

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Human Anatomy and Physiology I
<b>Course Code</b>	BP-101[T]

### Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Foundation core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Explain the gross morphology, structure and functions of various organs of the human body( <b>BL1-Remember</b> ) <b>CO2-</b> Describe the various homeostatic mechanisms and their imbalances.( <b>BL2-Understand</b> ) <b>CO3-</b> Identify the various tissues and organs of different systems of human body( <b>BL5-Evaluate</b> ) <b>CO4-</b> Perform the various experiments related to special senses and nervous system( <b>BL3-Apply</b> ) <b>CO5-</b> To analyze the importance of blood, lymphatic system and immunity in human body.( <b>BL4-Analyze</b> )							
<b>Course Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✓ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>		SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)			

### Part B

Modules	Contents	Pedagogy	Hours
UNIT I	Introduction to human body Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology. Cellular level of organization 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT II	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT III	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, Reticuloendothelial system. Lymphatic system Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT IV	Peripheral nervous system: Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves. Special senses Structure and functions of eye, ear, nose and tongue and their disorders.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT V	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	ESR determination of students	PBL	BL3-Apply	3
II	Blood Grouping	Experiments	BL3-Apply	2

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	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
<b>Articles</b>	1. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterje, Academic Publishers Kolkata
<b>References Books</b>	1. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA 2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
<b>MOOC Courses</b>	<a href="https://oli.cmu.edu/courses/anatomy-physiology-i-ii-v2-academic/">https://oli.cmu.edu/courses/anatomy-physiology-i-ii-v2-academic/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=3oUvqNuWzPg">https://www.youtube.com/watch?v=3oUvqNuWzPg</a>

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	-	1	-	-	2	-	3	1	3	1	3
CO2	2	1	-	1	-	1	-	-	1	-	2	1	2	1	2
CO3	3	2	-	-	-	1	-	-	2	-	1	1	2	1	2
CO4	3	2	-	1	1	2	-	-	-	-	-	-	1	2	1
CO5	2	1	-	-	1	-	1	-	-	-	-	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Analysis I
<b>Course Code</b>	BP-102[T]

### Part A

Year	1st	Semester	1st	Credits	L 3	T 1	P 0	C 4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Foundation core							
<b>Pre-Requisite/s</b>								
<b>Co-Requisite/s</b>								
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand the principles of volumetric and electro chemical analysis.( <b>BL2-Understand</b> ) <b>CO2-</b> To gain knowledge of sources of errors and minimizing techniques.( <b>BL1-Remember</b> ) <b>CO3-</b> To analyze the techniques of volumetric, gravimetric and gas analysis.( <b>BL3-Apply</b> ) <b>CO4-</b> To explain about accuracy, precision and significant figure error concepts.( <b>BL1-Remember</b> ) <b>CO5-</b> To compute analytical results and understand the physiochemical concepts of analysis, theories of acids and bases, stoichiometry etc( <b>BL4-Analyze</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)					

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Pharmaceutical Analysis- Definition and scope, Different techniques of analysis , Methods of expressing concentration Primary and secondary standards. 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 Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Concepts of oxidation and reduction, Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromometry, Dichrometry, Titration with potassium iodate	Blended Learning	08
UNIT 5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Making of differen buffers and its titration	Experiments	BL2-Understand	5

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	1. A.I. Vogel, Text Book of Quantitative Inorganic analysis 3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
<b>Articles</b>	<a href="https://www.orientjchem.org/vol36no1/a-review-article-on-pharmaceutical-analysis-of-pharmaceutical-industry-according-to-pharmacopoeias/">https://www.orientjchem.org/vol36no1/a-review-article-on-pharmaceutical-analysis-of-pharmaceutical-industry-according-to-pharmacopoeias/</a>
<b>References Books</b>	1. John H. Kennedy, Analytical chemistry principles 6. Indian Pharmacopoeia
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses/104108363">https://nptel.ac.in/courses/104108363</a>
<b>Videos</b>	You tube,

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	3	3	-	-	1	1	-	3	1	3	2	1
CO2	2	2	-	2	2	-	-	1	2	-	3	2	2	1	2
CO3	2	2	1	-	1	-	-	2	1	-	2	1	1	1	1
CO4	2	1	3	-	1	-	-	2	1	-	2	1	1	-	1
CO5	3	3	2	-	1	1	-	-	-	-	-	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutics I
<b>Course Code</b>	BP-103[T]

### Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Know the history of profession of pharmacy ( <b>BL1-Remember</b> ) <b>CO2-</b> Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations( <b>BL2-Understand</b> ) <b>CO3-</b> Understand the professional way of handling the prescription( <b>BL2-Understand</b> ) <b>CO4-</b> Preparation of solid and liquid dosage forms( <b>BL3-Apply</b> ) <b>CO5-</b> To formulate and evaluate semi solid dosage forms( <b>BL5-Evaluate</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗			<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)			

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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 the formulation of liquid dosage forms. Solubility enhancement techniques	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 4	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Students will Create and formulate different dosage form as a part of ABL	Experiments	BL6-Create	5

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

### Part E

<b>Books</b>	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 p Churchill Livingstone, Edinburgh.
<b>Articles</b>	<a href="https://www.mdpi.com/journal/pharmaceutics">https://www.mdpi.com/journal/pharmaceutics</a>
<b>References Books</b>	1. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The University of Michigan. 2. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams Delhi. 4. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses">https://nptel.ac.in/courses</a>
<b>Videos</b>	<a href="https://www.google.com/search?q=pharmaceutics+articles&amp;rlz=1C1ONGR_enIN1056IN1057&amp;oq=&amp;gs_lcrp=EgZjaHJvbWUqBggBEEUYOzIGCAAQRrg5MgYIARBFdGsyBwgCEAAyAQyBwgDEC4YgAQyBwgEEAAyAQyBwgFEAAyGA8">https://www.google.com/search?q=pharmaceutics+articles&amp;rlz=1C1ONGR_enIN1056IN1057&amp;oq=&amp;gs_lcrp=EgZjaHJvbWUqBggBEEUYOzIGCAAQRrg5MgYIARBFdGsyBwgCEAAyAQyBwgDEC4YgAQyBwgEEAAyAQyBwgFEAAyGA8</a>

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	3	2	1	-	-	-	3	2	3	2	2
CO2	3	2	3	-	-	-	-	-	-	-	-	-	3	2	1
CO3	2	2	2	-	-	1	1	2	-	3	3	-	3	1	1
CO4	2	1	1	-	-	-	-	-	-	-	2	1	3	3	-
CO5	2	1	-	1	-	1	-	1	-	-	2	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Inorganic Chemistry
<b>Course Code</b>	BP-104[T]

## Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the history and concept of pharmacopoeia and its editions. <b>(BL2-Understand)</b> <b>CO2-</b> To know the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals. <b>(BL1-Remember)</b> <b>CO3-</b> To gain knowledge on limit tests of different pharmaceutical inorganic compounds. <b>(BL1-Remember)</b> <b>CO4-</b> To understand the method to prepare inorganic pharmaceuticals <b>(BL2-Understand)</b> <b>CO5-</b> To justify the medicinal importance of acidifiers, antacids, cathartics and antimicrobial agents as gastrointestinal agents <b>(BL3-Apply)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>		SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)			

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes	Lecture based learning, ICT, Peer Tutorial	10
UNIT 2	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.	Lecture based learning, ICT, Peer Tutorial	10
UNIT 3	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	Lecture based learning, ICT, Peer Tutorial	10
UNIT 4	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 333 Astringents: Zinc Sulphate, Potash Alum	Lecture based learning, ICT, Peer Tutorial	08
UNIT 5	Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of $\alpha$ , $\beta$ , $\gamma$ radiations, Half-life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances.	Lecture based learning, ICT, Peer Tutorial	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Limit test finding in water of ITM premises sample	Experiments	BL3-Apply	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

## Part E

<b>Books</b>	1. A.I. Vogel, Text Book of Quantitative Inorganic analysis 2. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition 3. M.L Schroff, Inorganic Pharmaceutical Chemistry 4. Bentley and Driver's Textbook of Pharmaceutical Chemistry 5. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
<b>Articles</b>	NA
<b>References Books</b>	1. Indian Pharmacopoeia
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses">https://nptel.ac.in/courses</a>
<b>Videos</b>	You tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	2	1	2	1	3	-	3	-	3	3	-
CO2	3	2	1	2	2	1	1	1	2	-	3	-	2	3	1
CO3	2	2	1	1	2	2	1	1	2	-	3	1	1	2	-
CO4	2	2	1	1	2	1	1	1	1	-	2	-	1	1	-
CO5	3	1	2	1	3	1	2	1	1	-	2	3	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Communication Skills *
<b>Course Code</b>	BP-105[T]

### Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	0	0	2
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Non-graded Core Requirement							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation.( <b>BL2-Understand</b> ) <b>CO2-</b> Communicate effectively (Verbal and Non-Verbal)( <b>BL3-Apply</b> ) <b>CO3-</b> Effectively manage the team as a team player( <b>BL2-Understand</b> ) <b>CO4-</b> To develop interview skills( <b>BL3-Apply</b> ) <b>CO5-</b> To develop Leadership qualities and essentials.( <b>BL6-Create</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>		SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)			

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context Barriers to communication: 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	Lecture based Learning, interactive classroom,	07
UNIT 2	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	Lecture based Learning, interactive classroom, Discussion	07
UNIT 3	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	Lecture based Learning, interactive classroom, Discussion	07
UNIT 4	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	Lecture based Learning, interactive classroom, Discussion	05
UNIT 5	• Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion	Lecture based Learning, interactive classroom, Discussion, ABL (Mooc HR Round)	05

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	How to pitch yourself for HR Round	Seminar	BL5-Evaluate	10

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

### Part E

<b>Books</b>	1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011 2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011 3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013 4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011 5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
<b>Articles</b>	<a href="https://www.helpguide.org/articles/relationships-communication/effective-communication.htm">https://www.helpguide.org/articles/relationships-communication/effective-communication.htm</a>
<b>References Books</b>	1. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green Hall, 1st Edition Universe of Learning LTD, 2010 2. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011 3. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011 4. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India Pvt. Ltd, 2011 5. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses/102104061">https://nptel.ac.in/courses/102104061</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=yRwglZSsR_Y">https://www.youtube.com/watch?v=yRwglZSsR_Y</a>

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	-	1	-	-	3	3	-	1	3
CO2	-	-	-	-	-	2	1	1	-	-	2	2	-	1	3
CO3	-	1	-	-	-	1	-	1	-	-	2	2	-	1	3
CO4	-	-	-	1	-	2	1	1	-	-	2	3	-	1	3
CO5	-	-	-	-	-	-	1	1	-	-	1	2	-	1	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Remedial Biology *
<b>Course Code</b>	BP-106RB[T]

### Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	0	0	2
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Foundation core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the characters of living organisms and classification of kingdoms( <b>BL1-Remember</b> ) <b>CO2-</b> Understand the basic components of anatomy & physiology of plant( <b>BL2-Understand</b> ) <b>CO3-</b> To determine role of hormones in regulation of various organs functioning in the body and process of oogenesis and spermatogenesis( <b>BL2-Understand</b> ) <b>CO4-</b> To elaborate the physiology, nutrient requirements for plants and to predict plant/animal tissues( <b>BL3-Apply</b> ) <b>CO5-</b> To assess the physiology of brain and spinal cord, and role of kidney in regulation of body fluids( <b>BL4-Analyze</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗			<b>SDG (Goals)</b>		SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)		

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Living world: Definition and characters of living organisms Diversity in the living world Binomial nomenclature Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus, Morphology of Flowering plants Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones.	Lecture based learning, Audiovisual, interactive learning	07
UNIT 2	Body fluids and circulation Composition of blood, blood groups, coagulation of blood Composition and functions of lymph Human circulatory system Structure of human heart and blood vessels Cardiac cycle, cardiac output and ECG Digestion and Absorption Human alimentary canal and digestive glands Role of digestive enzymes Digestion, absorption and assimilation of digested food Breathing and respiration Human respiratory system Mechanism of breathing and its regulation Exchange of gases, transport of gases and regulation of respiration Respiratory volumes	Peer Tutorial, Lecture based learning, Audiovisual, interactive learning	07
UNIT 3	Excretory products and their elimination Modes of excretion Human excretory system- structure and function Urine formation Renin-angiotensin system Neural control and coordination Definition and classification of nervous system Structure of a neuron Generation and conduction of nerve impulse Structure of brain and spinal cord Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata Chemical coordination and regulation Endocrine glands and their secretions Functions of hormones secreted by endocrine glands Human reproduction Parts of female reproductive system Parts of male reproductive system Spermatogenesis and Oogenesis Menstrual cycle	Lecture based learning, Audiovisual, interactive learning, class using simulation	07
UNIT 4	Plants and mineral nutrition: Essential mineral, macro and micronutrients Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation Photosynthesis Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.	Lecture based learning, Audiovisual, interactive learning, Peer Tutorial	05
UNIT 5	Plant respiration: Respiration, glycolysis, fermentation (anaerobic). Plant growth and development Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators Cell - The unit of life Structure and functions of cell and cell organelles. Cell division Tissues Definition, types of tissues, location and functions.	Lecture based learning, Audiovisual, interactive learning	04

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Expert lecture on basics of biology	Seminar	BL2-Understand	2

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

### Part E

<b>Books</b>	1. Text book of Biology by S. B. Gokhale 2. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.
<b>Articles</b>	<a href="https://pharmdbm.com/bpharm-remedial-biology-notes-download/">https://pharmdbm.com/bpharm-remedial-biology-notes-download/</a> <a href="https://www.khanacademy.org/">https://www.khanacademy.org/</a>
<b>References Books</b>	1. A Textbook of Biology by Naidu and Murthy 2. Botany for Degree students By A.C.Dutta. 3. Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthkrishnan. 4. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate
<b>MOOC Courses</b>	<a href="https://nptel.ac.in">https://nptel.ac.in</a> <a href="https://www.udemy.com/course/biology-101/">https://www.udemy.com/course/biology-101/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=hDvg3cwD2bl&amp;list=PLPUtyE8MuppvHRI2XAKiqmSquwIMc0o2">https://www.youtube.com/watch?v=hDvg3cwD2bl&amp;list=PLPUtyE8MuppvHRI2XAKiqmSquwIMc0o2</a>

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	1	1	1	-	1	-	3	-	3	-	2
CO2	3	1	-	2	-	-	-	-	1	-	3	-	2	-	2
CO3	2	2	-	1	-	1	-	-	-	-	2	-	2	-	2
CO4	2	2	-	1	-	-	-	-	1	-	2	-	1	-	1
CO5	3	1	-	1	-	-	-	-	1	-	2	-	3	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Remedial Mathematics *
<b>Course Code</b>	BP-106RM[T]

## Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					2	0	0	2
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Non-graded Core Requirement							
<b>Pre-Requisite/s</b>								
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the role of mathematics in pharmacy( <b>BL1-Remember</b> ) <b>CO2-</b> Solve the different types of problems by applying theory( <b>BL2-Understand</b> ) <b>CO3-</b> Appreciate the important application of mathematics in Pharmacy( <b>BL4-Analyze</b> ) <b>CO4-</b> To adopt both conventional and creative techniques to the solutions of mathematical problems.( <b>BL4-Analyze</b> ) <b>CO5-</b> Apply a range of techniques effectively to solve problems including theory deduction, approximation and simulation( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	<b>SDG (Goals)</b>	SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)					

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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: Introduction, Limit of a function, Definition of limit of a function (definition)	Lecture based learning, Peer Tutorial	06
UNIT 2	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	lecture based l, numericals, based problem, learning	06
UNIT 3	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	lecture based learning	06
UNIT 4	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	lecture based learning	06
UNIT 5	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	lecture based learning	06

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Laplace Transform	Experiments	BL3-Apply	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

## Part E

<b>Books</b>	1. Differential Calculus by Shanthinarayan 2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
<b>Articles</b>	NA
<b>References Books</b>	1. Integral Calculus by Shanthinarayan 2. Higher Engineering Mathematics by Dr. B.S.Grewal
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/courses/102101067">https://nptel.ac.in/courses/102101067</a> <a href="https://www.udemy.com/course/math-fundamentals-complete-course-on-fundamentals-">https://www.udemy.com/course/math-fundamentals-complete-course-on-fundamentals-</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=d77qWQA4llw&amp;list=PL7qxHC_-XSZmafOUewEGxTKsc7brHKti_">https://www.youtube.com/watch?v=d77qWQA4llw&amp;list=PL7qxHC_-XSZmafOUewEGxTKsc7brHKti_</a>

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	1	1	1	-	-	-	-	-	2	-	-	1	1
CO2	-	3	1	-	1	-	-	-	-	-	1	-	-	1	-
CO3	-	2	1	-	1	-	-	-	-	-	1	-	-	1	1
CO4	1	2	1	1	1	-	-	-	-	-	1	-	-	-	1
CO5	-	2	-	-	2	-	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Human anatomy and Physiology
<b>Course Code</b>	BP-107[P]

### Part A

<b>Year</b>	1st	<b>Semester</b>	1st	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Foundation core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall handling of compound microscope and to memorize various animal tissues. <b>(BL1-Remember)</b> <b>CO2-</b> To summarize the characteristics of different bones (skeletal system) <b>(BL2-Understand)</b> <b>CO3-</b> To identify the bleeding/clotting time and blood group <b>(BL2-Understand)</b> <b>CO4-</b> To analyze the blood cells using heamocytometry <b>(BL4-Analyze)</b> <b>CO5-</b> To estimate the ESR, HR, PR, hemoglobin concentration of human blood and blood pressure <b>(BL5-Evaluate)</b>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth)				

### Part B

<b>Modules</b>	<b>Contents</b>	<b>Pedagogy</b>	<b>Hours</b>
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Study of compound microscope. 2. Microscopic study of epithelial and connective tissue	Experiments	BL2-Understand	4
2	3. Microscopic study of muscular and nervous tissue 4. Identification of axial bones	Experiments	BL3-Apply	4
3	5. Identification of appendicular bones 6. Introduction to hemocytometry	Experiments	BL4-Analyze	4
4	7. Enumeration of white blood cell (WBC) count 8. Enumeration of total red blood corpuscles (RBC) count	Experiments	BL5-Evaluate	4
5	9. Determination of bleeding time 10. Determination of clotting time	Experiments	BL4-Analyze	4
6	11. Estimation of hemoglobin content 12. Determination of blood group.	Experiments	BL3-Apply	4
7	13. Determination of erythrocyte sedimentation rate (ESR). 14. Determination of heart rate and pulse rate. 15. Recording of blood pressure.	Experiments	BL3-Apply	4

### Part D(Marks Distribution)

Theory	
<b>Total Marks</b>	<b>Minimum</b>



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Human Anatomy and Physiology II
<b>Course Code</b>	BP201T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> Explain the gross morphology, structure and functions of various organs of the human body.(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> Describe the various homeostatic mechanisms and their imbalances(<b>BL2-Understand</b>)</p> <p><b>CO3-</b> Identify the various tissues and organs of different systems of human body(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> 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.(<b>BL3-Apply</b>)</p> <p><b>CO5-</b> Appreciate coordinated working pattern of different organs of each system(<b>BL2-Understand</b>)</p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)					



## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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, movements of GIT, digestion and absorption of nutrients and disorders of GIT. • Energetics Formation and role of ATP, Creatinine Phosphate and BMR.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	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	Peer tutorial	10
UNIT 5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	09

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Create respiratory model using baloon and bottle	Experiments	BL3-Apply	3

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://www.medicalnewstoday.com/articles/248743">https://www.medicalnewstoday.com/articles/248743</a>
<b>References Books</b>	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
<b>MOOC Courses</b>	<a href="https://www.edx.org/learn/human-anatomy">https://www.edx.org/learn/human-anatomy</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=uBGI2BujkPQ">https://www.youtube.com/watch?v=uBGI2BujkPQ</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	3	-	3	-	2
CO2	1	-	-	1	-	1	-	1	-	-	3	-	3	-	2
CO3	3	-	-	1	1	1	-	-	-	-	3	-	2	-	2
CO4	1	-	-	1	1	1	-	2	-	-	2	-	2	-	2
CO5	1	-	-	2	1	1	1	1	-	-	2	-	2	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Organic Chemistry I
<b>Course Code</b>	BP202T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand and applications of nomenclature, properties, reactions and uses of organic compounds. <b>(BL3-Apply)</b> <b>CO2-</b> To remember the orientation of reactions and influence products. <b>(BL1-Remember)</b> <b>CO3-</b> To apply the knowledge for the identification of organic compounds. <b>(BL3-Apply)</b> <b>CO4-</b> To discuss chemistry and reactions of various organic compounds. <b>(BL2-Understand)</b> <b>CO5-</b> To elaborate the concepts of hybridization, electronic and steric effects of organic compounds. <b>(BL2-Understand)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07
UNIT 2	Alkanes*, Alkenes* and Conjugated dienes* SP <sup>3</sup> hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP <sup>2</sup> hybridization in alkenes E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 versus 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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 Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform. Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	study of lab chemical isomerism	PBL	BL2-Understand	3

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Organic Chemistry by Morrison and Boyd 2. Organic Chemistry by I.L. Finar, Volume-I 3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl
<b>Articles</b>	NA
<b>References Books</b>	1. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz. 2. Reaction and reaction mechanism by Ahluwaliah/Chatwal
<b>MOOC Courses</b>	<a href="https://extendedstudies.ucsd.edu/courses-and-programs/organic-chemistry-i">https://extendedstudies.ucsd.edu/courses-and-programs/organic-chemistry-i</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=XQhomr7j44M&amp;list=PLNiSYvRcckSyPEJ_PFIK-kfE66UUB_zmM">https://www.youtube.com/watch?v=XQhomr7j44M&amp;list=PLNiSYvRcckSyPEJ_PFIK-kfE66UUB_zmM</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	3	-	2	-	-	-	3	-	3	-	2
CO2	2	-	-	-	3	-	1	-	-	-	3	-	1	-	2
CO3	2	2	-	-	2	-	-	-	-	-	3	-	2	-	2
CO4	2	1	-	-	1	-	1	-	-	-	3	-	1	-	2
CO5	2	1	1	-	1	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Biochemistry
<b>Course Code</b>	BP203T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To remember the properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids (<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To understand the metabolism of carbohydrates and process of electron transport and ATP formation(<b>BL2-Understand</b>)</p> <p><b>CO3-</b> To apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzyme(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> To distinguish the process of DNA replication, transcription and translation(<b>BL2-Understand</b>)</p> <p><b>CO5-</b> To evaluate the causes, manifestations and diagnosis of metabolic disorders(<b>BL5-Evaluate</b>)</p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)					

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins. Bioenergetics Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 2	Carbohydrate metabolism Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus Biological oxidation Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Lipid metabolism $\beta$ -Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity. Amino acid metabolism General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Nucleic acid metabolism and genetic information transfer Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 5	Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes – Structure and biochemical functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DNA MODEL MAKING	Simulation	BL2-Understand	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Textbook of Biochemistry by Rama Rao. 2. Textbook of Biochemistry by Deb.
<b>Articles</b>	<a href="https://www.mcgill.ca/biochemistry/about-us/information/biochemistry">https://www.mcgill.ca/biochemistry/about-us/information/biochemistry</a>
<b>References Books</b>	1. Principles of Biochemistry by Lehninger. 2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell. 3. Biochemistry by Stryer.
<b>MOOC Courses</b>	<a href="https://www.edx.org/learn/biochemistry/harvard-university-principles-of-biochemistry?index=product&amp;queryID=6f52c57d14373630030886d85bfd4dfc&amp;position=1&amp;linked_from=autocomplete&amp;c=autocomplete">https://www.edx.org/learn/biochemistry/harvard-university-principles-of-biochemistry?index=product&amp;queryID=6f52c57d14373630030886d85bfd4dfc&amp;position=1&amp;linked_from=autocomplete&amp;c=autocomplete</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=GJAF85ckhyk&amp;list=PLTUO2J9MZQt1bmOFMAaWB8Nxa2qsInWPe">https://www.youtube.com/watch?v=GJAF85ckhyk&amp;list=PLTUO2J9MZQt1bmOFMAaWB8Nxa2qsInWPe</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	-	-	-	-	3	-	2	1	3
CO2	2	1	-	-	1	-	-	-	-	-	3	-	2	1	2
CO3	2	2	-	-	-	-	-	-	-	-	3	-	2	1	1
CO4	3	2	-	1	1	-	1	-	-	-	2	-	1	-	1
CO5	3	1	-	1	1	-	-	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pathophysiology
<b>Course Code</b>	BP204T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C	
						3	1	0	4
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To understand the process of cell injury, morphology of cell injury and cellular adaptations. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To understand the etiopathogenesis of cardiovascular, respiratory and renal diseases mentioned. <b>(BL2-Understand)</b></p> <p><b>CO3-</b> To apply the principles of pathogenesis in understanding symptoms, signs and complications of disease states mentioned. <b>(BL3-Apply)</b></p> <p><b>CO4-</b> To explain the etiopathogenesis of hematologic, endocrine, nervous, gastrointestinal, muscular skeletal diseases and Immunopathogenesis of infectious diseases. <b>(BL1-Remember)</b></p> <p><b>CO5-</b> To evaluate the principles of physical, chemical and biologic carcinogenesis. <b>(BL5-Evaluate)</b></p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)					

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Basic principles of Cell injury and Adaptation: 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis) Respiratory system: Asthma, Chronic obstructive airways diseases. Renal system: Acute and chronic renal failure	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Haematological Diseases: Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease. Gastrointestinal system: Peptic Ulcer	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease. Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Infectious diseases: Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections Sexually transmitted diseases: AIDS, Syphilis, Gonorrhoea	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Different disease model making	Seminar	BL2-Understand	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

## Part E

<b>Books</b>	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; 6th edition; India; Jaypee Publications; 2010. 3. Laurence B, Bruce C, Bjorn K.; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
<b>Articles</b>	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)
<b>References Books</b>	1. William and Wilkins, Baltimore; 1991 [1990 printing]. 2. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010. 3. Guyton A, John.E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010. 4. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014
<b>MOOC Courses</b>	<a href="https://www.coursera.org/courses?query=pathophysiology">https://www.coursera.org/courses?query=pathophysiology</a>
<b>Videos</b>	<a href="https://www.youtube.com/@RhesusMedicine">https://www.youtube.com/@RhesusMedicine</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	1	-	-	3	-	3	-	3
CO2	3	2	-	-	-	1	-	1	-	-	3	-	2	-	2
CO3	2	-	-	-	-	1	-	1	-	-	3	-	2	-	2
CO4	2	2	-	1	1	-	-	-	-	-	3	-	2	-	2
CO5	3	1	-	1	-	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Computer Applications in Pharmacy *
<b>Course Code</b>	BP205T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					3	0	0	3
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand different types of databases, applications of computers and databases in pharmacy. <b>(BL2-Understand)</b> <b>CO2-</b> To illustrate the concept of number system in computers. <b>(BL2-Understand)</b> <b>CO3-</b> Applications of web technologies such as HTML, XML, CSS, programming languages, Web servers and pharmacy drug database. <b>(BL3-Apply)</b> <b>CO4-</b> To evaluate the applications of computers in pharmacy such as drug information services, pharmacokinetics, mathematical model in drug design, hospital and clinical pharmacy etc., <b>(BL5-Evaluate)</b> <b>CO5-</b> To explain about bioinformatics and its impact in vaccine discovery. <b>(BL1-Remember)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG5(Gender equality)				

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 4	Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06
UNIT 5	Computers as data analysis in Preclinical development: Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	06

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	CADD	Simulation	BL2-Understand	3

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
75	38	50	25	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

## Part E

<b>Books</b>	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 Wiley and Sons, INC., Publication, USA
<b>Articles</b>	<a href="https://copbela.org/downloads/2020/SELF%20LEARNING%20MATERIAL%20BPHARMA/semester%202/BP205T/MODULE%2003.PDF">https://copbela.org/downloads/2020/SELF%20LEARNING%20MATERIAL%20BPHARMA/semester%202/BP205T/MODULE%2003.PDF</a>
<b>References Books</b>	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, SQLServer, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002
<b>MOOC Courses</b>	<a href="https://www.edx.org/certificates/professional-certificate/harvardx-data-science?index=product&amp;results_level=first-level-results&amp;term=COMPUTER+PHARMACY%22&amp;objectID=program-3c32e3e0-b6fe-4ee4-bd4f-210c6339e074&amp;campaign=Data++Science&amp;source=edx&amp;product_category=professional-certificate&amp;placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch">https://www.edx.org/certificates/professional-certificate/harvardx-data-science?index=product&amp;results_level=first-level-results&amp;term=COMPUTER+PHARMACY%22&amp;objectID=program-3c32e3e0-b6fe-4ee4-bd4f-210c6339e074&amp;campaign=Data++Science&amp;source=edx&amp;product_category=professional-certificate&amp;placement_url=https%3A%2F%2Fwww.edx.org%2Fsearch</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=vRDswGc2wyM">https://www.youtube.com/watch?v=vRDswGc2wyM</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	-	1	1	-	1	-	-	3	2	1	1	1
CO2	-	1	-	-	1	1	-	1	-	-	2	2	1	1	1
CO3	-	1	-	-	1	1	-	1	-	-	2	1	1	1	1
CO4	-	1	-	1	1	-	-	-	-	-	3	1	-	-	-
CO5	-	-	-	1	-	1	-	-	-	-	1	1	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Environmental sciences *
<b>Course Code</b>	BP206T

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
						3	0	0
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To extend basic knowledge on environment and its allied problems( <b>BL1-Remember</b> ) <b>CO2-</b> To compare the natural, renewable and nonrenewable resources and the problems associated with them.( <b>BL2-Understand</b> ) <b>CO3-</b> To motivate the learners to participate in environment protection and improvement.( <b>BL3-Apply</b> ) <b>CO4-</b> To analyze the concepts of eco system including structure and functions.( <b>BL4-Analyze</b> ) <b>CO5-</b> To implement skills in identifying and solving environmental problems.( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✗ Entrepreneurship ✗ Employability ✗ Professional Ethics ✓ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG11(Sustainable cities and economies) SDG12(Responsible consumption and production) SDG13(Climate action) SDG15(Life on land)				

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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)	Class out of classroom	10
UNIT 3	Environmental Pollution: Air pollution; Water pollution; Soil pollution	Peer Tutorial	10

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	assesment of air pollution in different area of Gwalior	Case Study	BL4-Analyze	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
75	38	50	25	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://byjus.com/commerce/meaning-and-functions-of-environment/">https://byjus.com/commerce/meaning-and-functions-of-environment/</a>
<b>References Books</b>	1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p 2. Clark R.S., Marine Pollution, Clarendon Press Oxford 3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p 4. De A.K., Environmental Chemistry, Wiley Eastern Ltd. 5. Down of Earth, Centre for Science and Environment
<b>MOOC Courses</b>	<a href="https://www.edx.org/executive-education/university-of-cambridge-sustainable-real-estate-creating-a-better-built-environment?index=product&amp;queryID=3b6747e421640130281f318eaa4efea1&amp;position=1&amp;linked_from=autocomplete&amp;c=autocomplete">https://www.edx.org/executive-education/university-of-cambridge-sustainable-real-estate-creating-a-better-built-environment?index=product&amp;queryID=3b6747e421640130281f318eaa4efea1&amp;position=1&amp;linked_from=autocomplete&amp;c=autocomplete</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=oD7d34bIMxQ">https://www.youtube.com/watch?v=oD7d34bIMxQ</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	3	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	3	1	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	1	-	-	-	-
CO5	-	-	-	-	-	-	2	1	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Human Anatomy and Physiology II
<b>Course Code</b>	BP207P

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
						0	0	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the physiology of special senses with the help of models, charts and specimens.( <b>BL1-Remember</b> ) <b>CO2-</b> To develop the knowledge on coordinating working of organs of various systems with the help of models, charts and specimens.( <b>BL3-Apply</b> ) <b>CO3-</b> To analyze the functions of cranial nerves by various sensory and motor functions.( <b>BL4-Analyze</b> ) <b>CO4-</b> To evaluate body temperature and body mass index.( <b>BL5-Evaluate</b> ) <b>CO5-</b> To determine tidal volume and vital capacity.( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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)	Peer tutorial	10

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	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	Experiments	BL2-Understand	16
2	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	Experiments	BL3-Apply	16
3	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	Experiments	BL3-Apply	16
4	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.	Experiments	BL3-Apply	16



## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi. 2. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi
<b>Articles</b>	NA
<b>References Books</b>	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.
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	1	1	-	-	-	-	3	-	3	-	1
CO2	2	1	-	-	1	1	-	-	-	-	2	-	3	-	1
CO3	2	1	-	-	1	1	-	-	-	-	2	-	2	-	1
CO4	3	-	-	-	-	1	-	-	-	-	3	-	2	-	2
CO5	2	-	1	1	1	-	-	-	-	-	3	-	2	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Organic Chemistry I
<b>Course Code</b>	BP208P

### Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>	Minimum 5 unknown organic compounds to be analysed systematically.			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To explain the qualitative analysis and preparation of pharmaceutical organic compounds. <b>(BL1-Remember)</b> <b>CO2-</b> To identify the extra elements, present in the pharmaceutical organic compounds. <b>(BL2-Understand)</b> <b>CO3-</b> To analyze the presence of several functional groups in pharmaceutical compounds. <b>(BL4-Analyze)</b> <b>CO4-</b> To appraise the rules concerned with reactivity and orientation of organic compounds. <b>(BL5-Evaluate)</b> <b>CO5-</b> To analyze unknown pharmaceutical organic compounds by determining their melting point/boiling point. <b>(BL4-Analyze)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.	Experiments	BL3-Apply	4
2	2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test	Experiments	BL4-Analyze	4
3	3. Solubility test	Experiments	BL3-Apply	4
4	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	Experiments	BL3-Apply	4
5	5. Melting point/Boiling point of organic compounds	Experiments	BL4-Analyze	4
6	6. Identification of the unknown compound from the literature using melting point/ boiling point.	Experiments	BL4-Analyze	4
7	7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point	Experiments	BL6-Create	4
8	8. Minimum 5 unknown organic compounds to be analysed systematically. 1. Preparation of suitable solid derivatives from organic compounds 2. Construction of molecular models	Experiments	BL4-Analyze	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry
<b>Articles</b>	



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Organic Chemistry II
<b>Course Code</b>	BP301T

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand about aromaticity, chemistry and reactions of benzene. <b>(BL1-Remember)</b> <b>CO2-</b> To understand the concept of hydrolysis, hydrogenation, saponification and rancidity of oils <b>(BL2-Understand)</b> <b>CO3-</b> To Account for reactivity/stability of compounds <b>(BL3-Apply)</b> <b>CO4-</b> To gain knowledge on chemistry of phenols, aromatic amines and aromatic acids. <b>(BL4-Analyze)</b> <b>CO5-</b> To gain knowledge on structure and medicinal uses of pharmaceutical organic compounds. <b>(BL2-Understand)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, Peer tutorial	10
UNIT-II	Phenols* - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols Aromatic Amines* - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts Aromatic Acids* -Acidity, effect of substituents on acidity and important reactions of benzoic acid	Lecture based learning, Peer tutorial	10
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	Lecture based learning, Peer tutorial	10
UNIT-IV	Polynuclear hydrocarbons: a. Synthesis, reactions b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives	Lecture based learning, Peer tutorial	8
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	Lecture based learning, Peer tutorial	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	synthesis and medicinal uses of Naphthalene, Phenanthrene	Experiments	BL2-Understand	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Organic Chemistry by Morrison and Boyd 2. Organic Chemistry by I.L. Finar, Volume-I 3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl
<b>Articles</b>	NA
<b>References Books</b>	1 Organic Chemistry by P.L.Soni 2 Practical Organic Chemistry by Mann and Saunders. 3 Vogel's text book of Practical Organic Chemistry 4 Advanced Practical organic chemistry by N.K.Vishnoi. 5 Introduction to Organic Laboratory techniques by Pavia, Lampman
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	youtube and other free resource

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	2	-	1	-	1	-	3	-	3	-	2
CO2	3	1	-	-	1	-	-	-	-	-	3	-	2	-	2
CO3	2	-	-	-	1	-	1	-	1	-	2	-	3	-	3
CO4	2	1	-	-	1	-	-	-	-	-	2	-	2	1	1
CO5	2	-	-	-	2	-	-	-	-	-	2	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Physical Pharmaceutics I
<b>Course Code</b>	BP302T

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C	
					03	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To recollect the states of matter and understand the applications of various physiochemical properties to design dosage forms(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> To gain knowledge of pH and buffers and their use in the stabilization of pharmaceutical formulations.(<b>BL3-Apply</b>)</p> <p><b>CO3-</b> To understand the principle of interfacial tension and the applications of surface active agents in drug solubilization.(<b>BL2-Understand</b>)</p> <p><b>CO4-</b> To elaborate the significance of physical properties of drug molecules in design and stability of dosage forms.(<b>BL1-Remember</b>)</p> <p><b>CO5-</b> To describe the principles of diffusion in biological systems and the the concepts of complexation and protein binding in pharmacy.(<b>BL1-Remember</b>)</p>								
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth)					

## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-V	Guest lecture by industry expert	Seminar	BL2-Understand	2

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation



## Part E

<b>Books</b>	1. Physical Pharmacy by Alfred Martin 2. Experimental Pharmaceutics by Eugene, Parott. 3. Tutorial Pharmacy by Cooper and Gunn
<b>Articles</b>	
<b>References Books</b>	1. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia. 2. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc. 3. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc. 4. Physical Pharmaceutics by Ramasamy C and ManavalanR.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	-	2	-	-	-	-	-	3	-	3	-	1
CO2	2	3	2	-	1	-	-	-	-	-	3	-	2	-	2
CO3	2	2	3	-	2	-	-	-	-	-	3	-	1	2	3
CO4	2	1	3	-	2	1	-	-	-	-	3	-	1	1	3
CO5	1	2	3	-	1	-	-	-	-	-	3	-	3	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Microbiology
<b>Course Code</b>	BP303T

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	basic understanding of cell and biology			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand methods of identification, cultivation and preservation of various microorganisms ( <b>BL2-Understand</b> ) <b>CO2-</b> To understand the importance and implementation of sterilization in pharmaceutical processing and industry( <b>BL2-Understand</b> ) <b>CO3-</b> To Learn sterility testing of pharmaceutical products( <b>BL3-Apply</b> ) <b>CO4-</b> Carried out microbiological standardization of Pharmaceuticals( <b>BL4-Analyze</b> ) <b>CO5-</b> Understand the cell culture technology and its applications in pharmaceutical industries( <b>BL2-Understand</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

## Part B

Modules	Contents	Pedagogy	Hours
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board/PPT	10
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Microbiological visit of Pharma industry	Virtual Labs	BL3-Apply	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London. 2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi. 3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn. 4. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
<b>Articles</b>	<a href="https://byjus.com/biology/microbiology/">https://byjus.com/biology/microbiology/</a>
<b>References Books</b>	1. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology. 2. Rose: Industrial Microbiology. 3. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan 4. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution. 5. Peppler: Microbial Technology. 6. I.P., B.P., U.S.P.- latest editions.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=liqpUJ4j_bs&amp;list=PLQnNyE1lxfVIVXt55hag4kapfWhPNjffT">https://www.youtube.com/watch?v=liqpUJ4j_bs&amp;list=PLQnNyE1lxfVIVXt55hag4kapfWhPNjffT</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	2	-	-	-	-	-	3	-	3	-	3
CO2	3	2	-	1	2	-	-	-	-	-	3	-	2	-	2
CO3	2	1	-	-	1	1	-	-	-	-	3	-	2	-	2
CO4	2	2	-	-	2	-	-	-	-	-	3	-	2	-	2
CO5	2	1	-	-	1	-	-	-	-	-	3	-	1	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Engineering
<b>Course Code</b>	BP304T

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To know various unit operations used in pharmaceutical industries( <b>BL1-Remember</b> ) <b>CO2-</b> To understand the material handling techniques( <b>BL2-Understand</b> ) <b>CO3-</b> To perform various processes involved in pharmaceutical manufacturing process( <b>BL3-Apply</b> ) <b>CO4-</b> To carry out various test to prevent environmental pollution( <b>BL3-Apply</b> ) <b>CO5-</b> To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.( <b>BL2-Understand</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consumption and production)				

## Part B

Modules	Contents	Pedagogy	Hours
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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,	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	10
UNIT 4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Peer tutorial	08
UNIT 5	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To understand the basics principle of distillation	Experiments	BL3-Apply	2

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	NA
<b>References Books</b>	1.Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition. 2. Unit operation of chemical engineering – McCabe Smith, Latest edition 3. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=Ey9M1neDgx0&amp;list=PLNiSYvRcckSxtpOvMxwzQInhwmXt8tzpU">https://www.youtube.com/watch?v=Ey9M1neDgx0&amp;list=PLNiSYvRcckSxtpOvMxwzQInhwmXt8tzpU</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	-	-	-	-	-	3	-	2	-	1
CO2	2	2	1	-	-	2	-	-	-	-	3	-	2	-	2
CO3	2	3	-	-	1	2	-	-	-	-	2	-	2	-	1
CO4	3	2	2	-	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	1	2	-	-	-	-	1	-	1	-	1
CO6	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Organic Chemistry II
<b>Course Code</b>	BP305P

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To gain the knowledge on different recrystallization and steam distillation techniques.(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> To remember and recall the different laboratory techniques used in pharmaceutical chemistry.(<b>BL1-Remember</b>)</p> <p><b>CO3-</b> To identify the purity of fats and oils by acid value, saponification value and iodine value and perform various reaction like diazotization, oxidation reactions.(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> To analyze named reactions like perkin and claisen schmidt reactions by using carbonyl compounds(<b>BL4-Analyze</b>)</p> <p><b>CO5-</b> To test the knowledge on different electrophilic aromatic substitutions reactions like bromination, nitration in monosubstituted aromatic compounds(<b>BL5-Evaluate</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth)				

### Part B

Modules	Contents	Pedagogy	Hours
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## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Experiments involving laboratory techniques • Recrystallization • Steam distillation	Experiments	BL3-Apply	8
2	II Determination of following oil values (including standardization of reagents) • Acid value • Saponification value • Iodine value	Experiments	BL5-Evaluate	8
3	III Preparation of compounds • Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.	Experiments	BL3-Apply	8
4	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	Experiments	BL3-Apply	8
5	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.	Experiments	BL3-Apply	8
6	Benzil from Benzoin by oxidation reaction. • Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction • Cinnamic acid from Benzaldehyde by Perkin reaction • P-Iodo benzoic acid from P-amino benzoic acid	Experiments	BL4-Analyze	

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Practical Organic Chemistry by Mann and Saunders. 2. Vogel's text book of Practical Organic Chemistry
<b>Articles</b>	NA
<b>References Books</b>	1. Advanced Practical organic chemistry by N.K.Vishnoi. 2. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz
<b>MOOC Courses</b>	NA
<b>Videos</b>	You tube, simulation

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	-	3
CO2	2	3	-	2	1	-	-	-	-	-	2	-	2	-	3
CO3	3	1	-	-	2	-	-	2	-	-	2	-	1	1	1
CO4	2	2	-	1	-	-	-	-	-	-	3	-	1	1	1
CO5	3	1	-	1	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Physical Pharmaceutics I
<b>Course Code</b>	BP306P

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> To explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal. (<b>BL2-Understand</b>)</p> <p><b>CO3-</b> To apply Henderson – Hasselbalch equation for interpretation of pKa value of drugs(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> To determine the surface tension of sample liquids by drop count and drop weight methods and deduce the HLB value and critical micellar concentration of a surfactant(<b>BL4-Analyze</b>)</p> <p><b>CO5-</b> To estimate the stability constants of complexes by solubility and pH titration methods and (<b>BL5-Evaluate</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG8(Decent work and economic growth)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Determination the solubility of drug at room temperature 4 Hrs/week 2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.	Experiments	BL3-Apply	8
2	3. Determination of Partition co- efficient of benzoic acid in benzene and water 4. Determination of Partition co- efficient of Iodine in CCl <sub>4</sub> and water	Experiments	BL4-Analyze	8
3	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	Experiments	BL4-Analyze	8
4	7. Determination of HLB number of a surfactant by saponification method 8. Determination of Freundlich and Langmuir constants using activated char coal	Experiments	BL4-Analyze	8
5	9. Determination of critical micellar concentration of surfactants 10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method	Experiments	BL4-Analyze	4
6	11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method	Experiments	BL4-Analyze	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
<b>Articles</b>	NA
<b>References Books</b>	1. Physical Pharmaceutics by Ramasamy C and ManavalanR.
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	1	-	-	-	-	-	3	-	2	2	3
CO2	3	2	1	-	1	-	-	-	-	-	3	-	2	1	1
CO3	2	1	1	1	2	-	-	-	1	-	1	-	-	1	2
CO4	2	2	2	-	1	-	-	-	1	-	2	-	1	1	1
CO5	1	1	3	1	-	-	1	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Microbiology
<b>Course Code</b>	BP307P

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand methods of identification, cultivation and preservation of various microorganisms( <b>BL2-Understand</b> ) <b>CO2-</b> To Learn sterility testing of pharmaceutical products( <b>BL3-Apply</b> ) <b>CO3-</b> Carried out microbiological standardization of Pharmaceuticals( <b>BL4-Analyze</b> ) <b>CO4-</b> To demonstrate various staining methods – simple, gram staining and acid fast staining( <b>BL3-Apply</b> ) <b>CO5-</b> To choose the correct method to evaluate the microbes to be tested( <b>BL5-Evaluate</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
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	Experiments	BL2-Understand	4
2	Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations	Experiments	BL3-Apply	4
3	Staining methods- Simple, Grams staining and acid-fast staining (Demonstration with practical).	Experiments	BL3-Apply	4
4	Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.	Experiments	BL4-Analyze	4
5	Microbiological assay of antibiotics by cup plate method and other methods	Experiments	BL5-Evaluate	4
6	Motility determination by Hanging drop method	Experiments	BL5-Evaluate	4
7	Sterility testing of pharmaceuticals	Experiments	BL5-Evaluate	4
8	Bacteriological analysis of water	Experiments	BL5-Evaluate	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	50	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London. 2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
<b>Articles</b>	NA
<b>References Books</b>	1. Lab manual
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	1	-	-	-	-	-	3	-	2	-	3
CO2	2	2	-	-	2	-	-	1	-	-	2	-	2	-	2
CO3	3	2	1	-	1	-	1	-	-	-	3	-	1	-	2
CO4	3	2	1	1	1	1	-	1	-	-	3	-	1	2	1
CO5	2	3	1	-	1	-	1	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Engineering
<b>Course Code</b>	BP308P

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C	
					0	0	4	4	
<b>Course Type</b>	Lab only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To know various unit operations used in pharmaceutical industries(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> To demonstrate and explain about the construction, working and applications of pharmaceutical equipments such as colloid mill, planetary mixer, fluidized bed dryer and freeze dryer.(<b>BL3-Apply</b>)</p> <p><b>CO3-</b> To experiment with the process variables of filtration, evaporation and infer the same(<b>BL3-Apply</b>)</p> <p><b>CO4-</b> To determine overall heat transfer coefficient by heat exchanger and calculate the efficiency of steam distillation(<b>BL4-Analyze</b>)</p> <p><b>CO5-</b> To estimate moisture content, loss on drying and construct drying curves for calcium carbonate and starch(<b>BL5-Evaluate</b>)</p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)					

### Part B

Modules	Contents	Pedagogy	Hours
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## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I. Determination of radiation constant of brass, iron, unpainted and painted glass	Experiments	BL2-Understand	6
2	II. Steam distillation – To calculate the efficiency of steam distillation	Experiments	BL3-Apply	6
3	III. To determine the overall heat transfer coefficient by heat exchanger. IV. Construction of drying curves (for calcium carbonate and starch).	Experiments	BL2-Understand	6
4	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	Experiments	BL3-Apply	6
5	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	Experiments	BL3-Apply	6
6	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	Experiments	BL3-Apply	6
7	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	Experiments	BL3-Apply	6
8	XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.	Experiments	BL3-Apply	6

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition. 2. Remington practice of pharmacy- Martin, Latest edition.
<b>Articles</b>	NA
<b>References Books</b>	1. Theory and practice of industrial pharmacy by Lachmann., Latest edition. 2. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	1	-	-	-	-	-	3	-	2	-	2
CO2	2	3	2	2	2	-	-	-	-	-	3	-	2	-	2
CO3	3	2	1	1	1	-	-	-	-	-	2	-	1	-	3
CO4	2	2	1	1	2	-	-	-	-	-	2	-	3	1	2
CO5	3	1	1	-	1	-	-	-	-	-	1	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Fine art and Music III/online certification course *
<b>Course Code</b>	BP309T

### Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	1	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Generic Elective							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Study of two-dimensional space and its organizational possibilities Study of three-dimensional space and its organizational possibilities( <b>BL2-Understand</b> ) <b>CO2-</b> Study of three-dimensional space and its organizational possibilities( <b>BL2-Understand</b> )							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professsonal Ethics ✗ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	2-D Design: 2 3-D Design: 2	PBL	BL2-Understand	4

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
25		20	10	5	2
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

### Part E

<b>Books</b>	
<b>Articles</b>	
<b>References Books</b>	
<b>MOOC Courses</b>	
<b>Videos</b>	

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Organic Chemistry III
<b>Course Code</b>	BP401T

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To understand the nomenclature, properties and methods of preparation of heterocyclic compounds. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To understand the fundamentals of stereo chemical aspects <b>(BL2-Understand)</b></p> <p><b>CO3-</b> To identify medicinal uses and other applications of organic compounds. <b>(BL3-Apply)</b></p> <p><b>CO4-</b> To explain stereo isomerism in biphenyl compounds and conditions for optical activity. <b>(BL1-Remember)</b></p> <p><b>CO5-</b> To elaborate the reactions and synthetic importance of metal hydride reduction (NaBH<sub>4</sub> &amp; LiAlH<sub>4</sub>), Clemmensen reduction, Oppenauer oxidation and Beckmann rearrangement. <b>(BL2-Understand)</b></p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)					

## Part B

Modules	Contents	Pedagogy	Hours
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	WHITEBOARD	10
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	WHITEBOARD/PPT	10
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	WHITEBOARD/PPT	10
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	WHITEBOARD/PPT	8
UNIT-V	Reactions of synthetic importance Metal hydride reduction (NaBH <sub>4</sub> and LiAlH <sub>4</sub> ), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation	WHITEBOARD/PPT	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-IV	synthesis and medicinal uses pyrimidine	PBL		5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	NA
<b>References Books</b>	1. Organic Chemistry by Morrison and Boyd 2. Heterocyclic Chemistry by T.L. Gilchrist
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	1	-	-	-	2	-	2	-	3	1	3
CO2	2	1	2	-	2	-	-	-	1	-	2	-	2	-	2
CO3	2	2	2	-	3	-	-	-	-	-	2	-	3	1	2
CO4	2	-	-	-	2	-	-	-	-	-	3	-	2	-	1
CO5	3	-	-	-	1	-	-	-	-	-	2	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Medicinal Chemistry I
<b>Course Code</b>	BP402T

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the various classes of medicinal compounds( <b>BL1-Remember</b> ) <b>CO2-</b> To explain the physicochemical properties, steric aspects of drugs and their metabolic pathways( <b>BL2-Understand</b> ) <b>CO3-</b> To identify the structural requirements of drugs to elicit biological response( <b>BL4-Analyze</b> ) <b>CO4-</b> To categorize the drugs based on their mechanism of action and clinical uses( <b>BL2-Understand</b> ) <b>CO5-</b> To design and create the synthetic routes for medicinal compounds.( <b>BL6-Create</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG12(Responsible consumption and production)				

## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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. • 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Drugs acting on Central Nervous System A. Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturates: SAR of barbiturates, Barbitol*, Phenobarbital, Mephobarbital, Amobarbital, Butobarbital, Pentobarbital, Secobarbital Miscellaneous: Amides & imides: Glutethimide. Alcohol & their carbamate derivatives: Meproboamate, 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: Sulpieride. C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action Barbiturates:	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10



	Phenobarbitone, Methabarbital. Hydantoin: Phenytoin*, Mephentyoin, Ethotoin Oxazolidine diones: 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.*	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Receptor binding of drug simulation	Simulation	BL2-Understand	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	
<b>Articles</b>	NA
<b>References Books</b>	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia 4. Indian Pharmacopoeia
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	-	1	-	-	-	2	-	3	-	2	-	3
CO2	2	2	2	-	2	-	-	-	1	-	2	-	2	-	2
CO3	3	1	1	-	1	-	-	-	1	-	2	-	3	-	3
CO4	3	-	-	-	1	-	-	-	1	-	2	-	2	-	2
CO5	3	-	-	-	2	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Physical Pharmaceutics II
<b>Course Code</b>	BP403T

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To introduce and categorize the dispersed systems and understand the properties and applications of colloidal dispersions. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To make the use of principles of kinetics in the stabilization of dosage forms. <b>(BL3-Apply)</b></p> <p><b>CO3-</b> To interpret the rheological behavior of fluids and illustrate the physics of tablet compression. <b>(BL2-Understand)</b></p> <p><b>CO4-</b> To determine the properties of powders and apply them in formulation development. <b>(BL4-Analyze)</b></p> <p><b>CO5-</b> To formulate and evaluate coarse dispersions making use of rheological and electrical properties. <b>(BL5-Evaluate)</b></p>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	Micromeritics: 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
UNIT-III	PREPARATION OF EMULSIONS, SUSPENSIONS	Experiments	BL3-Apply	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38		
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0	0			

## Part E

<b>Books</b>	
<b>Articles</b>	1.Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc. 2. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc. 3. Physical Pharmaceutics by Ramasamy C, and Manavalan R.
<b>References Books</b>	
<b>MOOC Courses</b>	
<b>Videos</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	1	-	-	-	2	-	3	-	1	2	1
CO2	2	2	2	-	-	-	-	-	1	-	2	-	2	2	2
CO3	3	3	3	-	2	-	-	-	1	-	2	-	3	1	3
CO4	3	1	1	1	1	-	-	-	1	-	2	-	2	1	2
CO5	2	1	2	1	1	-	-	-	1	-	3	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology I
<b>Course Code</b>	BP404T

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To define the fundamental concepts of pharmacology and pharmacokinetics(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To understand the basics of pharmacodynamics, adverse reactions, drug interactions and drug discovery(<b>BL2-Understand</b>)</p> <p><b>CO3-</b> To identify the role of neurohumoral transmission and drugs acting on peripheral nervous system.(<b>BL4-Analyze</b>)</p> <p><b>CO4-</b> To analyze the functions of neurotransmitters and drugs acting on central nervous system.(<b>BL4-Analyze</b>)</p> <p><b>CO5-</b> To evaluate the pharmacology of Psychopharmacological agents.(<b>BL5-Evaluate</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
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. e. Introduction to Pharmacovigilance: History and development of Pharmacovigilance, Importance of safety monitoring of Medicine, Pharmacovigilance Program of India (PvPI), Adverse drug reactions: detection and Reporting	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	12
UNIT-III	2.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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-IV	3. 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board/PPT	8
UNIT-V	3.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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	EVALUATION OF ANTIDEPRESSANT ACTIVITY	Simulation	BL5-Evaluate	2

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan,
<b>Articles</b>	JOURNAL related to pharmacology
<b>References Books</b>	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
<b>MOOC Courses</b>	<a href="https://www.mooc-list.com/tags/pharmacology">https://www.mooc-list.com/tags/pharmacology</a>
<b>Videos</b>	you tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	-	1	3	-	-	2	-	2	-	1	1	1
CO2	2	2	2	-	-	2	-	-	1	-	3	-	1	1	2
CO3	3	3	3	-	2	3	-	-	2	-	2	-	-	1	1
CO4	2	3	2	-	3	1	-	-	1	-	2	-	1	1	1
CO5	1	2	1	-	2	1	-	-	1	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacognosy and Phytochemistry I
<b>Course Code</b>	BP405T

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	Basic understanding of plant taxonomy and physiology			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the history, scope and development of pharmacognosy.( <b>BL1-Remember</b> ) <b>CO2-</b> To remember different sources of crude drugs and also classify them accordingly.( <b>BL1-Remember</b> ) <b>CO3-</b> To illustrate students about cultivation, collection, processing and storage of crude drugs.( <b>BL2-Understand</b> ) <b>CO4-</b> To plan systematic pharmacognostic study of primary metabolites, ayurvedic drugs, marine drugs and teratogens.( <b>BL6-Create</b> ) <b>CO5-</b> To analyze quality of crude drugs.( <b>BL4-Analyze</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consumption and production)				



## Part B

Modules	Contents	Pedagogy	Hours
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT-III	Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible vaccines	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	VISIT OF MEDICINAL GARDEN	Field work	BL4-Analyze	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi
<b>Articles</b>	<a href="https://phcogj.com/">https://phcogj.com/</a>
<b>References Books</b>	1. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi. 2. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007 3. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae 4. Anatomy of Crude Drugs by M.A. Iyengar
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	YOUTUBE

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	1	2	-	-	2	-	2	-	1	-	2
CO2	3	2	1	-	1	1	-	-	2	-	1	-	2	-	1
CO3	2	1	2	-	1	2	-	-	2	-	2	-	2	-	1
CO4	2	-	-	-	-	-	-	-	2	-	2	-	1	-	2
CO5	3	-	-	-	-	-	-	-	1	-	1	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Medicinal Chemistry I
<b>Course Code</b>	BP406P

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the basic requirements for synthesis and assay of drugs( <b>BL1-Remember</b> ) <b>CO2-</b> To explain the techniques involved in isolation and purification of drugs and intermediates( <b>BL2-Understand</b> ) <b>CO3-</b> To synthesize, characterize and purify medicinal compounds and intermediates( <b>BL6-Create</b> ) <b>CO4-</b> To analyze the selected drugs present in dosage forms and to determine the percentage purity( <b>BL4-Analyze</b> ) <b>CO5-</b> To determine the physicochemical property of drugs and draw its importance( <b>BL4-Analyze</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✓ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of drugs/ intermediates 1,3-pyrazole	Experiments	BL3-Apply	4
2	II Assay of drugs 1 Chlorpromazine 2 Phenobarbitone 3 Atropine 4 Ibuprofen 5 Aspirin 6 Furosemide	Experiments	BL3-Apply	4
3	2,3- diphenyl quinoxaline	Experiments	BL6-Create	4
4	Benzocaine and Barbiturate	Experiments	BL6-Create	4
5	Phenytoin	Experiments	BL6-Create	4
6	Phenothiazine	Experiments	BL6-Create	4
7	IIDetermination of Partition coefficient for any two drugs	Experiments	BL4-Analyze	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	i. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry. ii. Foye's Principles of Medicinal Chemistry. iii. Burger's Medicinal Chemistry, Vol I to IV. iv. Introduction to principles of drug design- Smith and Williams. v. Remington's Pharmaceutical Sciences. vi. Martindale's extra pharmacopoeia.
<b>Articles</b>	<a href="https://benthamscience.com/public/journals/medicinal-chemistry">https://benthamscience.com/public/journals/medicinal-chemistry</a>
<b>References Books</b>	1 Organic Chemistry by I.L. Finar, Vol. II. 2. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5. 3. Indian Pharmacopoeia. 4. Text book of practical organic chemistry- A.I.Vogel.
<b>MOOC Courses</b>	<a href="https://swayam.gov.in/nc_details/NPTEL">https://swayam.gov.in/nc_details/NPTEL</a> <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/results?search_query=kcl+channel">https://www.youtube.com/results?search_query=kcl+channel</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	1	-	-	-	2	-	2	-	1	1	1
CO2	2	-	2	-	2	-	-	-	1	-	2	-	2	1	2
CO3	2	2	3	-	2	-	-	-	1	-	2	-	2	1	2
CO4	3	-	-	-	2	-	-	-	2	-	2	-	1	1	2
CO5	2	-	-	-	1	-	-	-	-	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Physical Pharmaceutics II
<b>Course Code</b>	BP407P

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	Lab safety manual			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To choose a good suspending agent to formulate a stable suspension. <b>(BL5-Evaluate)</b> <b>CO2-</b> To interpret the shelf life of a given formulation by accelerated stability studies. <b>(BL5-Evaluate)</b> <b>CO3-</b> To make use of derived and flow properties of powders to ensure a stable solid formulation. <b>(BL3-Apply)</b> <b>CO4-</b> To distinguish the rate constants as per the chemical reaction. <b>(BL2-Understand)</b> <b>CO5-</b> To determine the viscosity using Ostwald's and Brookfield's viscometer. <b>(BL4-Analyze)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Determination of particle size, particle size distribution using sieving method 2. Determination of particle size, particle size distribution using Microscopic method	Experiments	BL2-Understand	8
2	3. Determination of bulk density, true density and porosity 4. Determine the angle of repose and influence of lubricant on angle of repose	Experiments	BL3-Apply	8
3	5. Determination of viscosity of liquid using Ostwald's viscometer 6. Determination sedimentation volume with effect of different suspending agent	Experiments	BL4-Analyze	8
4	7. Determination sedimentation volume with effect of different concentration of single suspending agent 8. Determination of viscosity of semisolid by using Brookfield viscometer	Experiments	BL4-Analyze	8
5	9. Determination of reaction rate constant first order. 10. Determination of reaction rate constant second order	Experiments	BL3-Apply	8
6	11. Accelerated stability studies	Experiments	BL3-Apply	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Physical Pharmacy by Alfred Martin, Sixth edition 2. Experimental pharmaceutics by Eugene, Parott. 3. Tutorial pharmacy by Cooper and Gunn. 4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia
<b>Articles</b>	<a href="https://benthamscience.com/public/journal/172">https://benthamscience.com/public/journal/172</a>
<b>References Books</b>	1. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc. 2. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc. 3.Physical Pharmaceutics by Ramasamy C, and Manavalan R.
<b>MOOC Courses</b>	<a href="https://swayam.gov.in/nc_details/NPTEL">https://swayam.gov.in/nc_details/NPTEL</a> <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/results?search_query=kcl+channel">https://www.youtube.com/results?search_query=kcl+channel</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	1	-	-	-	2	-	2	-	1	1	1
CO2	2	1	2	-	2	-	-	-	1	-	2	-	2	2	2
CO3	3	1	-	-	3	-	-	-	1	-	2	-	3	1	3
CO4	2	1	-	-	2	-	-	-	2	-	3	-	1	1	1
CO5	3	1	-	-	1	-	-	-	1	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology I
<b>Course Code</b>	BP408P

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To learn about basic instruments, common laboratory animals used in experimental pharmacology and to organize animal house as per the CPCSEA guidelines. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To demonstrate the common laboratory techniques like routes of administration, blood withdrawal, anesthetics and euthanasia used for animal studies <b>(BL3-Apply)</b></p> <p><b>CO3-</b> To interpret the effects of various drugs on rabbit eye and ciliary motility of frog oesophagus in correlation with humans <b>(BL5-Evaluate)</b></p> <p><b>CO4-</b> To analyse the effect of drugs acting as enzyme inducers, skeletal muscle relaxants and affecting locomotor activity in laboratory animals <b>(BL4-Analyze)</b></p> <p><b>CO5-</b> To evaluate the stereotypic and anticholinergic activity of drugs in rats/mice <b>(BL5-Evaluate)</b></p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Introduction to experimental pharmacology. 2,3,4. Commonly used instruments in experimental pharmacology	Experiments	BL2-Understand	6
2	3. Study of common laboratory animals. 4. Maintenance of laboratory animals as per CPCSEA guidelines	Experiments	BL2-Understand	8
3	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.	Experiments	BL4-Analyze	8
4	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	Experiments	BL4-Analyze	8
5	9. Effect of drugs on rabbit eye. 10. Effects of skeletal muscle relaxants using rota-rod apparatus	Experiments	BL2-Understand	8
6	11. Effect of drugs on locomotor activity using actophotometer. 12. Anticonvulsant effect of drugs by MES and PTZ method	Experiments	BL2-Understand	8
7	13. Study of stereotype and anti-catatonic activity of drugs on rats/mice	Experiments	BL4-Analyze	8
8	14. Study of anxiolytic activity of drugs using rats/mice. 15. Study of local anesthetics by different methods	Experiments	BL3-Apply	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://benthamscience.com/public/subject/123">https://benthamscience.com/public/subject/123</a>
<b>References Books</b>	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
<b>MOOC Courses</b>	<a href="https://swayam.gov.in/nc_details/NPTEL">https://swayam.gov.in/nc_details/NPTEL</a> <a href="https://onlinecourses.nptel.ac.in/">https://onlinecourses.nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/results?search_query=kcl+channel">https://www.youtube.com/results?search_query=kcl+channel</a>



## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	-	-	1	-	-	2	-	2	1	2
CO2	2	2	2	-	2	-	-	-	-	-	2	-	2	1	2
CO3	3	3	3	-	3	-	-	-	-	-	3	-	3	2	3
CO4	2	-	-	-	-	-	-	-	-	-	2	-	1	1	1
CO5	3	1	-	-	1	-	-	-	-	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacognosy and Phytochemistry I
<b>Course Code</b>	BP409P

### Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	4	4
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To remember different morphological and microscopical characteristic features of crude drugs. <b>(BL1-Remember)</b> <b>CO2-</b> To understand the cellular structure of crude drugs. <b>(BL2-Understand)</b> <b>CO3-</b> To evaluate the crude drugs by quantitative evaluation methods. <b>(BL5-Evaluate)</b> <b>CO4-</b> To evaluate the crude drugs by physical methods of evaluation. <b>(BL5-Evaluate)</b> <b>CO5-</b> To evaluate the crude drugs by chemical methods of evaluation. <b>(BL5-Evaluate)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG11(Sustainable cities and economies)				

### Part B

Modules	Contents	Pedagogy	Hours
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<4d style="border: 1px solid black;">Experiments

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Analysis of crude drugs by chemical tests: (i)Tragacanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil	Experiments	BL2-Understand	4
2	2. Determination of stomatal number and index	Experiments	BL5-Evaluate	4
3	3. Determination of vein islet number, vein islet termination and palisade ratio	Experiments	BL2-Understand	4
4	4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer	Experiments	BL4-Analyze	4
5	5. Determination of Fiber length and width	Experiments	BL3-Apply	4
6	6. Determination of number of starch grains by Lycopodium spore method	Experiments	BL3-Apply	4
7	7. Determination of Ash value	Experiments	BL2-Understand	4
8	8. Determination of Extractive values of crude drugs	BL4-Analyze	4	

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	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, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
<b>Articles</b>	<a href="https://www.sciencedirect.com/journal/phytomedicine">https://www.sciencedirect.com/journal/phytomedicine</a> <a href="https://www.ajol.info/index.php/jopat">https://www.ajol.info/index.php/jopat</a> <a href="https://www.phcogres.com/">https://www.phcogres.com/</a>
<b>References Books</b>	1. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi. 2. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007 3. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae 4. Anatomy of Crude Drugs by M.A. Iyengar
<b>MOOC Courses</b>	
<b>Videos</b>	<a href="https://www.youtube.com/results?search_query=kcl+channel">https://www.youtube.com/results?search_query=kcl+channel</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	-	1	-	-	-	1	-	3	-	1	-	1
CO2	3	2	2	-	2	-	-	-	2	-	2	-	2	1	2
CO3	2	1	3	-	3	-	-	-	1	-	2	-	3	-	1
CO4	3	1	-	-	-	-	-	-	1	-	2	-	1	1	1
CO5	3	1	-	-	-	-	-	-	1	-	2	-	1	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Fine art and Music IV/ online certification course *
<b>Course Code</b>	BP410T

### Part A

Year	2nd	Semester	4th	Credits		L	T	P	C
						0	0	1	1
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Generic Elective								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To acquire knowledge about the clinical data management and its skills( <b>BL2-Understand</b> ) <b>CO2-</b> To understand about CRF processing, and documentation forms( <b>BL2-Understand</b> ) <b>CO3-</b> To develop skills to acquire Job opportunities( <b>BL3-Apply</b> )								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)					

### Part B

Modules	Contents	Pedagogy	Hours
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### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
25		20	10	5	2
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

### Part E

<b>Books</b>	
<b>Articles</b>	
<b>References Books</b>	
<b>MOOC Courses</b>	<a href="https://www.coursera.org/learn/clinical-data-management">https://www.coursera.org/learn/clinical-data-management</a>
<b>Videos</b>	

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	1	-	-	-	-	-	-	2	-	1	-	-
CO2	1	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO3	1	1	-	-	-	-	-	-	-	-	1	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Medicinal Chemistry II
<b>Course Code</b>	BP501T

### Part A

Year	3rd	Semester	5th	Credits		L	T	P	C
						3	1	0	4
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the classification of drugs obtained by natural and synthetic route( <b>BL1-Remember</b> ) <b>CO2-</b> To explain the biological targets for medicinal compounds( <b>BL2-Understand</b> ) <b>CO3-</b> To apply the knowledge of biochemical processes to understand the mechanism of action and therapeutic uses of drugs( <b>BL3-Apply</b> ) <b>CO4-</b> To understand the relationships between structure of compound and its activity( <b>BL2-Understand</b> ) <b>CO5-</b> To choose the synthetic route for selected category of drugs( <b>BL4-Analyze</b> )								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consumption and production)					

## Part B

Modules	Contents	Pedagogy	Hours
1	Antihistaminic agents: Histamine, receptors and their distribution in the human body 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, Levocetazine Cromolyn sodium H2-antagonists: Cimetidine*, Famotidine, Ranitidin. Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole Anti-neoplastic agents: Alkylating agents: Meclroethamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate Miscellaneous: Cisplatin, Mitotane.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2.	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3.	Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol. Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholestamine and Cholestipol Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4.	Drugs acting on Endocrine system Nomenclature, Stereochemistry and metabolism of steroids Sex hormones: Testosterone, Nandralone, Progesterone, Oestradiol, Oestrone, 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
5.	Antidiabetic agents: Insulin and its preparations Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride. 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, Propoxycaïne, Tetracaine, Benoxinate. Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine. Miscellaneous: Phenacaine, Dipiperodon, Dibucaine.* Narcotic and non-narcotic analgesics Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	3D Model making of Histamine Receptor	Games	BL2-Understand	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation



## Part E

<b>Books</b>	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.
<b>Articles</b>	<a href="https://pubs.acs.org/journal/jmcmr">https://pubs.acs.org/journal/jmcmr</a>
<b>References Books</b>	1. Burger's Medicinal Chemistry, Vol I to IV. 2. Introduction to principles of drug design- Smith and Williams. 3. Remington's Pharmaceutical Sciences.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	You tube and others free resource

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	1	2	-	-	-	-	-	3	-	3	-	3
CO2	2	2	-	1	2	-	-	-	-	-	2	-	2	1	2
CO3	3	3	-	1	2	-	-	-	-	-	2	-	3	-	3
CO4	3	1	-	-	1	-	-	-	-	-	2	-	1	-	2
CO5	2	1	-	-	1	-	-	-	-	-	3	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Industrial Pharmacy I
<b>Course Code</b>	BP502T

### Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To outline the objectives and applications of pre-formulation studies in the development and stability of dosage forms. <b>(BL3-Apply)</b> <b>CO2-</b> To discuss the formulation, manufacturing, coating and quality control tests of tablets. <b>(BL2-Understand)</b> <b>CO3-</b> To review the formulation and manufacturing considerations of liquid orals. <b>(BL4-Analyze)</b> <b>CO4-</b> To illustrate the pharmaceutical aspects of capsules and pellets. <b>(BL2-Understand)</b> <b>CO5-</b> To describe the preparation and quality control of parenterals and ophthalmic preparations. <b>(BL4-Analyze)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
Unit-1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07
Unit-2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit-3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
Unit-4	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit-5	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. 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. 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit-1	cosmetic preparations from commnely used herbs	Experiments	BL2-Understand	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://www.fip.org/industrial-pharmacy">https://www.fip.org/industrial-pharmacy</a>
<b>References Books</b>	1. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 2. Theory and Practice of Industrial Pharmacy by Liberman & Lachman 3. Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill Livingstone, Latest edition 4. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition, 2005
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=JKr6mtSEbEU&amp;list=PLFpCrSN3I3fAHUyhDdQ39rGDKux3MvOtg">https://www.youtube.com/watch?v=JKr6mtSEbEU&amp;list=PLFpCrSN3I3fAHUyhDdQ39rGDKux3MvOtg</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	1	-	-	-	1	-	3	-	3	1	2
CO2	3	2	2	3	-	-	-	-	1	-	3	-	2	2	2
CO3	3	1	2	3	1	-	-	-	-	-	3	-	2	2	3
CO4	3	2	3	-	-	-	-	-	1	-	3	-	-	-	-
CO5	2	1	3	1	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology II
<b>Course Code</b>	BP503T

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To relate the relative pros and cons in the use of drugs for various cardiac complications. <b>(BL2-Understand)</b> <b>CO2-</b> To illustrate the drugs acting on hematopoietic system, shock diuretics and anti-diuretics. <b>(BL2-Understand)</b> <b>CO3-</b> To identify the role of autocooids and related drugs. <b>(BL3-Apply)</b> <b>CO4-</b> To analyze and summarize the drugs acting on endocrine system. <b>(BL4-Analyze)</b> <b>CO5-</b> To appraise the physiological role of sex hormones and to assess the effects of oral contraceptives and drugs acting on the uterus. <b>(BL5-Evaluate)</b>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4.	5. 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Poster making competition between students	Games	BL2-Understand	10

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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 Prakasha
<b>Articles</b>	1.Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology. 2. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
<b>References Books</b>	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
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=pJ37dBfj670&amp;list=PLOsge3l7t_CQDMZu32Y2a3xLT963Bn6YM">https://www.youtube.com/watch?v=pJ37dBfj670&amp;list=PLOsge3l7t_CQDMZu32Y2a3xLT963Bn6YM</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	3	-	-	-	-	3	1	2	3	2
CO2	2	-	-	-	1	2	-	-	-	-	3	-	2	3	1
CO3	2	1	-	-	1	3	-	-	-	-	3	1	2	3	1-
CO4	2	1	-	-	2	3	-	-	-	-	3	-	2	3	2
CO5	3	-	-	-	1	2	-	-	-	-	2	1	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacognosy and Phytochemistry II
<b>Course Code</b>	BP504T

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To outline the metabolic pathway in higher plants and their biogenetic studies. <b>(BL1-Remember)</b> <b>CO2-</b> To the pharmacognostic study of secondary metabolites like alkaloids, glycosides, tannins, volatile oils etc. <b>(BL2-Understand)</b> <b>CO3-</b> To demonstrate the different types and steps involved in isolation, identification and analysis of Phytoconstituents like terpenoids, glycosides, alkaloids and resins. <b>(BL2-Understand)</b> <b>CO4-</b> To plan the industrial production, estimation and utilization of Phytoconstituents. <b>(BL6-Create)</b> <b>CO5-</b> To assess the crude drug by modern methods of extraction, spectroscopy, chromatography, isolation and purification. <b>(BL4-Analyze)</b>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	14
3	Isolation, Identification and Analysis of Phytoconstituents a) Terpenoids: Menthol, Citral, Artemisin b) Glycosides: Glycyrhetinic acid & Rutin c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine d) Resins: Podophyllotoxin, Curcumin	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	6
4	Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Extraction method of Given drugs	PBL	BL2-Understand	8

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. 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.
<b>Articles</b>	<a href="https://www.phytojournal.com/">https://www.phytojournal.com/</a>
<b>References Books</b>	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.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=v1vqV7YHKWg&amp;list=PLtEqsPSBZIXteljdyrwrPiMHidHO7G6">https://www.youtube.com/watch?v=v1vqV7YHKWg&amp;list=PLtEqsPSBZIXteljdyrwrPiMHidHO7G6</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	1	-	-	-	3	-	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	3	-	2	1	2
CO3	3	2	-	-	-	-	-	-	-	-	2	-	1	1	1
CO4	2	1	1	-	-	-	1	-	-	-	2	-	-	-	1
CO5	2	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Jurisprudence
<b>Course Code</b>	BP505T

### Part A

Year	3rd	Semester	5th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the pharmaceutical legislations, ethics, right to information, medical termination of pregnancy and intellectual property rights( <b>BL1-Remember</b> ) <b>CO2-</b> To relate the significance of Drugs and cosmetics act 1940 and its rules 1945 in relation to import and manufacture of drugs( <b>BL2-Understand</b> ) <b>CO3-</b> To apply the knowledge on schedules pertaining to Drugs and cosmetics act 1940 and its rules 1945 and also administration of the act and rules( <b>BL3-Apply</b> ) <b>CO4-</b> To understand the functions of pharmacy councils and implementation of education regulations in pharmacy( <b>BL2-Understand</b> ) <b>CO5-</b> To appraise the importance of medicinal and toilet preparations act and narcotic drugs and psychotropic substances act and rules( <b>BL5-Evaluate</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✓ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG12(Responsible consumption and production)				

### Part B

Modules	Contents	Pedagogy	Hours
1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2.	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3.	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	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)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	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 Medical Termination of Pregnancy Act Right to Information Act Introduction to Intellectual Property Rights (IPR)	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	visit of Wholesale, Retail sale and Restricted license.	Field work	BL2-Understand	6

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. A text book of Forensic Pharmacy by N.K. Jain 2. Drugs and Cosmetics Act/Rules by Govt. of India publications. 3. Medicinal and Toilet preparations act 1955 by Govt. of India publications
<b>Articles</b>	<a href="https://www.iptsalipur.org/wp-content/uploads/2020/08/BP505T-PJ-UNIT_III.pdf">https://www.iptsalipur.org/wp-content/uploads/2020/08/BP505T-PJ-UNIT_III.pdf</a>
<b>References Books</b>	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)
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	-	-	-	-	-	2	3
CO2	-	-	-	-	-	-	-	3	-	1	-	-	1	2	2
CO3	-	-	-	-	-	-	-	3	-	-	-	-	1	2	-
CO4	-	-	-	-	-	-	-	3	-	1	-	-	-	-	3
CO5	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Industrial Pharmacy I
<b>Course Code</b>	BP506P

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To interpret the pre-formulation studies on drugs. <b>(BL2-Understand)</b> <b>CO2-</b> To explain the preparation, evaluation and coating of tablets. <b>(BL2-Understand)</b> <b>CO3-</b> To design parenteral and ophthalmic products. <b>(BL6-Create)</b> <b>CO4-</b> To illustrate the formulation and evaluation of capsules. <b>(BL5-Evaluate)</b> <b>CO5-</b> To evaluate glass containers as per pharmacopeial specifications. <b>(BL5-Evaluate)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Preformulation studies on paracetamol/aspirin/or any other drug 2. Preparation and evaluation of Paracetamol tablets	Experiments	BL3-Apply	8
2	3. Preparation and evaluation of Aspirin tablets 4. Coating of tablets-film coating of tablets/granules	Experiments	BL4-Analyze	8
3	5. Preparation and evaluation of Tetracycline capsules 6. Preparation of Calcium Gluconate injection	Experiments	BL3-Apply	8
4	7. Preparation of Ascorbic Acid injection 8. Quality control test of (as per IP) marketed tablets and capsules	Experiments	BL3-Apply	8
5	9. Preparation of Eye drops/ and Eye ointments 10. Preparation of Creams (cold / vanishing cream)	Experiments	BL3-Apply	8
6	11. Evaluation of Glass containers (as per IP)	Experiments	BL5-Evaluate	8

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

### Part E

<b>Books</b>	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)
<b>Articles</b>	NA
<b>References Books</b>	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
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	-	-	-	-	-	-	3	-	1	3	3
CO2	2	2	3	1	-	-	-	-	-	-	3	-	1	2	3
CO3	3	1	3	-	-	-	-	-	-	-	3	-	3	-	2
CO4	3	1	1	1	-	-	-	-	-	-	3	-	2	-	2
CO5	3	1	2	1	-	-	-	-	-	-	3	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology II
<b>Course Code</b>	BP507P

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos				<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To learn the importance of physiological salt solutions and to identify the effect of various drugs on isolated frog heart, blood pressure and heart rate of dog. <b>(BL1-Remember)</b> <b>CO2-</b> To illustrate the diuretic activity of drugs in mice/rats <b>(BL3-Apply)</b> <b>CO3-</b> To identify the dose response relationship, effect of drugs on DRC and to construct the drug concentrations by various bioassay methods using animal simulator software. <b>(BL4-Analyze)</b> <b>CO4-</b> To categorize the PA2 and PD2 value of drugs using rat anococcygeus muscle and guinea pig ileum. <b>(BL2-Understand)</b> <b>CO5-</b> To interpret the effect of spasmogens and spasmolytics using rabbit jejunum. <b>(BL4-Analyze)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Introduction to in-vitro pharmacology and physiological salt solutions. 2. Effect of drugs on isolated frog heart	Experiments	BL3-Apply	8
2	3. Effect of drugs on blood pressure and heart rate of dog. 4. Study of diuretic activity of drugs using rats/mice	Experiments	BL5-Evaluate	8
4	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.	Experiments	BL3-Apply	8
5	7. Bioassay of histamine using guinea pig ileum by matching method. 8. Bioassay of oxytocin using rat uterine horn by interpolation method.	Experiments	BL3-Apply	8
6	9. Bioassay of serotonin using rat fundus strip by three-point bioassay. 10. Bioassay of acetylcholine using rat ileum/colon by four-point bioassay	Experiments	BL4-Analyze	8
7	11. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plot method). 12. Determination of PD2 value using guinea pig ileum	Experiments	BL3-Apply	8
8	13. Effect of spasmogens and spasmolytics using rabbit jejunum. 14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.	Experiments	BL3-Apply	8

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata. 2. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan
<b>Articles</b>	NA
<b>References Books</b>	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.
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

## Course Articulation Matrix

<b>COs</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-	2	3	-	--	-	-	3	-	1	2	3
CO2	2	1	-	-	1	3	-	-	-	-	3	-	1	2	2
CO3	3	2	-	-	3	3	-	-	-	-	3	-	-	-	2
CO4	2	-	-	-	2	2	-	-	-	-	3	-	-	-	2
CO5	3	-	-	-	2	2	-	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacognosy and Phytochemistry II
<b>Course Code</b>	BP508P

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To remember the wide variety of the crude drugs and their sources by morphological characteristics. <b>(BL1-Remember)</b> <b>CO2-</b> To identify the powder mixture and to report the types of adulterants and substituents present. <b>(BL4-Analyze)</b> <b>CO3-</b> To analyze and evaluate the powdered crude drug samples by morphological and microscopical characteristics. <b>(BL4-Analyze)</b> <b>CO4-</b> To isolate the drug from the given crude drug sample. <b>(BL6-Create)</b> <b>CO5-</b> To predict the crude drug by performing chromatographic techniques. <b>(BL5-Evaluate)</b>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander	Experiments	BL2-Understand	8
3	3. Separation of sugars by Paper chromatography	Experiments	BL2-Understand	8
4	4. TLC of herbal extract	Experiments	BL3-Apply	8
5	5. Distillation of volatile oils and detection of phytoconstituents by TLC	Experiments	BL5-Evaluate	8
6	6. Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh	PBL		8

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

### Part E

<b>Books</b>	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. 4. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
<b>Articles</b>	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4204033/#:~:text=Pharmacognosy%20deals%20with%20the%20natural,model%20molecules%20in%20drug%20discovery.">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4204033/#:~:text=Pharmacognosy%20deals%20with%20the%20natural,model%20molecules%20in%20drug%20discovery.</a>
<b>References Books</b>	5. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007 6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi. 7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
<b>MOOC Courses</b>	NA
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	1	-	-	-	3	-	2	2	1
CO2	2	-	-	-	-	-	1	-	-	-	3	-	1	2	2
CO3	3	-	-	-	-	-	1	-	-	-	3	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	3	-	2	-	1
CO5	2	-	-	-	-	-	1	-	-	-	2	-	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Online certified courses related to Pharmacy I *
<b>Course Code</b>	BP509ET

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					1	0	0	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Specific Elective							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	CO1- To gain the skill and knowldege in pharmaceutical domain(BL3-Apply)							
<b>Coures Elements</b>	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professionnal Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			<b>SDG (Goals)</b>				

### Part B

Modules	Contents	Pedagogy	Hours
1	online course are available in coursera, edx, udemy and NEPTEL. Students are instructed to registered in mooc course and submit the certificate after completion	Blended	30

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
25	20	20	5	0	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	NA
<b>Articles</b>	NA
<b>References Books</b>	NA
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	3	1	-	-	2
CO2	2	2	2	1	-	-	-	-	-	-	2	1	1	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	International Regulatory Requirements for Good Manufacturing Practices
<b>Course Code</b>	BP510ET

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					1	0	0	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Specific Elective							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand the different quality level for global regulatory agency ( <b>BL2-Understand</b> ) <b>CO2-</b> To apply the knowledge of Quality management guidelines in real scenario( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✓ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consumption and production) SDG16(Peace Justice and strong institutions)				

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Overview on Product Life cycle Management , Good Manufacturing Practices and its Regulations , Functions of pharmaceutical and healthcare industries (Quality, Production, RA, R&	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Good Documentation Practices, Data Integrity Assurance, Qualification and Validation, Change Control, Deviation Management, Out of specifications, Data Integrity Assurance	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	CAPA & QRM, Complaint Handling & Product Recall, GMP requirements in Medical Devices, GMP Requirements in Pharmaceutical Drug substances and products, GMP for Biologics products and guidelines for injectable products	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	<a href="https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&amp;isAllowed=y">https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&amp;isAllowed=y</a>
<b>Articles</b>	<a href="https://www.fda.gov/drugs/pharmaceutical-quality-resources/current-good-manufacturing-practice-cgmp-regulations">https://www.fda.gov/drugs/pharmaceutical-quality-resources/current-good-manufacturing-practice-cgmp-regulations</a> , CDER-OPQ-Inquiries@fda.hhs.gov
<b>References Books</b>	<a href="https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&amp;isAllowed=y">https://iris.who.int/bitstream/handle/10665/64465/WHO_VSQ_97.01-eng.pdf?sequence=1&amp;isAllowed=y</a>
<b>MOOC Courses</b>	<a href="https://www.itsligo.ie/courses/higher-certificate-in-science-in-good-manufacturing-practice-gmp/">https://www.itsligo.ie/courses/higher-certificate-in-science-in-good-manufacturing-practice-gmp/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=mFwA2KTiPwI">https://www.youtube.com/watch?v=mFwA2KTiPwI</a> <a href="https://www.youtube.com/watch?v=mFwA2KTiPwI">https://www.youtube.com/watch?v=mFwA2KTiPwI</a>

### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	3	1	1	1	1
CO2	2	1	1	1	1	-	-	-	-	-	2	1	1	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

### (SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Product Development
<b>Course Code</b>	BP511ET

#### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Specific Elective							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To recall the formulation development of different types of dosage forms( <b>BL1-Remember</b> ) <b>CO2-</b> To outline the role of different pharmaceutical excipients in product development( <b>BL2-Understand</b> ) <b>CO3-</b> To select the excipients for a specific drug product( <b>BL5-Evaluate</b> ) <b>CO4-</b> To classify different of packaging for the drug product and materials used for primary and secondary packaging. ( <b>BL3-Apply</b> ) <b>CO5-</b> To choose optimization technique in the development of pharmaceutical drug product. ( <b>BL4-Analyze</b> )							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

#### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT4	Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

#### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Evaluation of suspending and emulsifying agent	Experiments		

#### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

#### Part E

<b>Books</b>	1. Pharmaceutical Statistics Practical and Clinical Applications by Stanford Bolton, Charles Bon; Marcel Dekker Inc.
<b>Articles</b>	<a href="https://www.ema.europa.eu/en/documents/scientific-guideline/note-guidance-pharmaceutical-development_en.pdf">https://www.ema.europa.eu/en/documents/scientific-guideline/note-guidance-pharmaceutical-development_en.pdf</a>
<b>References Books</b>	3. Pharmaceutical Dosage Forms – Tablets Vol 1 to 3, A. Liberman, Leon Lachman and Joseph B. Schwartz
<b>MOOC Courses</b>	<a href="https://www.coursera.org/courses?query=pharmaceutical">https://www.coursera.org/courses?query=pharmaceutical</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=sesDthMPCRC0&amp;list=PLkxD16eG21tVre8GBj-LbjfUUuq1qghVM">https://www.youtube.com/watch?v=sesDthMPCRC0&amp;list=PLkxD16eG21tVre8GBj-LbjfUUuq1qghVM</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	1	1	-	-	-	-	-	3	-	2	1	1
CO2	2	2	1	1	1	-	-	-	-	-	1	-	1	1	1
CO3	3	1	2	1	1	-	-	-	-	-	3	-	2	2	2
CO4	2	1	2	1	1	-	-	-	-	-	1	-	1	1	1
CO5	1	1	2	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Purification of Pharmaceutical Compounds
<b>Course Code</b>	BP512ET

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					1	0	0	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Skill Enhancement Courses							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the basics of impurities in pharmaceuticals( <b>BL2-Understand</b> ) <b>CO2-</b> To gain the knowledge of techniques to purify the compounds and remove the impurities the basics of impurities in pharmaceuticals( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			<b>SDG (Goals)</b>				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	<a href="https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf">https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf</a>
<b>Articles</b>	<a href="https://www.mdpi.com/books/reprint/8083-extraction-and-purification-of-bioactive-compounds">https://www.mdpi.com/books/reprint/8083-extraction-and-purification-of-bioactive-compounds</a>
<b>References Books</b>	<a href="https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf">https://crescent.education/wp-content/uploads/2021/06/Pharmaceutical-Organic-Chemistry.pdf</a>
<b>MOOC Courses</b>	NA
<b>Videos</b>	

### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	3	-	1	1	1
CO2	2	2	2	1	-	-	-	-	-	-	3	2	-	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Introduction to intellectual property rights
<b>Course Code</b>	BP513ET

### Part A

<b>Year</b>	3rd	<b>Semester</b>	5th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Skill Enhancement Courses							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To create awareness of IPR among pharmacy students. <b>(BL2-Understand)</b> <b>CO2-</b> To make the pharmacy students aware about the pharmaceutical R & D and the activities therein. <b>(BL2-Understand)</b> <b>CO3-</b> Develop the understanding of the Intellectual Property Rights necessary for research activities in the pharmaceutical industry. <b>(BL3-Apply)</b> <b>CO4-</b> To know the database of intellectual property and TKDL <b>(BL2-Understand)</b> <b>CO5-</b> To apply the Knowledge of IPR in drafting and filing of IPR <b>(BL3-Apply)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	The pharmaceutical business and The pharmaceutical R & D	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Module 3 – Intellectual Property Rights: Introduction about patents, copyright, trademark, Industrial Designs, Geographical Indications, Trade Secrets, Module 4 – IPR: With specific reference to pharma	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	IPR: Indian patent scenario and Patent commercialization and licensing	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Patent drafting and Patent searches, patent filing, registration, granting World Intellectual Property Organization (WIPO) and its functions	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	IP in Traditional Knowledge, TKDL database in medicinal plants, INDIAN WEB-PORTALS FOR PATENTS AND TECHNOLOGIES	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	patent drafting and filing	Case Study	BL3-Apply	5

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	Cockburn IM. Intellectual property rights and pharmaceuticals: challenges and opportunities for economic research. The economics of intellectual property. 2009 Jan:150.
<b>Articles</b>	Savale SK, Savale VK. Intellectual property rights (IPR). World J Pharm Pharm Sci. 2016 Apr 22;5:2559-92.
<b>References Books</b>	Prabu SL, Tnk S, editors. Intellectual property rights. BoD–Books on Demand; 2017 Jun 21.
<b>MOOC Courses</b>	NEPTEL
<b>Videos</b>	NA

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	1	-	-	-	3	-	2	3	-	1	1	1
CO2	-	1	-	-	-	-	-	3	-	-	2	-	1	-	1
CO3	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-







## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Medicinal Chemistry III
<b>Course Code</b>	BP601T

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand the importance of drug design and different techniques of drug design. <b>(BL2-Understand)</b> <b>CO2-</b> Understand the chemistry of drugs with respect to their biological activity. <b>(BL2-Understand)</b> <b>CO3-</b> To recall the classification and nomenclature of drugs of natural and synthetic origin <b>(BL1-Remember)</b> <b>CO4-</b> To Know the importance of SAR of drugs. <b>(BL1-Remember)</b> <b>CO5-</b> To discuss the approaches in drug design including QSAR, pharmacophore modeling, docking and combinatorial chemistry <b>(BL3-Apply)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
1	Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes. $\beta$ -Lactam antibiotics: Penicillin, Cephalosporins, $\beta$ -Lactamase inhibitors, Monobactams Aminoglycosides: Streptomycin, Neomycin, Kanamycin Tetracyclines: Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	Anti-tubercular Agents Synthetic anti tubercular agents: Isoniazid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.* Anti-tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycin, 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	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*.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Pharmacophore modeling and docking	Experiments	BL2-Understand	6

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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.
<b>Articles</b>	<a href="https://pubs.acs.org/journal/jmcmr">https://pubs.acs.org/journal/jmcmr</a>
<b>References Books</b>	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	-	-	-	-	3	-	1	2	3-
CO2	2	3	-	-	1	-	-	-	-	-	2	-	1	2	3
CO3	3	2	-	-	2	-	-	-	-	-	2	-	1	2	3
CO4	3	2	-	1	2	-	-	-	-	1	3	1	1	1	1
CO5	2	2	-	1	1	-	-	-	-	1	1	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology III
<b>Course Code</b>	BP602T

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To list the drugs used in respiratory and gastrointestinal complications( <b>BL2-Understand</b> ) <b>CO2-</b> Comprehend the principles of toxicology and treatment of various poisonings and( <b>BL2-Understand</b> ) <b>CO3-</b> Appreciate correlation of pharmacology with related medical sciences.( <b>BL1-Remember</b> ) <b>CO4-</b> To assess the various types of toxicity studies, principles of treatment of poisoning and management of various poisoned conditions( <b>BL3-Apply</b> ) <b>CO5-</b> o compile the biological clock and its significance leading to chronotherapy( <b>BL1-Remember</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
1	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 diarrhea. c. Appetite stimulants and suppressants. d. Digestants and carminatives. e. Emetics and anti-emetics	PPT/White Board	10
2	3. Chemotherapy a. General principles of chemotherapy. b. Sulfonamides and cotrimoxazole. c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides	PPT/White Board	10
3	3. Chemotherapy a. Antitubercular agents b. Antileprotic agents c. Antifungal agents d. Antiviral drugs e. Anthelmintics f. Antimalarial drugs g. Antiamoebic agents	PPT/White Board	10
4	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	PPT/White Board	8
5	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. 7. Clinical trials and Good Clinical Practice: Introduction, Institutional review board, informed consent, confidentiality and privacy, participant safety and Adverse events, Quality assurance, the research protocol, Documentation and record keeping, Research misconduct, Roles and responsibilities, recruitment and retention, investigational new drug.	PPT/White Board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Unit-1	SWISS ADME TOOL HANDLING	Simulation	BL3-Apply	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	37	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://www.frontiersin.org/journals/pharmacology/article">https://www.frontiersin.org/journals/pharmacology/article</a>
<b>References Books</b>	1. Goodman and Gilman's, The Pharmacological Basis of Therapeutics 2. 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 3. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology 4. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	2	2	-	-	-	-	3	-	1	2	2
CO2	2	2	-	-	-	1	-	-	-	-	3	-	1	2	3
CO3	1	2	-	-	1	1	-	-	-	-	2	-	1	2	2
CO4	3	1	-	-	-	1	-	-	-	-	2	-	-	-	3
CO5	3	1	-	-	1	1	-	-	-	-	2	-	2	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Herbal Drug Technology
<b>Course Code</b>	BP603T

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To Understand raw material as source of herbal drugs from cultivation to herbal drug product ( <b>BL2-Understand</b> ) <b>CO2-</b> To Know the WHO and ICH guidelines for evaluation of herbal drugs( <b>BL1-Remember</b> ) <b>CO3-</b> To know the herbal cosmetics, natural sweeteners, nutraceuticals( <b>BL2-Understand</b> ) <b>CO4-</b> To Appreciate patenting of herbal drugs, GMP( <b>BL2-Understand</b> ) <b>CO5-</b> To illustrate the scope and future prospects of the herbal drug industry( <b>BL1-Remember</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consumption and production)				

## Part B

Modules	Contents	Pedagogy	Hours
1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	11
2	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7
3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
5	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation and standardization of Ayurvedic formulations	Research Paper Presentation	BL2-Understand	8



## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Textbook of Pharmacognosy by Trease &Evans. 2. Textbook of Pharmacognosy byTyler, Brady & Robber.
<b>Articles</b>	<a href="https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future">https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future</a>
<b>References Books</b>	3. Pharmacognosy by Kokate, Purohit and Gokhale 4. Essential of Pharmacognosy by Dr.S.H.Ansari 5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO2	3	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO3	1	2	-	-	-	-	2	-	-	-	3	-	1	2	2
CO4	2	2	-	-	-	-	1	-	-	-	2	-	2	-	1
CO5	3	2	-	-	-	-	1	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Biopharmaceutics and Pharmacokinetics
<b>Course Code</b>	BP604T

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. <b>(BL3-Apply)</b></p> <p><b>CO2-</b> To Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. <b>(BL2-Understand)</b></p> <p><b>CO3-</b> To understand the concepts of bioavailability and bioequivalence of drug products and their significance. <b>(BL2-Understand)</b></p> <p><b>CO4-</b> To Understand various pharmacokinetic parameters, their significance &amp; applications. <b>(BL2-Understand)</b></p> <p><b>CO5-</b> To analyze the bioavailability of a drug and to compare the bioequivalence between drug products. <b>(BL4-Analyze)</b></p>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)				

## Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Biopharmaceutics 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. a. Michaelis-menton method of estimating parameters, Explanation with example of drugs.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	in-vitro drug dissolution models,	PBL	BL2-Understand	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi. 2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
<b>Articles</b>	<a href="https://onlinelibrary.wiley.com/journal/1099081x">https://onlinelibrary.wiley.com/journal/1099081x</a>
<b>References Books</b>	3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA 4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmkar and Sunil B.Jaiswal, Vallabh Prakashan Pitampura, Delhi 5. Pharmacokinetics: By Milo Gibaldi Donald, R. Mercel Dekker Inc.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	-	-	-	-	-	3	-	3	2	3
CO2	3	2	2	1	2	-	-	-	-	-	3	-	1	-	3
CO3	2	2	1	-	2	-	-	-	-	-	3	-	1	2	-
CO4	2	3	1	1	2	-	-	-	-	-	3	-	1	1	1
CO5	3	1	2	1	2	-	-	-	-	-	2	1	-	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmaceutical Biotechnology
<b>Course Code</b>	BP605T

### Part A

Year	3rd	Semester	6th	Credits		L	T	P	C
						3	1	0	4
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understanding the importance of Immobilized enzymes in Pharmaceutical Industries( <b>BL2-Understand</b> ) <b>CO2-</b> To understand the Genetic engineering applications in relation to production of pharmaceuticals( <b>BL2-Understand</b> ) <b>CO3-</b> To know the Importance of Monoclonal antibodies in Industries( <b>BL1-Remember</b> ) <b>CO4-</b> To Appreciate the use of microorganisms in fermentation technology( <b>BL1-Remember</b> ) <b>CO5-</b> To elaborate on microbial genetics, biotransformation and various immunological products.( <b>BL3-Apply</b> )								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)					

## Part B

Modules	Contents	Pedagogy	Hours
1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	DNA ISOLATION FROM ONION	Experiments	BL2-Understand	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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.
<b>Articles</b>	<a href="https://pdf.sciencedirectassets.com/272281/1-s2.0-S1369702101X80012/1">https://pdf.sciencedirectassets.com/272281/1-s2.0-S1369702101X80012/1</a>
<b>References Books</b>	3. J.W. Goding: Monoclonal Antibodies. 4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	-	1	2	2
CO2	2	2	-	1	-	-	-	-	-	-	3	-	1	2	2
CO3	2	2	-	-	-	-	-	-	-	-	2	-	1	2	2
CO4	3	1	-	-	-	-	-	-	-	-	3	-	1	1	2
CO5	3	2	-	1	-	1	-	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Quality Assurance
<b>Course Code</b>	BP606T

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> Understand the cGMP aspects in a pharmaceutical industry appreciate the importance of documentation(<b>BL2-Understand</b>)</p> <p><b>CO2-</b> Understand the scope of quality certifications applicable to pharmaceutical industries such as ISO, NABL and QbD concepts in pharmaceutical industry.(<b>BL3-Apply</b>)</p> <p><b>CO3-</b> Understand the responsibilities of QA &amp; QC departments(<b>BL2-Understand</b>)</p> <p><b>CO4-</b> To evaluate the complaints and documents maintenance in industry with required regulatory guidelines(<b>BL5-Evaluate</b>)</p> <p><b>CO5-</b> To elaborate the calibration, validation procedures and good warehousing practices(<b>BL2-Understand</b>)</p>								
<b>Courses Elements</b>	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✓ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education)					



## Part B

Modules	Contents	Pedagogy	Hours
1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
2	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. Equipment and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
4	Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal. Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
5	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Calibration of pH meter	Experiments	BL2-Understand	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	15	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088954/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088954/</a>
<b>References Books</b>	4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh 5. How to Practice GMP's – P P Sharma. 6. ISO 9000 and Total Quality Management – Sadhank G Ghosh 7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	kcl tutorial

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	1	2	-	-	-	-	-	3	-	1	2	1
CO2	1	2	-	1	2	-	-	-	-	-	3	-	1	2	1
CO3	2	2	-	1	2	-	-	-	-	-	3	-	1	-1	3
CO4	3	1	-	1	2	-	-	-	-	-	3	-	1	-	2
CO5	2	1	-	1	1	-	-	-	-	-	2	-	1	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Medicinal Chemistry III
<b>Course Code</b>	BP607P

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To define and select the method for preparation of drugs and intermediates( <b>BL1-Remember</b> ) <b>CO2-</b> To explain principle underlying the preparation of drugs( <b>BL2-Understand</b> ) <b>CO3-</b> To choose the method for assay of drugs by quantitative analysis( <b>BL3-Apply</b> ) <b>CO4-</b> To compare the advantages of microwave technique over conventional synthesis of drugs( <b>BL5-Evaluate</b> ) <b>CO5-</b> To predict the relation between physicochemical properties and biological activity( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	I Preparation of drugs and intermediates 1 Sulphanilamide 2 7-Hydroxy, 4-methyl coumarin 3 Chlorobutanol 4 Triphenyl imidazole 5 Tolbutamide 6 Hexamine	Experiments	BL3-Apply	9
2	II Assay of drugs 1 Isonicotinic acid hydrazide 2 Chloroquine 3 Metronidazole 4 Dapsone 5 Chlorpheniramine maleate 6 Benzyl penicillin	Experiments	BL6-Create	8
3	III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique	Experiments	BL3-Apply	8
4	IV Drawing structures and reactions using chem draw®	Experiments	BL4-Analyze	8
5	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 likeness screening (Lipinskies RO5)	Experiments	BL5-Evaluate	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	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.
<b>Articles</b>	<a href="https://pubs.acs.org/journal/jmcmr">https://pubs.acs.org/journal/jmcmr</a>
<b>References Books</b>	1. Introduction to principles of drug design- Smith and Williams. 2. Remington's Pharmaceutical Sciences. 3. Martindale's extra pharmacopoeia.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	Pharmacy India

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	1	-	-	-	-	-	3	-	1	2	1
CO2	3	2	-	3	1	-	-	-	-	-	2	-	1	2	2
CO3	2	1	-	2	2	-	-	-	-	-	3	-	1	2	2
CO4	2	2	-	1	1	-	-	-	-	-	2	-	-	-	2
CO5	3	1	-	1	1	-	-	-	-	-	1	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacology III
<b>Course Code</b>	BP608P

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C	
					0	0	2	2	
<b>Course Type</b>	Lab only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To recall the dose calculations in pharmacological experiments, and to relate the antiallergic activity / anti-ulcer activity in rat models(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To demonstrate of effect of drugs on gastrointestinal motility and the effect of agonist/antagonists on guinea pig ileum(<b>BL3-Apply</b>)</p> <p><b>CO3-</b> o analyze effect of saline purgative on frog intestine, insulin hypoglycemic effect and test for pyrogens using rabbit method(<b>BL4-Analyze</b>)</p> <p><b>CO4-</b> To evaluate acute oral toxicity (LD50), acute skin irritation / corrosion and acute eye irritation / corrosion of a test substance(<b>BL5-Evaluate</b>)</p> <p><b>CO5-</b> To predict the pharmacokinetic parameters and adapt the biostatistics methods in experimental pharmacology.(<b>BL3-Apply</b>)</p>								
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being)					

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. Dose calculation in pharmacological experiments 2. Antiallergic activity by mast cell stabilization assay	Experiments	BL2-Understand	8
2	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	Experiments	BL4-Analyze	8
3	5. Effect of agonist and antagonists on guinea pig ileum 6. Estimation of serum biochemical parameters by using semi- autoanalyzer	Experiments	BL2-Understand	8
4	7. Effect of saline purgative on frog intestine 8. Insulin hypoglycemic effect in rabbit	Experiments	BL3-Apply	8
5	9. Test for pyrogens (rabbit method) 10. Determination of acute oral toxicity (LD50) of a drug from a given data	Experiments	BL3-Apply	8
6	11. Determination of acute skin irritation / corrosion of a test substance 12. Determination of acute eye irritation / corrosion of a test substance	Experiments	BL2-Understand	8
7	13. Calculation of pharmacokinetic parameters from a given data 14. Biostatistics methods in experimental pharmacology (student's t test, ANOVA)	Experiments	BL3-Apply	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	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
<b>Articles</b>	<a href="https://www.sciencedirect.com/science/article/abs/pii/S0163725804001718">https://www.sciencedirect.com/science/article/abs/pii/S0163725804001718</a>
<b>References Books</b>	1.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 2. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	Pharmacy india

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	3	-	-	-	-	2	-	1	2	2
CO2	3	1	-	-	-	3	-	-	-	-	3	-	1	2	1
CO3	3	2	-	-	-	2	-	-	-	-	3	-	1	2	1
CO4	2	1	-	-	-	2	-	-	-	-	2	-	-	-	1
CO5	3	2	-	-	-	2	-	-	-	-	1	-	1	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Herbal Drug Technology
<b>Course Code</b>	BP609P

### Part A

<b>Year</b>	3rd	<b>Semester</b>	6th	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To remember different preliminary phytochemical screening of crude drugs( <b>BL2-Understand</b> ) <b>CO2-</b> To evaluate the various herbal formulations( <b>BL4-Analyze</b> ) <b>CO3-</b> To apply monographic analysis of herbal drugs as per pharmacopoeias( <b>BL3-Apply</b> ) <b>CO4-</b> To evaluate parameters such as aldehyde and phenol contents( <b>BL5-Evaluate</b> ) <b>CO5-</b> To assess the total alkaloid and other content( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics X Gender ✓ Human Values ✓ Environment ✓		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1. To perform preliminary phytochemical screening of crude drugs. 2. Determination of the alcohol content of Asava and Arista	Experiments	BL3-Apply	12
2	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.	Experiments	BL5-Evaluate	12
3	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	Experiments	BL5-Evaluate	12
4	7. Determination of Aldehyde content 8. Determination of Phenol content 9. Determination of total alkaloids	Experiments	BL4-Analyze	12

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8

## Part E

<b>Books</b>	1. Textbook of Pharmacognosy by Trease & Evans. 2. Textbook of Pharmacognosy by Tyler, Brady & Robber. 3. Pharmacognosy by Kokate, Purohit and Gokhale
<b>Articles</b>	<a href="https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future">https://www.researchgate.net/publication/8914668_Herbal_medicine_Current_status_and_the_future</a>
<b>References Books</b>	5. Pharmacognosy & Phytochemistry by V.D.Rangari 6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy) 7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	Pharmacy India

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
CO2	1	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	1	2	1
CO5	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Artificial intelligence in Pharmaceutical
<b>Course Code</b>	BP611ET

### Part A

<b>Year</b>	3rd	<b>Semester</b>	6th	<b>Credits</b>	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Specific Elective							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Acquire an in-depth comprehension of AI applications in pharmaceutical domain.( <b>BL2-Understand</b> ) <b>CO2-</b> Recognize and counter prevalent myths associated with AI.( <b>BL2-Understand</b> ) <b>CO3-</b> Implement AI in real-life pharmaceutical use cases without the need for coding.( <b>BL3-Apply</b> ) <b>CO4-</b> To gain the knowlege of AI and how to implement in healthcare( <b>BL3-Apply</b> ) <b>CO5-</b> AbilitTo apply time-series forecasting for healthcare applications( <b>BL3-Apply</b> )							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professsonal Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG9(Industry Innovation and Infrastructure) SDG17(Partnerships for the goals)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	Harrer S, Menard J, Rivers M, Green DV, Karpik J, Jeliaskov JR, Shapovalov MV, del Alamo D, Sternke MC. Artificial intelligence drives the digital transformation of pharma. InArtificial Intelligence in Clinical Practice 2024 Jan 1 (pp. 345-372). Academic Press.
<b>Articles</b>	Patel J, Patel D, Meshram D. Artificial Intelligence in Pharma Industry-A Rising Concept. Journal of Advancement in Pharmacognosy. 2021;1(2).
<b>References Books</b>	Bhupathyraaj M, Rani KR, Essa MM, editors. Artificial Intelligence in Pharmaceutical Sciences. CRC Press; 2023 Nov 23.
<b>MOOC Courses</b>	Udemy, coursera, NEPTEL
<b>Videos</b>	YOU TUBE

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	2	3	-	-	-	-	-	3	-	1	1	2
CO2	2	2	1	-	1	-	-	-	-	-	2	2	1	1	1
CO3	2	3	1	1	1	-	-	-	-	-	1	1	1	1	1
CO4	1	2	1	1	1	-	-	-	-	-	1	1	1	1	1
CO5	1	1	1	1	-	-	-	-	-	-	-	1	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

### (SOP)(BPharm)

<b>Title of the Course</b>	Good Manufacturing in Pharma
<b>Course Code</b>	BP612ET

#### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					1	0	0	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Specific Elective							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To be able to understand the basics of Good Manufacturing Practice for medicinal products for human use and the current legal regulations and guidelines(<b>BL1-Remember</b>)</p> <p><b>CO2-</b> To have the confidence to outline the main GMP requirements related to premises, storage facilities and personnel;( <b>BL2-Understand</b>)</p> <p><b>CO3-</b> To get familiar with the principles of the GMP quality system and quality control and the important procedures when dealing with complaints and recalls(<b>BL3-Apply</b>)</p>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✓ Gender ✗ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education) SDG12(Responsible consumption and production)				

#### Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	Introduction What is Good Manufacturing Practice? Why is GMP important? Official GMP Directives. the basic requirements of Good Manufacturing Practice., Pharmaceutical Quality System Principle and overview of the Pharmaceutical Quality System. Major updates. Development, content and implementation of PQS.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 2	Personnel Key personnel. Background and duties of the Qualified person. Duties of the Head of production department. Duties of the Head of quality control. Person releasing the batch. Consultants. Personnel training and hygiene, Premises and Equipment Production area. Storage area. Quality control areas. Ancillary areas. Equipment.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 3	Documentation Premises. Generation and control of documentation. Types of documents and specifications. Manufacturing formula and processing instructions. Packaging instructions. Procedures and records., Production General principles. Prevention of cross-contamination in production. Guidelines for starting materials. Processing operations. Packaging materials and operations. Guidelines for finished products.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 4	Quality Control General principles. Main tasks of the Quality control department. Technical transfer of testing methods. Transfer protocol., Complaints and Recalls GMP Guidelines related to complaints. Classification of defects. Product Recalls.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	Karmacharya JB. Good manufacturing practices (GMP) for medicinal products. Promising Pharmaceuticals. 2014;101.
<b>Articles</b>	Patel KT, Chotai NP. Pharmaceutical GMP: past, present, and future—a review. Die Pharmazie-An International Journal of Pharmaceutical Sciences. 2008 Apr 1;63(4):251-5.
<b>References Books</b>	Durivage MA, editor. The Certified Pharmaceutical GMP Professional Handbook. Quality Press; 2016 May 23.
<b>MOOC Courses</b>	UDEMY, COURSERA, PHARMASTATE ACADEMY
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	1	2	-	2	2	1	-	3	-	1	1	1
CO2	2	2	-	1	3	-	2	1	1	-	2	-	1	1	1
CO3	1	1	-	1	1	-	1	1	1	-	1	-	1	1	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Healthcare Marketplace Capstone
<b>Course Code</b>	BP613ET

### Part A

Year	3rd	Semester	6th	Credits	L	T	P	C
					1	0	0	1
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Ability Enhancement Courses							
<b>Pre-Requisite/s</b>	This course is offered by the University of Minnesota on the Coursera platform. students are requested to enroll the programme and follow the instructions given by institute				<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Learn new concepts from industry experts( <b>BL2-Understand</b> ) <b>CO2-</b> Gain a foundational understanding of a subject or tool, Develop job-relevant skills with hands-on projects( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗			<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)			

### Part B

Modules	Contents	Pedagogy	Hours
1	What is your Health Marketplace Innovation? In this Milestone you will describe a new medical innovation in the context of what makes it extraordinary for investment or use in a community. Your final project for this capstone will feature 4 critical milestone components for an assessment of new innovation. Once completed, hope is that you have a body of illustrate your critical thinking to advance your career or switch careers into the healthcare market.		
2	What is the Voice of the Healthcare Provider For the second milestone you will complete an analysis of what the key customer - the medical provider - will required of the new technology or innovation to want to use it. This will require you to ask medical providers that you encounter about the nature of the technology and whether would find it of value. Remember to always tell provider that you are a student not a sales agent. The health care delivery course provides great insight into how care is delivered and will provide the context and background for your brief 2-3 page memo resulting from this milestone		
3	Regulatory and IP Status of the Innovation, How will the Innovation Generate Revenue, A great innovation needs a solid revenue model for survival-ability. In this milestone you will be asked to use parts of the prior three capstones to generate your own market report. Identifying the innovation's market space, voice of the customer, IP and regulatory path and final path roof reimbursement are critical components for identifying whether a medical innovation should advance and be sustained commercially		
4	Submitting the Final Project		

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
25	20	5	5	0	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	
<b>Articles</b>	
<b>References Books</b>	
<b>MOOC Courses</b>	<a href="https://www.coursera.org/learn/healthcare-marketplace-capstone">https://www.coursera.org/learn/healthcare-marketplace-capstone</a>
<b>Videos</b>	

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	-	3	1	1	1	1
CO2	2	1	1	-	1	1	-	-	1	-	2	1	1	1	1
CO3	1	1	1	1	1	-	-	-	-	-	1	1	1	1	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Instrumental Methods of Analysis
<b>Course Code</b>	BP-701T

## Part A

Year	4th	Semester	7th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand selected instrumental analytical techniques (spectroscopic and chromatographic methods) and differentiate with volumetric analysis. <b>(BL2-Understand)</b> <b>CO2-</b> Gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy. <b>(BL1-Remember)</b> <b>CO3-</b> Characterization and estimation of ions by spectroscopic techniques <b>(BL4-Analyze)</b> <b>CO4-</b> Simplify affinity of matter with stationary phase and mobile phase, physical and chemical properties of matter. <b>(BL2-Understand)</b> <b>CO5-</b> Categorize different organic and inorganic compounds using suitable spectroscopic and chromatographic techniques. <b>(BL3-Apply)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>		SDG1(No poverty) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)			

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations, Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications Flame Photometry-Principle, interferences, instrumentation and applications Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications Nephelo-turbidometry- Principle, instrumentation and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	Introduction to chromatography Adsorption and partition column chromatography- Methodology, advantages, disadvantages and applications. Thin layer chromatography- Introduction, Principle, Methodology, Rf 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	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	white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Modal making of Gel electrophoresis	Experiments	BL2-Understand	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Instrumental Methods of Chemical Analysis by B.K Sharma 2. Organic spectroscopy by Y.R Sharma 3. Textbook of Pharmaceutical Analysis by Kenneth A. Connors 4. Vogel's Textbook of Quantitative Chemical Analysis by A.I. Vogel
<b>Articles</b>	NA
<b>References Books</b>	1. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake 2. Organic Chemistry by I. L. Finar 3. Organic spectroscopy by William Kemp 4. Quantitative Analysis of Drugs by D. C. Garrett
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	you tube



## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	1	2	-	-	-	-	3	-	1	2	1
CO2	2	3	-	2	-	-	-	-	-	-	3	-	1	1	1
CO3	2	2	-	1	-	-	-	-	-	-	3	-	1	1	2
CO4	2	2	-	-	-	-	-	-	-	-	2	-	1	2	1
CO5	2	2	-	-	-	-	-	-	-	-	2	-	1	1	0
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Industrial Pharmacy II
<b>Course Code</b>	BP702T

## Part A

<b>Year</b>	4th	<b>Semester</b>	7th	<b>Credits</b>	L	T	P	C
					3	1	-1	3
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To explain pilot plant, scale up techniques and SUPAC guidelines. <b>(BL1-Remember)</b> <b>CO2-</b> To outline various aspects of technology transfer involved from R & D to production. <b>(BL2-Understand)</b> <b>CO3-</b> To choose and to apply various responsibilities and regulatory requirements for drug approval. <b>(BL3-Apply)</b> <b>CO4-</b> To analyze and study various quality management systems in pharmacy field. <b>(BL4-Analyze)</b> <b>CO5-</b> To determine the requirements and approval procedures for new drugs by Indian Regulatory <b>(BL5-Evaluate)</b>							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG4(Quality education)				

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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, 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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Blended Learning	10
UNIT 4	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
UNIT 5	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board, Case Based Learning	7

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Regulatory requirements and approval	Case Study	BL3-Apply	5

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. International Regulatory Affairs Updates, 2005. available at <a href="http://www.iraup.com/about.php">http://www.iraup.com/about.php</a> 2. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
<b>Articles</b>	5. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at <a href="http://en.wikipedia.org/wiki/Regulatory_Affairs">http://en.wikipedia.org/wiki/Regulatory_Affairs</a> . 6. International Regulatory Affairs Updates, 2005. available at <a href="http://www.iraup.com/about.php">http://www.iraup.com/about.php</a>
<b>References Books</b>	3. International Regulatory Affairs Updates, 2005. available at <a href="http://www.iraup.com/about.php">http://www.iraup.com/about.php</a> 4. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a> <a href="https://www.udemy.com/course/certificate-course-in-drug-regulatory-affairs-dra/?--&amp;utm_source=adwords&amp;utm_medium=udemyads&amp;utm_campaign=LongTail_la_EN_cc.INDIA&amp;utm_content=deal4584&amp;utm_term=__ag_118445032537__ad_618853564450__kw__de_c__dm__pl__1212271230479__li_1007795__pd__&amp;matchtype=&amp;gad_source=1&amp;gclid=CjwKCAjwT-OwBhBnEiwAgwzrUvsaJ5SOVDqVcWySo7cw5sJ-Zb7x2IEpdRy076Mnp3jNtdJKIIZ7ORoCu2YQAvD_BwE&amp;couponCode=IND21PM">https://www.udemy.com/course/certificate-course-in-drug-regulatory-affairs-dra/?--&amp;utm_source=adwords&amp;utm_medium=udemyads&amp;utm_campaign=LongTail_la_EN_cc.INDIA&amp;utm_content=deal4584&amp;utm_term=__ag_118445032537__ad_618853564450__kw__de_c__dm__pl__1212271230479__li_1007795__pd__&amp;matchtype=&amp;gad_source=1&amp;gclid=CjwKCAjwT-OwBhBnEiwAgwzrUvsaJ5SOVDqVcWySo7cw5sJ-Zb7x2IEpdRy076Mnp3jNtdJKIIZ7ORoCu2YQAvD_BwE&amp;couponCode=IND21PM</a>
<b>Videos</b>	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	-	-	-	-	-	-	-	3	-	3	2	1
CO2	3	3	1	-	-	-	-	-	-	-	3	-	3	2	1
CO3	2	2	1	1	-	-	2	-	-	-	3	-	3	2	1
CO4	3	1	1	-	-	-	-	-	-	-	2	-	3	2	1
CO5	2	3	3	-	-	-	-	-	-	-	2	-	1	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Pharmacy Practice
<b>Course Code</b>	BP703T

## Part A

Year	4th	Semester	7th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To acquire the knowledge on organization of hospitals, various methods of distribution and hospital formulary in hospitals and apply it in the practice of pharmacy. <b>(BL1-Remember)</b> <b>CO2-</b> To outline the organization and structure of community pharmacy and to build ability to design and run own community pharmacy. <b>(BL1-Remember)</b> <b>CO3-</b> To demonstrate the knowledge of therapeutic drug monitoring, patient medication history interview and to apply the knowledge on assessment of drug related problems. <b>(BL2-Understand)</b> <b>CO4-</b> categorize and evaluate the role of hospital pharmacist in pharmacy and therapeutic committee, drug information services, patient counseling, education and training programmes in hospitals. <b>(BL1-Remember)</b> <b>CO5-</b> To interpret clinical laboratory tests of specific disease states to provide better patient centered service. <b>(BL4-Analyze)</b>							
<b>Coures Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professonal Ethics ✓ Gender ✓ Human Values ✓ Environment X		<b>SDG (Goals)</b>		SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation)			

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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 center, Sources of drug information, Computerized services, and storage and retrieval of information. Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist c) 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. d) Prescribed medication order and communication skills Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	a) Drug store management and inventory control Organization 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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Visit of ITM Hospital	Internships	BL2-Understand	3
2	Visit of ITM Hospital	Field work	BL2-Understand	2

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Merchant S.H. and Dr. J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001. 2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1st ed. Chennai: Orient Longman Private Limited; 2004.
<b>Articles</b>	6. Therapeutic drug monitoring. ISSN: 0163-4356 7. Journal of pharmacy practice. ISSN: 0974-8326 8. American journal of health system pharmacy. ISSN: 1535-2900 (online) 9. Pharmacy times (Monthly magazine)
<b>References Books</b>	3. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008. 4. Scott LT. Basic skills in interpreting laboratory data, 4th ed. American Society of Health System Pharmacists Inc; 2009. 5. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a> , <a href="https://www.udemy.com/">https://www.udemy.com/</a>
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	-	-	-	-	3	-	1	2	1
CO2	3	1	-	1	-	2	-	-	-	-	3	-	1	1	1
CO3	2	2	-	-	-	1	-	-	-	-	3	-	1	1	1
CO4	3	1	-	1	-	2	-	-	-	-	2	-	1	1	1
CO5	2	1	-	1	-	1	1	-	-	-	2	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Novel Drug Delivery System
<b>Course Code</b>	BP704T

### Part A

Year	4th	Semester	7th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand and rationalize fundamentals and polymers used in the design of controlled drug delivery systems( <b>BL2-Understand</b> ) <b>CO2-</b> To outline the concepts of formulation and evaluation of oral, mucosal and implantable drug delivery system.( <b>BL1-Remember</b> ) <b>CO3-</b> To develop and study oral, mucosal, dermal, pulmonary and Nasa I drug delivery systems over conventional dosage forms for prolonged action.( <b>BL3-Apply</b> ) <b>CO4-</b> To illustrate the principles and fundamentals of drug targeting in the design of site-specific drug delivery system.( <b>BL2-Understand</b> ) <b>CO5-</b> To predict the rate and maximize therapeutic compliance of site-specific drug delivery systems by modifying conventional dosage forms( <b>BL5-Evaluate</b> )							
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>		SDG3(Good health and well-being) SDG4(Quality education)			

### Part B

Modules	Contents	Pedagogy	Hours
Unit 1	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 3	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
Unit 4	Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	8
Unit 5	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 intrauterine devices (IUDs) and applications	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	7

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To make model of disintegration	Simulation	BL3-Apply	5

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	1. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001). 2. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.
<b>Articles</b>	1.Indian Journal of Pharmaceutical Sciences (IPA) 2.Indian Drugs (IDMA) 3. Journal of Controlled Release (Elsevier Sciences) 4. Drug Development and Industrial Pharmacy (Marcel & Decker) 5. International Journal of Pharmaceutics (Elsevier Sciences)
<b>References Books</b>	1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992. 2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992. 3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	you tube

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	-	3	-	-	-	-	-	3	-	2	1	1
CO2	2	1	2	-	2	-	-	-	-	-	3	-	2	2	2
CO3	3	2	2	1	2	-	-	-	-	-	3	-	2	1	1
CO4	2	1	3	-	2	-	-	-	-	-	3	-	1	1	1
CO5	2	1	1	1	1	-	-	-	-	-	2	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Instrumental Methods of Analysis
<b>Course Code</b>	BP705P

### Part A

<b>Year</b>	4th	<b>Semester</b>	7th	<b>Credits</b>	L	T	P	C
					0	0	2	2
<b>Course Type</b>	Lab only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>	Theory of Respective Experiments			<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> Understand selected instrumental analytical techniques (spectroscopic and chromatographic methods) and differentiate with volumetric analysis. <b>(BL3-Apply)</b> <b>CO2-</b> Gain knowledge on interaction of EMR with matter and to build the analytical understanding at the level of atom, group and molecular structure of organic and inorganic compounds with different functional groups and their applications in pharmacy <b>(BL2-Understand)</b> <b>CO3-</b> Characterization and estimation of ions by spectroscopic techniques <b>(BL3-Apply)</b> <b>CO4-</b> Simplify affinity of matter with stationary phase and mobile phase, physical and chemical properties of matter. <b>(BL3-Apply)</b> <b>CO5-</b> Categorize different organic and inorganic compounds using suitable spectroscopic and chromatographic techniques. <b>(BL3-Apply)</b>							
<b>Course Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

### Part B

Modules	Contents	Pedagogy	Hours
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### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds 2 Estimation of dextrose by colorimetry	Experiments	BL2-Understand	8
2	3 Estimation of sulfanilamide by colorimetry 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy	Experiments	BL4-Analyze	8
3	5 Assay of paracetamol by UV- Spectrophotometry 6 Estimation of quinine sulfate by fluorimetry	Experiments	BL4-Analyze	8
4	7 Study of quenching of fluorescence 8 Determination of sodium by flame photometry	Experiments	BL4-Analyze	8
5	9 Determination of potassium by flame photometry 10 Determination of chlorides and sulphates by nephelo-turbidometry	Experiments	BL4-Analyze	8
6	11 Separation of amino acids by paper chromatography 12 Separation of sugars by thin layer chromatography	Experiments	BL3-Apply	8
7	13 Separation of plant pigments by column chromatography 14 Demonstration experiment on HPLC	Experiments	BL3-Apply	8
8	15 Demonstration experiment on Gas Chromatography	PBL	BL3-Apply	8

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
50	25	35	18	15	8
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

### Part E

<b>Books</b>	1.Vogel's Textbook of Quantitative Chemical Analysis by A.I. Vogel 2. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
<b>Articles</b>	NA
<b>References Books</b>	1. Organic Chemistry by I. L. Finar 2. Organic spectroscopy by William Kemp 3. Quantitative Analysis of Drugs by D. C. Garrett
<b>MOOC Courses</b>	NA
<b>Videos</b>	NA

### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	1	-	1	-	-	-	3	-	1	1	1
CO2	3	1	2	1	1	-	1	-	-	-	3	-	1	1	1
CO3	2	2	2	1	1	-	1	-	-	-	3	-	1	1	1
CO4	2	1	3	1	1	-	1	-	-	-	2	-	1	2	1
CO5	2	1	1	2	1	-	-	-	-	-	3	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Practice School *
<b>Course Code</b>	BP706PS

### Part A

Year	4th	Semester	7th	Credits	L	T	P	C	
					0	0	6	6	
<b>Course Type</b>	Project								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>	In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt for any one of the domains for practice school declared by the program committee from time to time.			<b>Co-Requisite/s</b>	every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at the college level and grade points shall be awarded.				
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand the importance of realistic learning through practice in various domains such as community pharmacy, drug testing and manufacturing, preclinical testing, clinical practice, patent filing, regulatory filing accounting, green audit and article writing. <b>(BL2-Understand)</b> <b>CO2-</b> To get familiarize with the aspects of realistic practice in the domain of interest. <b>(BL3-Apply)</b> <b>CO3-</b> To develop knowledge and skills related to practical learning in the domain of interest. <b>(BL1-Remember)</b> <b>CO4-</b> To analyze the problems encountered during realistic practice and make use of theoretical knowledge to resolve those problems. <b>(BL1-Remember)</b> <b>CO5-</b> To build up the ability to perform well in the domain of interest after becoming an employee/entrepreneur. <b>(BL6-Create)</b>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics X Gender ✓ Human Values ✓ Environment ✓		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)					

### Part B

Modules	Contents	Pedagogy	Hours
1	Practice school	Practice School involves task orientation, teamwork, goal orientation and managing the interpersonal relationships. Therefore, it helps students to develop the qualities required by a graduate. A good Practice School program undertaken with all the seriousness provides an excellent learning opportunity to the student and also paves the way for successful career path.	150

### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Practice School	Field work		5

### Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0		0			
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
150	75	100	50	50	25

### Part E

<b>Books</b>	Please refer Library and Internet
<b>Articles</b>	Refer to the Library and Internet
<b>References Books</b>	Please refer Library and Internet
<b>MOOC Courses</b>	NA
<b>Videos</b>	Refer Library and Internet, NPTEL, YOU TUBE

### Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	1	1	1	2	2	-	-	3	-	2	1	1
CO2	2	-	1	1	-	-	-	-	-	-	2	-	1	1	1
CO3	1	-	1	-	1	-	-	-	-	-	2	-	-	1	1
CO4	1	1	1	1	1	-	-	-	-	-	3	-	-	1	1
CO5	3	-	1	1	-	-	-	-	1	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-





## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Biostatistics and Research Methodology
<b>Course Code</b>	BP801T

### Part A

Year	4th	Semester	8th	Credits	L	T	P	C	
					3	1	0	4	
<b>Course Type</b>	Theory only								
<b>Course Category</b>	Discipline Core								
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>					
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To understand the basic aspects of statistics such as central tendency, dispersion and correlation. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To make use of regression and probability while analyzing data by statistical methods. <b>(BL2-Understand)</b></p> <p><b>CO3-</b> To explain the need of research, research designs and their applications and to explain methodological designs. <b>(BL3-Apply)</b></p> <p><b>CO4-</b> To assess the need of regression modeling and to build up the ability to use various statistical problems. <b>(BL2-Understand)</b></p> <p><b>CO5-</b> To build the ability to perform various parametric and non parametric statistical tests and to draw graphs and plots based on type of data. <b>(BL3-Apply)</b></p>								
<b>Courses Elements</b>	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)					

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	Blocking and confounding system for Two-level factorials Regression modeling: Hypothesis testing in Simple and Multiple regression models Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	Design and Analysis of experiments: Factorial Design: Definition, 2 <sup>2</sup> , 2 <sup>3</sup> design. Advantage of factorial design Response Surface methodology: Central composite design, Historical design, optimization Techniques	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	hands on practical of MS Excel and SPSS	Simulation	BL2-Understand	3

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork. 2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
<b>Articles</b>	datatab.net <a href="https://www.ijdr.com/articles/biostatistics--research-methodology-with-an-overview-on-clinical-research.pdf">https://www.ijdr.com/articles/biostatistics--research-methodology-with-an-overview-on-clinical-research.pdf</a>
<b>References Books</b>	1. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam, 2. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a> datatab.net
<b>Videos</b>	You tube

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	3	1	-	-	-	-	2	-	2	1	1
CO2	2	1	1	2	3	1	-	-	-	-	2	-	1	1	1
CO3	3	1	1	1	3	1	-	-	-	-	2	-	1	1	1
CO4	2	1	1	1	3	1	-	-	-	-	1	-	-	1	2
CO5	2	1	1	2	3	1	-	-	-	-	1	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Syllabus-2023-2024

(SOP)(BPharm)

<b>Title of the Course</b>	Social and Preventive Pharmacy
<b>Course Code</b>	BP802T

### Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					3	1	0	4
<b>Course Type</b>	Theory only							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>				<b>Co-Requisite/s</b>				
<b>Course Outcomes &amp; Bloom's Level</b>	<p><b>CO1-</b> To understand the concept of health and health education. <b>(BL2-Understand)</b></p> <p><b>CO2-</b> To create awareness about various preventive measures of stated communicable and non-communicable diseases. <b>(BL2-Understand)</b></p> <p><b>CO3-</b> To apply the knowledge of national health programmes mentioned in real world to serve the society. <b>(BL2-Understand)</b></p> <p><b>CO4-</b> To evaluate the health and pharmacy related problems in societal perspective. <b>(BL5-Evaluate)</b></p> <p><b>CO5-</b> To demonstrate the impact of socio-cultural factors and urbanization on health. <b>(BL3-Apply)</b></p>							
<b>Courses Elements</b>	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✓ Gender ✓ Human Values ✓ Environment ✗		<b>SDG (Goals)</b>	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG12(Responsible consumption and production) SDG15(Life on land) SDG17(Partnerships for the goals)				

## Part B

Modules	Contents	Pedagogy	Hours
UNIT 1	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 2	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 3	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	10
UNIT 4	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	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	08
UNIT 5	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.	Lecture based learning, interactive class, Peer tutorial, Class using ICT tool/PPT/white board	07

## Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Nukkad Natak Program on Awareness of woman hygiene	Field work	BL3-Apply	4

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	75	38	25	13
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

## Part E

<b>Books</b>	1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications 2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
<b>Articles</b>	Research in Social and Administrative Pharmacy, Elsevier, Ireland
<b>References Books</b>	1. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications 2. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS. 3. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad
<b>MOOC Courses</b>	<a href="https://nptel.ac.in/">https://nptel.ac.in/</a>
<b>Videos</b>	<a href="https://www.youtube.com/watch?v=pF8zYdLAeKM">https://www.youtube.com/watch?v=pF8zYdLAeKM</a>

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	3	3	1	-	1	-	1	3	1
CO2	2	-	-	-	-	3	3	3	1	-	1	-	1	2	1
CO3	3	-	-	-	-	3	2	3	1	-	1	-	1	3	1
CO4	2	1	-	-	-	3	2	2	-	-	2	-	1	2	1
CO5	2	-	-	1	-	3	2	1	-	-	-	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## Syllabus-2023-2024

### (SOP)(BPharm)

<b>Title of the Course</b>	Project Work
<b>Course Code</b>	BP813PW

#### Part A

Year	4th	Semester	8th	Credits	L	T	P	C
					0	0	6	6
<b>Course Type</b>	Project							
<b>Course Category</b>	Discipline Core							
<b>Pre-Requisite/s</b>					<b>Co-Requisite/s</b>			
<b>Course Outcomes &amp; Bloom's Level</b>	<b>CO1-</b> To understand Review literature ( <b>BL2-Understand</b> ) <b>CO2-</b> To apply knowledge into practical manner ( <b>BL3-Apply</b> ) <b>CO3-</b> To write and present thesis work ( <b>BL3-Apply</b> ) <b>CO4-</b> To design the drug product by using principles of Quality by Design( <b>BL6-Create</b> ) <b>CO5-</b> To choose optimization technique in the development of pharmaceutical drug product.( <b>BL3-Apply</b> )							
<b>Courses Elements</b>	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		<b>SDG (Goals)</b>	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)				

#### Part B

Modules	Contents	Pedagogy	Hours
1	1. The area of the project shall directly relate any one of the elective subject opted by the students 2. All the students shall undertake a project under the supervision of a teacher and submit a report. 3. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages). 4. The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). 5. Students shall be evaluated in groups for four hours (i.e., about half an hour for a group of five students). 6. The projects shall be evaluated as per the criteria given below.	PBL	150

#### Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	As per supervisor's instructions	PBL	BL2-Understand	10

## Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
150	75	100	50	50	25

## Part E

<b>Books</b>	As per Given Topic
<b>Articles</b>	As per Given Topic <a href="https://www.sciencedirect.com/search">https://www.sciencedirect.com/search</a> NCBI/Pubmed Library
<b>References Books</b>	As per Given Topic
<b>MOOC Courses</b>	NA
<b>Videos</b>	As per Given Topic

## Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	1	0	0	-	-	1	-	1	0	1
CO2	2	1	2	3	2	1	0	0	-	-	2	-	1	0	1
CO3	2	1	2	3	2	1	0	0	-	-	1	-	1	0	2
CO4	3	2	2	-	1	-	-	-	-	-	1	-	3	3	1
CO5	3	3	1	-	1	1	-	-	-	-	2	-	-	-	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

