- 6 Hexamine

II Assay of drugs

- 1 Isonicotinic acid hydrazide
- 2 Chloroquine
- 3 Metronidazole
- 4 Dapsone
- 5 Chlorpheniramine maleate
- 6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software
Drug likeliness screening (Lipinskies RO5)

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Pharmacology III– Theory
B. Pharm- Semester VI

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP602T	Pharmacology III – Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP608P	Pharmacology III – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP602T: Pharmacology III– Theory

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

1. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
2. Comprehend the principles of toxicology and treatment of various poisonings
3. Appreciate correlation of pharmacology with related medical sciences.

Course Outcomes:

CO1: This subject is intended to impart the fundamental knowledge on various aspects

CO2: Classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications

CO3: Understand pharmacology of drugs acting on respiratory and gastrointestinal system

CO4: Understand pharmacology of infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology

CO4: Understand concepts of chronopharmacology

UNIT-I

1. Pharmacology of drugs acting on Respiratory system

- a. Anti -asthmatic drugs
- b. Drugs used in the management of COPD
- c. Expectorants and antitussives
- d. Nasal decongestants
- e. Respiratory stimulants

2. Pharmacology of drugs acting on the Gastrointestinal Tract

- a. Antiulcer agents.
- b. Drugs for constipation and diarrhoea.
- c. Appetite stimulants and suppressants.
- d. Digestants and carminatives.
- e. Emetics and anti-emetics.

UNIT-II

3. Chemotherapy

- a. General principles of chemotherapy.
- b. Sulfonamides and cotrimoxazole.
- c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT-III

3. Chemotherapy

- a. Antitubercular agents
- b. Antileprotic agents
- c. Antifungal agents
- d. Antiviral drugs
- e. Anthelmintics
- f. Antimalarial drugs
- g. Antiamoebic agents

UNIT-IV

3. Chemotherapy

- l. Urinary tract infections and sexually transmitted diseases. m. Chemotherapy of malignancy.

4. Immunopharmacology

- a. Immunostimulants
- b. Immunosuppressant Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V

5. Principles of toxicology

- a. Definition and basic knowledge of acute, subacute and chronic toxicity.
- b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity
- c. General principles of treatment of poisoning
- d. Clinical symptoms and management of barbiturates, morphine, organophosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

- a. Definition of rhythm and cycles.
- b. Biological clock and their significance leading to chronotherapy.

Text Books:

1. N.Udapa and P.D. Gupta, Concepts in Chronopharmacology
2. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
3. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata
4. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.

Reference Books:

1. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
2. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
3. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
4. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
5. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
6. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier

Web references

1. Wikipedia
2. Delnet

BP 608 P. PHARMACOLOGY-III (Practical)

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

*Experiments are demonstrated by simulated experiments/videos

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Herbal Drug Technology – Theory
B. Pharm- Semester VI
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP603T	Herbal Drug Technology – Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP609P	Herbal Drug Technology – Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP603T: Herbal Drug Technology – Theory

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

1. understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP .

Course Outcomes:

CO1: Understand raw material as source of herbal drugs—from cultivation to herbal drug product

CO2: Know the WHO and ICH guidelines for evaluation of herbal drugs

CO3: Know the herbal cosmetics, natural sweeteners, nutraceuticals

CO4: Appreciate patenting of herbal drugs and Good Manufacturing Practices (GMP)

CO5: Validate herbal drugs based on WHO & ICH guidelines

UNIT-I

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation

Source of Herbs

Selection, identification and authentication of herbal materials

Processing of herbal raw material

Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy

b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.

UNIT-II

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable

bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina.

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT-III

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like

phytosomes

UNIT-IV

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs

Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

- a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
- b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT-V

General Introduction to Herbal Industry

Herbal drugs industry: Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India. **Schedule T – Good Manufacturing Practice of Indian systems of medicine**

Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

Text Books:

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Herbal Drug Technology (S. S. Agrawal & M. Paridhavi, 2013)

Reference Books:

1. Martindale: The Complete Drug Reference

A global compendium including herbal and complementary medicines, drug monographs, excipients, and more. An excellent reference for in-depth details on herbal ingredients.

2. Works by T. Parimelazhagan (2013–2022)

Includes titles like Traditional Herbal Medicine, Scientific Basis of Herbal Medicine, Phytomedicine: Research and Development, and more—valuable for deeper theoretical and research-oriented understanding.

Web references

1. Pharmacy Council of India (PCI) syllabus page – for up-to-date course structure and topics.
2. WHO and ICH official websites – for guidelines on herbal drug assessment (validation, quality control, safety).
3. Ayush.gov.in – for Indian regulatory frameworks like Schedule T, ASU regulations, and GMP standards.

BP609P: Herbal Drug Technology – Practical

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Practical Book

1. Essential Practical Book of Herbal Drug Technology
2. Practical Manual on Herbal Drug Technology (Brillion Publishing, 2023)
3. Practical Manual of Herbal Drug Technology (R. Narain Publishers, 2023)
4. A Practical Book of Herbal Drug Technology for B.Pharm 6th Semester (BP-609P) (Innovative Publication, 2024)

Reference Books

1. Pharmacognosy by Kokate, Purohit and Gokhale
2. Essential of Pharmacognosy by Dr.S.H.Ansari
3. Pharmacognosy & Phytochemistry by V.D.Rangari
4. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)

Web references

1. Core Practical Syllabus Summary (Pharmacy Infoline)
2. Detailed Practical Manual (BrainKart PDF)
3. Practical Lab Manual Preview (Studocu)

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Biopharmaceutics and Pharmacokinetics
B. Pharm- Semester VI
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP604T	Biopharmaceutics and Pharmacokinetics – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP604T :Biopharmaceutics and Pharmacokinetics – Theory

Course Objectives:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
4. Understand various pharmacokinetic parameters, their significance & applications.

Course Outcomes:

- CO1:** Understand basic concepts in biopharmaceutics and pharmacokinetics.
CO2: Use plasma drug concentration–time data to calculate pharmacokinetic parameters (e.g., absorption, distribution, metabolism, excretion).
CO3: Understand concepts of bioavailability and bioequivalence and their significance.
CO4: Understand various pharmacokinetic parameters and their applications
CO5: Evaluate drug-protein binding to predict pharmacokinetics

UNIT–I

Introduction Biopharmaceutics to Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption through GIT, absorption of drug from Non per oral extra-vascular routes, Distribution Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT–II

Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs
Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in-vitro-in-vivo correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

UNIT–III

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open

model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - KE , $t_{1/2}$, V_d , AUC , K_a , Cl_t and CLR - definitions methods of eliminations, understanding of their significance and Application.

UNIT-IV

Multicompartment models: Two compartment open model. IV bolus Kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical settings.

UNIT-V

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

Text Books:

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA

Reference Books:

1. Biopharmaceutics by Swarbrick
2. Clinical Pharmacokinetics: Concepts & Applications by Malcolm Rowland & Thomas Tozer
3. Pharmacokinetics by Milo Gibaldi & Donald — often cited as Milo Gibaldi's Pharmacokinetics, covers fundamental PK theory
4. Handbook of Clinical Pharmacokinetics by Milo Gibaldi & Laurie Prescott (ADIS) — compact clinical reference

Web references

1. Modeling in Biopharmaceutics, Pharmacokinetics & Pharmacodynamics (Springer, 2nd Edition, 2016) Focuses on advanced modeling (e.g., fractional PK, bioequivalence simulations).
2. Applied Biopharmaceutics & Pharmacokinetics PDF available through university libraries— shared in academic forums like Reddit

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Pharmaceutical Biotechnology
B. Pharm-<<Semester VI>

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP605T	Pharmaceutical Biotechnology– Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP605T:Pharmaceutical Biotechnology

Course Objectives:

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

Course Outcomes:

CO1: Understanding the importance of Immobilized enzymes in Pharmaceutical Industries

CO2: Genetic engineering applications in relation to production of pharmaceuticals

CO3: Importance of Monoclonal antibodies in Industries

CO4: Appreciate the use of microorganisms in fermentation technology

UNIT-I

a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences. b) Enzyme Biotechnology- Methods of enzyme immobilization and applications. c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries. d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. f) Basic principles of genetic engineering.

UNIT-II

a) Study of cloning vectors, restriction endonucleases and DNA ligase. b) Recombinant DNA technology. Application of genetic engineering in medicine. c) Application of r DNA technology and genetic engineering in the production of: i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin. d) Brief introduction to PCR

UNIT-III

Types of immunity- humoral immunity, cellular immunity a) Structure of Immunoglobulins b) Structure and Function of MHC c) Hypersensitivity reactions, Immune stimulation and Immune suppressions. d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity. e) Storage conditions and stability of official vaccines f) Hybridoma technology- Production, Purification and Applications g) Blood products and Plasma Substitutes.

UNIT-IV

a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting. b) Genetic organization of

Eukaryotes and Prokaryotes c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons. d) Introduction to Microbial biotransformation and applications. e) Mutation: Types of mutation/mutants.

UNIT-V

a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring. b) Large scale production fermenter design and its various controls. c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin, d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.

Text Books:

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.

Reference Books:

1. Zaborsky: Immobilized Enzymes, CRC Press, Degrand, Ohio.
2. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
3. tanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Pharmaceutical Quality Assurance
B. Pharm-<<Semester VI>
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP606T	Quality Assurance – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP606T:Pharmaceutical Quality Assurance

Course Objectives:

1. Understand the cGMP aspects in a pharmaceutical industry
2. Appreciate the importance of documentation
3. Understand the scope of quality certifications applicable to pharmaceutical industries
4. Understand the responsibilities of QA & QC departments

Course Outcomes:

CO1: Understand the cGMP aspects in a pharmaceutical industry

CO2: Appreciate the importance of documentation

CO3: Understand the scope of quality certifications applicable to pharmaceutical industries

CO4: Understand the responsibilities of QA & QC departments

UNIT-I

Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP Total Quality Management (TQM): Definition, elements, philosophies ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines Quality by design (QbD): Definition, overview, elements of QbD program, tools ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration NABL accreditation : Principles and procedures

UNIT-II

Organization and personnel: Personnel responsibilities, training, hygiene and personal records. Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination. Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT-III

Quality Control: Quality control test for containers, rubber closures and secondary packing materials. Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

UNIT-IV

Complaints: Complaints and evaluation of complaints, Handling of return goods, recalling and waste disposal. Document maintenance in the pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT-V

Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation. Warehousing: Good warehousing practice, materials management.

Text Books:

1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh

Reference Books:

1. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
2. Good laboratory Practices – Marcel Dekker Series
3. ICH guidelines, ISO 9000 and 14000 guidelines

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Instrumental Methods of Analysis – Theory
B. Pharm-7th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP701T	Instrumental Methods of Analysis Theory	3	1	-	4	75	15	10	100	-	-	-	100
BP705P	Instrumental Methods of Analysis Practical	4	-	1	2	-	-	-	-	35	10	5	50

BP701T: Instrumental Methods of Analysis – Theory

Course Objectives:

1. To develop an in-depth understanding of the principles, instrumentation, and working mechanisms of modern analytical techniques used in pharmaceutical analysis.
2. To enhance the ability to select appropriate instrumental methods for qualitative and quantitative determination of pharmaceutical substances.
3. To train students in interpreting analytical data obtained from various spectroscopic, chromatographic, and electrochemical techniques.
4. To cultivate problem-solving skills in analytical method development, optimization, and validation in compliance with regulatory requirements.
5. To prepare students for professional applications of instrumental methods in research, quality control, and pharmaceutical manufacturing.

Course Outcomes:

- CO1:** Explain the working principles and instrumentation of major analytical techniques such as UV-Visible spectroscopy, IR spectroscopy, NMR, Mass spectrometry, chromatography, and electrochemical methods.
- CO2:** Select and justify appropriate instrumental methods for the analysis of various pharmaceutical substances and formulations.
- CO3:** Interpret, analyze, and evaluate analytical data obtained from instrumental methods for quality assessment and research purposes.
- CO4:** Apply knowledge of instrumental techniques to design, optimize, and validate analytical procedures in accordance with pharmacopoeial and regulatory guidelines.
- CO5:** Demonstrate professional competence in using instrumental methods for problem-solving in pharmaceutical analysis, quality control, and drug development.

UNIT-I**10 Hours****UV Visible 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****IR 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, Thermistor, Pyroelectric detector and applications

Flame Photometry-Principle, interferences, instrumentation and applications

Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications

Nepheloturbidometry- Principle, instrumentation and applications

UNIT-III**10 Hours****Introduction to chromatography**

Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.

Thin layer chromatography- Introduction, Principle, Methodology, R_f values, advantages, disadvantages and applications.

Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications.

Electrophoresis- Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications.

UNIT-IV**08 Hours**

Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

High performance liquid chromatography (HPLC)- Introduction, theory, instrumentation, advantages and applications.

UNIT- V**07 Hours**

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, theory, instrumentation and applications.

Text Books:

1. Chatwal, G.R. & Anand, S.K. – Instrumental Methods of Chemical Analysis, Himalaya Publishing House.
2. Willard, H.H., Merritt, L.L., Dean, J.A., & Settle, F.A. – Instrumental Methods of Analysis, CBS Publishers.
3. Beckett, A.H. & Stenlake, J.B. – Practical Pharmaceutical Chemistry, Vol. II, CBS Publishers.

Reference Books:

1. Skoog, D.A., Holler, F.J., & Crouch, S.R. – *Principles of Instrumental Analysis*, Cengage Learning.
2. Sharma, B.K. – *Instrumental Methods of Chemical Analysis*, Goel Publishing House.
3. Robinson, J.W. – *Undergraduate Instrumental Analysis*, CRC Press.

Web references:

1. **United States Pharmacopeia (USP)** – <https://www.usp.org>
2. **Indian Pharmacopoeia (IPC)** – <https://ipc.gov.in>
3. **FDA Analytical Procedures and Methods Validation** – <https://www.fda.gov>

1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2. Estimation of dextrose by colorimetry
3. Estimation of sulfanilamide by colorimetry
4. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5. Assay of paracetamol by UV- Spectrophotometry
6. Estimation of quinine sulfate by fluorimetry
7. Study of quenching of fluorescence
8. Determination of sodium by flame photometry
9. Determination of potassium by flame photometry
10. Determination of chlorides and sulphates by nephelo turbidometry
11. Separation of amino acids by paper chromatography
12. Separation of sugars by thin layer chromatography
13. Separation of plant pigments by column chromatography
14. Demonstration experiment on HPLC
15. Demonstration experiment on Gas Chromatography

Practical Books:

1. Practical Aspects of Instrumental Methods of Analysis – Dr. Shom Prakash Kushwaha, Dr. Kuldeep Singh, Dr. Smriti Ojha
2. A Practical Book of Instrumental Methods of Analysis (BP705P) – Nirali Prakashan
3. Instrumental Methods of Chemical Analysis – B.K. Sharma

Reference Books:

1. Vogel's Textbook of Quantitative Chemical Analysis – A.I. Vogel
2. Practical Pharmaceutical Chemistry – A.H. Beckett & J.B. Stenlake
3. Textbook of Pharmaceutical Analysis – Kenneth A. Connors

Web references:

1. MLR Institute Lab Manual – mlrip.ac.in
2. H.R. Patel Pharmacy College Lab Manual – hrpatelpharmacy.co.in
3. NPTEL Online Course: Instrumental Methods of Chemical Analysis – nptel.ac.in

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Industrial Pharmacy-II – Theory
B. Pharm-7th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP702T	Industrial PharmacyII – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP702T:Industrial Pharmacy-II – Theory

Course Objectives:

1. Provide an in-depth understanding of large-scale manufacturing processes of pharmaceuticals such as tablets, capsules, parenterals, aerosols, and cosmetics.
2. Familiarize students with quality assurance concepts, GMP, and validation in the pharmaceutical industry.
3. Develop knowledge of packaging materials, labeling requirements, and regulatory guidelines.
4. Enable students to relate theoretical concepts to industrial practices for dosage form production.
5. Promote problem-solving and decision-making skills in pharmaceutical manufacturing and quality control.

Course Outcomes:

CO1: Explain the principles, equipment, and processes involved in the large-scale manufacture of pharmaceutical dosage forms.

CO2: Apply knowledge of GMP, quality assurance, and validation in pharmaceutical manufacturing.

CO3: Select suitable packaging materials and design appropriate labeling for pharmaceutical products.

CO4: Analyze and troubleshoot manufacturing problems related to dosage forms.

CO5: Interpret regulatory guidelines and apply them to ensure product quality and compliance.

UNIT-I

10 Hours

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.

UNIT-II

10 Hours

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 equipment's, 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, MoUs, legal issues.

UNIT-III

10 Hours

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

UNIT-IV

08 Hours

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.

UNIT- V

07 Hours

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.

Text Books:

1. Pharmaceutics: The Science of Dosage Form Design – Michael E. Aulton.
2. Pharmaceutical Dosage Forms: Tablets Vol. 1–3 – Herbert A. Lieberman, Leon Lachman, Joseph B. Schwartz.
3. Pharmaceutical Production and Management – C.V.S. Subrahmanyam.

Reference Books:

1. The Theory and Practice of Industrial Pharmacy – Leon Lachman, Herbert A. Lieberman, Joseph L. Kanig.
2. Pharmaceutical Dosage Forms and Drug Delivery Systems – Howard C. Ansel.
3. Remington: The Science and Practice of Pharmacy – Gennaro A.R.

Web references:

1. WHO Guidelines on GMP for Pharmaceutical Products – who.int
2. U.S. FDA – Current Good Manufacturing Practice (CGMP) Regulations – fda.gov
3. ICH Guidelines (Q8, Q9, Q10) – ich.org

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
Pharmacy Practice – Theory
B. Pharm-7th Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP703T	Pharmacy Practice– Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP703T:Pharmacy Practice – Theory

Course Objectives:

1. To familiarize students with the structure, functions, and organization of hospital and community pharmacies.
2. To develop skills in drug distribution systems, formulary preparation, and therapeutic drug monitoring.
3. To train students in clinical pharmacy services, including medication chart review, patient counseling, and ADR monitoring.
4. To impart knowledge of drug store management, inventory control techniques, and budgeting in pharmacy settings.
5. To promote rational use of medicines and effective communication with patients and healthcare teams.

Course Outcomes:

CO1: Explain the roles and responsibilities of hospital and community pharmacists.

CO2: Apply knowledge of drug distribution, formulary systems, and TDM in healthcare practice.

CO3: Provide pharmaceutical care through medication history collection, ADR identification, and patient counseling.

CO4: Manage drug stores and inventory efficiently using modern control techniques.

CO5: Advocate and implement rational drug therapy in clinical and community pharmacy settings.

UNIT–I10 Hours

a) Hospital and it's organization

Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization

Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction

Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for

detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) Community Pharmacy

Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

UNIT-II 10 Hours

a) Drug distribution system in a hospital

Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary

Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring

Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence

Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview

Need for the patient medication history interview, medication interview forms.

f) Community pharmacy management

Financial, materials, staff, and infrastructure requirements.

UNIT-III

10 Hours

a) Pharmacy and therapeutic committee

Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services

Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling

Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist

d) Education and training program in the hospital

Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

e) Prescribed medication order and communication skills

Prescribed medication order- interpretation and legal requirements, and Communication skills-communication with prescribers and patients.

UNIT-IV

08 Hours

a) Budget preparation and implementation

Budget preparation and implementation

b) Clinical Pharmacy

Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and pharmaceutical care.

Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales

Introduction and sale of over the counter, and Rational use of common over the counter medications.

UNIT– V

07 Hours

a) Drug store management and inventory control

Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs

Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests

Blood chemistry, hematology, and urinalysis

Text Books:

1. Parthasarathi G., Karin Nyfort-Hansen, Milap C. Nahata – *A Textbook of Clinical Pharmacy Practice* (2nd Ed., Universities Press.
2. David A. Holdford, Thomas R. Brown – *Introduction to Hospital and Health-System Pharmacy Practice* (American Society of Health-System Pharmacists)
3. Sachdeva P. D. – *Hospital and Clinical Pharmacy* (B.S. Shah Prakashan)

Reference Books:

1. William E. Hassan – *Hospital Pharmacy* (Lea & Febiger)
2. Allen L.V., Popovich N.G., Ansel H.C. – *Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems*.
3. World Health Organization – *The Role of the Pharmacist in the Health Care System* (WHO publications)

Web references:

1. World Health Organization – Pharmacy Practice
2. American Society of Health-System Pharmacists (ASHP)
3. Pharmacy Council of India – B.Pharm Syllabus

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
Novel Drug Delivery System – Theory
B. Pharm-7th Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP704T	Novel Drug Delivery System – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP704T:Novel Drug Delivery System – Theory

Course Objectives:

1. Understand the various approaches for developing novel drug delivery systems (NDDS).
2. Grasp the criteria for selecting drugs and polymers suitable for novel drug delivery formulations and their evaluation.
3. Comprehend the mechanisms and principles behind controlled, targeted, and route-specific delivery systems.
4. Learn to address biological barriers (e.g., mucosal, ocular) and enhance bioavailability in drug delivery design.
5. Develop foundational knowledge for formulation and evaluation of diverse NDDS such as microencapsulation and implants.

Course Outcomes:

CO1: Describe different approaches to design novel drug delivery systems, including diffusion- and dissolution-based systems.

CO2: Identify suitable drug candidates and polymers for specific NDDS and justify their choice in formulation design.

CO3: Explain the design principles and applications of systems such as TDDS, gastroretentive, nasopulmonary, mucosal, ocular, and implantable systems.

CO4: Illustrate targeted delivery mechanisms using liposomes, nanoparticles, monoclonal antibodies, and their advantages/disadvantages.

CO5: Analyze and propose formulation strategies to overcome physiological barriers—improving bioavailability and therapeutic efficacy.

UNIT-I

10 Hours

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design-controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

UNIT-II

10 Hours

Microencapsulation: Definition, advantages and disadvantages, microspheres/microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implants and osmotic pump

UNIT-III

10 Hours

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high-density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

UNIT-IV

08 Hours

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

UNIT- V

07 Hours

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Text Books:

1. Y. W. Chien, *Novel Drug Delivery Systems*, 2nd ed., Revised & Expanded, Marcel Dekker, New York, 1992.
2. J. R. Robinson, V. H. L. Lee, *Controlled Drug Delivery Systems*, Marcel Dekker, New York, 1992.
3. Encyclopedia of Controlled Delivery, edited by Edith Mathiowitz, Wiley Interscience, New York.

Reference Books:

1. N. K. Jain, *Controlled and Novel Drug Delivery*, CBS Publishers, New Delhi, 1997 (Reprint 2001).
2. S. P. Vyas & R. K. Khar, *Controlled Drug Delivery: Concepts and Advances*, Vallabh Prakashan, New Delhi, 2002.
3. Dr. Sachin N. Kothawade, *Novel Drug Delivery Systems (BP704T, PCI syllabus)*, Nirali Prakashan (First ed., 2024).

Web references:

1. Amrita Vishwa Vidyapeetham – Course page for Novel Drug Delivery System (Theory) outlining syllabus, units, objectives, and references.
2. GIPS-LMS Course Outcomes for BP704T, providing detailed course outcome statements (CO-PO Matrix).
3. NPTEL Course—Novel Drug Delivery Systems: Describes coverage of NDDS, including nanocarriers, transdermal, ocular, etc., matching PCI syllabus structure.

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
For Practice School
B. Pharm-7th Semester

Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP706 PS	Practice School*	12	-	1	6	-	-	-	-	125	-	25	150


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Proposed Syllabus
Biostatistics and Research Methodology – Theory
B. Pharm-8th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP801T	Biostatistics and Research Methodology – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP801T:Biostatistics and Research Methodology – Theory

Course Objectives:

1. Introduce the fundamental concepts of biostatistics and their applications in pharmaceutical research.
2. Develop skills to design, conduct, and analyze experiments using appropriate statistical tools.
3. Familiarize students with research methodology, hypothesis formulation, and sampling techniques.
4. Enable students to interpret and present research data in a scientifically valid manner.
5. Provide knowledge of scientific writing, ethics in research, and preparation of research proposals.

Course Outcomes:

- CO1:**Apply descriptive and inferential statistical methods to pharmaceutical data analysis.
CO2:Select suitable sampling methods and experimental designs for research studies.
CO3:Formulate research problems and hypotheses based on literature and observations.
CO4:Use statistical software and tools for data analysis and interpretation.
CO5:Prepare research reports, scientific manuscripts, and proposals following ethical guidelines.

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 modelling: 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, 2², 2³ design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Text Books:

1. Biostatistics: A Foundation for Analysis in the Health Sciences – Wayne W. Daniel
2. Fundamentals of Biostatistics – Bernard Rosner
3. Research Methodology: Methods and Techniques – C.R. Kothari

Reference Books:

1. Biostatistics: Basic Concepts and Methodology for the Health Sciences – Daniel & Cross.
2. Pharmaceutical Statistics: Practical and Clinical Applications – Sanford Bolton, Charles Bon.
3. Design and Analysis of Experiments – Douglas C. Montgomery.

Web references:

1. WHO – Health Statistics Methodology – who.int
2. NPTEL – Biostatistics and Design of Experiments – nptel.ac.in
3. Coursera – Biostatistics in Public Health – coursera.org

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
Social and Preventive Pharmacy – Theory
B. Pharm-8th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teach ers Asses sment *	Total	END SEM Univer sity Exam	Two Term Exam	Teach ers Asses sment*	
BP802T	Social and Preventive Pharmacy – Theory	3	1	-	4	75	15	10	100	-	-	-	100

BP802T:Social and Preventive Pharmacy – Theory

Course Objectives:

1. Provide knowledge about health and disease, including their social, environmental, and occupational determinants.
2. Familiarize students with national health programs, health care delivery systems, and policies.
3. Develop an understanding of epidemiology and preventive measures for communicable and non-communicable diseases.
4. Equip students with skills to promote community health through education and intervention programs.
5. Emphasize the pharmacist's role in social and preventive healthcare services.

Course Outcomes:

- CO1:** Explain the concepts of health, disease, and epidemiology in public health contexts.
CO2: Describe the objectives, structure, and implementation of national health programs.
CO3: Identify social and environmental factors influencing community health.
CO4: Apply preventive strategies to control communicable and non-communicable diseases.
CO5: Demonstrate the role of pharmacists in promoting social health and preventive care.

UNIT-I 10 Hours

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health.

Hygiene and health: personal hygiene and health care; avoidable habits.

UNIT-II

10 Hours

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse.

UNIT-III**10 Hours**

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

UNIT-IV**08 Hours**

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

UNIT- V**07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Text Books:

1. Textbook of Preventive and Social Medicine – K. Park.
2. Public Health and Preventive Medicine – J.E. Park & K. Park.
3. Health Education and Community Pharmacy – C.K. Kokate, S.B. Gokhale.

Reference Books:

1. Social Pharmacy: A Textbook for Health Professionals – B. Waterfield & D. Nash
2. Oxford Textbook of Global Public Health – Roger Detels, Martin Gulliford, et al.
3. Epidemiology – Leon Gordis

Web references:

1. WHO – Health Statistics Methodology – who.int
2. CDC – Global Health & Public Health Resources – cdc.gov
3. NPTEL – Health Research Fundamentals – nptel.ac.in

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus
PHARMACOVIGILANCE (Theory)
B. Pharm Semester -VIII
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
						THEORY				PRACTICAL			
						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP805ET	PHARMACOVIGILANCE (Theory)	3	1	-	4	75	15	10	100	-	-	-	100

BP805ET: PHARMACOVIGILANCE (Theory)

Course Objectives:

At completion of this paper it is expected that students will be able to (know, do, and appreciate):

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance.
3. National and international scenario of pharmacovigilance.
4. Dictionaries, coding and terminologies used in pharmacovigilance.
5. Detection of new adverse drug reactions and their assessment.
6. International standards for classification of diseases and drugs.

Course Outcomes:

CO1: Explain the principles, scope, and history of pharmacovigilance, including national and international programmes for drug safety monitoring.

CO2: Identify and classify adverse drug reactions (ADRs), and apply methods for their detection, reporting, management, predictability, preventability, severity, and causality assessment.

CO3: Describe drug and disease classification systems, coding standards, dictionaries, and specialized information resources used in pharmacovigilance practice.

CO4: Demonstrate knowledge of vaccine safety surveillance methods, active and passive surveillance techniques, and effective communication strategies in drug safety and crisis management.

CO5: Interpret regulatory guidelines (ICH, CIOMS, CDSCO, D&C Act, Schedule Y) and processes for safety data generation, expedited reporting, and pharmacovigilance planning.

UNIT-I

Introduction to Pharmacovigilance

- Pharmacovigilance Program of India(PvPI)
- WHO international drug monitoring programme
- Importance of safety monitoring of Medicine
- History and development of Pharmacovigilance

Introduction to adverse drug reactions

- Detection and reporting
- Definitions and classification of ADRs
- Management of adverse drug reactions
- Predictability and preventability assessment
- Severity and seriousness assessment

- Methods in Causality assessment

Basic terminologies used in pharmacovigilance

- Regulatory terminology
- Terminologies of adverse medication related events

UNIT-II

Drug and disease classification

- International Non proprietary Names for drugs
- Daily defined doses
- International classification of diseases

Drug dictionaries and coding in pharmacovigilance

- WHO drug dictionary
- MedDRA and Standardized MedDRA queries
- WHO adverse reaction terminologies
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Specialised resources for ADRs
- Basic drug information resources

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishing & operation of drug safety department in industry Establishing a national programme
Contract Research Organizations (CROs)

UNIT-III

Vaccine safety surveillance

- Adverse events following immunization
- Vaccination failure
- Vaccine Pharmacovigilance

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance & Media
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities

UNIT-IV

Safety data generation

- Post approval phase (PMS)

- Clinical phase
- Pre clinical phase

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH Expedited reporting
- Post approval expedited reporting
- Periodic safety update reports
- Individual case safety reports
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

UNIT-V

Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population

- Pregnancy and lactation
- Paediatrics
- Geriatrics

CIOMS

- CIOMS Form
- CIOMS Working Groups

CDSCO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Text Books:

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.

Reference Books:

1. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
2. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones & Bartlett Publishers.
3. National Formulary of India.

Web references:

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2. https://scholar.google.com/scholar?q=related:D908c509kAJ:scholar.google.com/&scioq=pharmacovigilance&hl=en&as_sdt=0,5
3. https://scholar.google.com/scholar?q=related:inJwaoPsjdMJ:scholar.google.com/&scioq=pharmacovigilance&hl=en&as_sdt=0,5

Oriental University, Indore
University Institute of Pharmacy
Proposed Syllabus for
COSMETIC SCIENCE (Theory)
B. Pharmacy 8th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total	
						THEORY				PRACTICAL				
						END SEM University Exam	Two Term Exam	Teachers Assessment*	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*		
BP809ET	Cosmetic Science Theory	-	3	1	-	4	75	15	10	100	-	-	-	100

BP809ET: COSMETIC SCIENCE(Theory)

Course Objectives:

1. **Classify and define** cosmetic and cosmeceutical products as per Indian and EU regulations, and explain their evolution, including the concept of quasi-drugs and OTC drugs.
2. **Identify and describe cosmetic excipients** such as surfactants, rheology modifiers, humectants, emollients, and preservatives, with their classification and applications.
3. **Explain basic anatomy and physiology** of skin, including its structure and functions.
4. **Describe actives and mechanisms of action** of antiperspirants and deodorants.
5. **Explain formulation principles** of hair care products including conditioning shampoo, hair conditioner, anti-dandruff shampoo, hair oils, and para-phenylenediamine-based hair dyes.
6. **Explain formulation principles** of oral care products including toothpaste for bleeding gums, sensitive teeth, teeth whitening, and mouthwash.

Course Outcomes:

CO1: Classify and define cosmetics and cosmeceuticals as per Indian and EU regulations, explain their evolution, and describe the role of excipients, skin, hair, and oral cavity in cosmetic formulation.

CO2: Apply formulation principles to design and evaluate skin care, hair care, oral care, and sun protection products, including advantages, disadvantages, and active ingredients.

CO3: Explain the role of herbs (aloe, turmeric, henna, amla, neem, clove) in cosmetics and interpret BIS specifications and analytical methods for common cosmetic products.

CO4: Demonstrate understanding of cosmetic evaluation techniques using instruments such as sebumeter, corneometer, TEWL meter, and hair tensile testers.

CO5: Identify and manage cosmetic problems of skin, hair, and scalp, and explain moisturization strategies, comedogenicity, dermatitis, and mechanisms of antiperspirants and deodorants.

UNIT-I

Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs

Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application

Skin: Basic structure and function of skin.

Hair: Basic structure of hair. Hair growth cycle.

Oral Cavity: Common problem associated with teeth and gums.

UNIT-II

Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmeceuticals.

Antiperspirants & deodorants- Actives & mechanism of action.

Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para-phenylene diamine based hair dye.

Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

UNIT-III

Sun protection, Classification of Sunscreens and SPF.

Role of herbs in cosmetics: Skin Care:

Skin Care: Aloe and turmeric

Aloe and turmeric Hair care: Henna and amla.

Oral care: Neem and clove

Analytical cosmetics: BIS specification and analytical methods for shampoo, skin- cream and toothpaste.

UNIT-IV

Principles of Cosmetic Evaluation:

Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars.

Evolution and skin benefits.

UNIT-V

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis.

Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

Text Books:

1. Barel AO, Paye M, Maibach HI, editors. Handbook of cosmetic science and technology. CRC press; 2014 Apr 9.
2. PANIGRAHI DR, ASANE GS, KHAN DM. The Textbook of Cosmetic Sciences. JEC PUBLICATION;
3. Selden R, Widdowson P, Brooker P. A reader's guide to contemporary literary theory. Routledge; 2013 Aug 16.

Reference Books:

1. Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
2. Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4 th Edition, Vandana Publications Pvt. Ltd., Delhi.
3. Text book of cosmeticology by Sanju Nanda & Roop K. Khar, Tata Publishers.

Web references

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2. [https://books.google.com/books?hl=en&lr=&id=HGp_CwAAQBAJ&oi=fnd&pg=PA87&dq=COSMETIC+SCIENCE\(Theory\)&ots=DY2TCWstEQ&sig=j2cwbUUqhBLPz39DK2RV9uZ1yNg](https://books.google.com/books?hl=en&lr=&id=HGp_CwAAQBAJ&oi=fnd&pg=PA87&dq=COSMETIC+SCIENCE(Theory)&ots=DY2TCWstEQ&sig=j2cwbUUqhBLPz39DK2RV9uZ1yNg)
3. https://scholar.google.com/scholar?cluster=12533541070360611997&hl=en&as_sdt=0,5

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Proposed Syllabus for
Project Work
B. Pharmacy 8th Semester
Choice Based Credit System (CBCS)-W. E. F. 2025

COURSE CODE	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME							Total
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						END SEM University Exam	Two Term Exam	Teachers Assessment *	Total	END SEM University Exam	Two Term Exam	Teachers Assessment*	
BP812PW	Project Work	12	-	-	6	150	-	-	150	-	-	-	150


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Oriental University, Indore


Dean
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