Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

For

Bachelor of Pharmacy

Semester-II

(Effective from the session: 2019-20)

Faculty of Pharmacy,
Shri Rawatpura Sarkar University, Raipur

Bachelor of Pharmacy
Semester-II
Examination Scheme
(Effective from the session: 2019-20)

SCHEME OF TEACHING AND EXAMINATION
Table-I: Course of study for semester II

Sr. No.	Subject Code	Name of the Course with PCI code	Internal assessment								End semester exams			Total Marks
			TA	Sessional exams			Teaching hours per week			Credit				
				CT	Duration	Total								
							L	T	P		Marks		Duration	
1	BPH201T	Human Anatomy and Physiology II-Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
2	BPH202T	Pharmaceutical Organic Chemistry I-Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
3	BPH203T	Biochemistry-Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
4	BPH204T	Pathophysiology-Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
5	BSCPH205T	Computer Applications in Pharmacy *-Theory	10	15	1 Hr	25	2	1		3	50	25	2 Hrs	75
6	BSCPH206T	Environmental Studies-Theory	10	15	1 Hr	25	2	1		3	50	25	2 Hrs	75
7	BPH201P	Human Anatomy and Physiology II-Practical	05	10	4 Hrs	15			4	2	35	15	4 Hrs	50
8	BPH202P	Pharmaceutical Organic Chemistry I-Practical	05	10	4 Hrs	15			4	2	35	15	4 Hrs	50
9	BPH203P	Biochemistry- Practical	05	10	4 Hrs	15			4	2	35	15	4 Hrs	50
10	BSCPH205P	Computer Applications in Pharmacy- Practical *	05	05	2 Hrs	10			2	1	15	10	2 Hrs	25
			80	125	20 Hrs	205	Credits: 29				520		30 Hrs	**725**

* The subject experts at college level shall conduct examinations.

Bachelor of Pharmacy
Semester-II
2023-24

B. PHARMACY SEMESTER II SYLLABUS

<table>
<tr><td>Course Title</td><td colspan="6">Human Anatomy and Physiology II-Theory</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH201T</td><td colspan="2">Total theory periods : 45 Hrs</td><td colspan="2">Total Tutorial periods : 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td colspan="2">Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td colspan="2">Minimum of class tests to be conducted : 02</td></tr>
<tr><td>Prerequisites</td><td colspan="6">Human Anatomy and Physiology I studied in previous class</td></tr>
<tr><td>Course objectives</td><td colspan="6">Upon completion of this course the student should be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.

2. Describe the various homeostatic mechanisms and their imbalances.

3. Identify the various tissues and organs of different systems of human body.

4. Appreciate coordinated working pattern of different organs of each system</td></tr>
<tr><td>Course Contents</td><td colspan="6">Unit I

• Body fluids and blood 10 hours

• Body fluids, composition and functions of blood, hemopoeisis, formation of haemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticule endothelial system.

• Lymphatic system</td></tr>
</table>

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

Unit II **10 hours**

- **Cardiovascular system**

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

Unit III **06 hours**

- **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.

- **Respiratory system**

Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration

Unit IV **10 hours**

- **Respiratory system**

Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

- **Urinary system**

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

	Unit V **09 hours** • **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
Course outcomes	1. Students would have studied about the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body. Learn about visual activity, sense, auditory, differential WBC etc. 2. They would have studied in detailed about energy and metabolism. 3. Students would able to identify the various organs of different systems of human body.
Text books	1. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A. 2. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata 3. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brother's medical publishers, New Delhi.
Reference books	1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York. 2. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA. 1. 3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,

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	Riverview, MI USA

Course Title	**Pharmaceutical Organic Chemistry I-Theory**					
Course Code	**BPH202T**				**Total theory periods : 45 Hrs**	**Total Tutorial periods : 15**
Course Credits	**L**	**T**	**P**	**Credits**	**Total marks in the end semester : 75**	
	3	**1**		**4**	**Minimum of class tests to be conducted : 02**	
Prerequisites	**Basic common fundamental studied in pharmaceutical chemistry in diploma in pharmacy**					
Course objectives	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. identify/confirm the identification of organic compound					
Course Contents	General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences **UNIT-I** **07** **Hours**					

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- **Classification, nomenclature and isomerism**

Classification of Organic Compounds Common and IUPAC systems of nomenclature of ganic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural omerism's in organic compounds

UNIT-II **10 Hours**

- **Alkanes*, Alkenes* and Conjugated dienes***

SP3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP2 hybridization in alkenes

E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E_1 verses E_2 reactions, Factors affecting E_1 and E_2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement.

UNIT-III **10 Hours**

- **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, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

UNIT-IV **10 Hours**

- **Carbonyl compounds* (Aldehydes and ketones)**

	Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde. **UNIT-V** **08 Hours** • **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
Course outcomes	Understand the preparation, properties, general reaction and mechanism of basic reactions like substitution, elimination, addition etc. To perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration, etc
Text books	1. Organic Chemistry by P.L.Soni 2. Practical Organic Chemistry by Mann and Saunders. 3. Vogel's text book of Practical Organic Chemistry
Reference books	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.

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<table>
<tr><td>Course Title</td><td colspan="5">Biochemistry-Theory</td></tr>
<tr><td>Course Code</td><td colspan="3">BPH203T</td><td>Total theory periods : 45 Hrs</td><td>Total Tutorial periods : 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td colspan="2">Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td colspan="2">Minimum of class tests to be conducted : 02</td></tr>
<tr><td>Prerequisites</td><td colspan="5">Basic fundamental studied in previous chemistry & diploma course</td></tr>
<tr><td>Course objectives</td><td colspan="5">Upon completion of course student shell able to
1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.</td></tr>
<tr><td></td><td colspan="5">UNIT I 10 Hours
• 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
UNIT II 10 Hours
• 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</td></tr>
</table>

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Course Contents	**UNIT III** **10 Hours** • **Lipid metabolism** β-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 (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice • **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 **UNIT IV** **08 Hours** • **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 **UNIT V** **07 Hours** • **Enzymes** 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

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	Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions.
Course outcomes	1. Understand the knowledge of biochemical reactions and pathways and efficiency diseases, structures functions of DNA and RNA. 2. To acquire knowledge in qualitative and quantitative estimation of the biological macromolecules. 3. To know the interpretation of data emanating from a Clinical Test Lab. 4. To know how physiological conditions influence the structures and re -activities of biomolecules. 5. To understand the basic principles of protein and polysaccharide structure.
Text books	1. Textbook of Biochemistry by Rama Rao. 2. Textbook of Biochemistry by Deb. 3. Outlines of Biochemistry by Conn and Stumpf 4. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
Reference books	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. 4. Biochemistry by D. Satyanarayan and U.Chakrapani.

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Bachelor of Pharmacy
Semester-II
2023-24

Course Title	**Pathophysiology-Theory**					
Course Code	**BPH204T**				**Total theory periods : 45 Hrs**	**Total Tutorial periods : 15**
Course Credits	**L**	**T**	**P**	**Credits**	**Total marks in the end semester : 75**	
	3	**1**		**4**	**Minimum of class tests to be conducted : 02**	
Prerequisites	**Anatomy and physiology detailed studied in previous HAP**					
Course objectives	Upon completion of the subject student shall be able to – 1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases; and 3. Mention the complications of the diseases.					
Course Contents	**Unit I** 10 Hours • **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 **Unit II** 10 Hours • **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 . **Unit III** 10 Hours • **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, and stroke, psychiatric disorders:						

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	depression, schizophrenia and Alzheimer's disease. • **Gastrointestinal system:** Peptic Ulcer **Unit IV** 08 Hours • 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 **Unit V** 07 Hours • **Infectious diseases:** Meningitis,Typhoid, Leprosy, Tuberculosis Urinary tract infections • **Sexually transmitted diseases:** AIDS, Syphilis, Gonorrhea
Course outcomes	1. Describe the etiology and pathogenesis of the selected disease states 2. Knowledge of signs and symptoms of the diseases 3. Identify the complications of the diseases. 4. Know most commonly encountered pathophysiological state(s) and/or disease mechanism(s), as well as any clinical testing requirements
Text books	1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014. 2. William and Wilkins, Baltimore; 1991 [1990 printing].
Reference books	1. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010. 2. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011. 3. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;

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Bachelor of Pharmacy
Semester-II
2023-24

<table>
<tr><td>Course Title</td><td colspan="6">Computer Applications in Pharmacy-Theory</td></tr>
<tr><td>Course Code</td><td colspan="2">BSCPH205T</td><td colspan="2">Total theory periods : 30 Hrs</td><td colspan="2">Total Tutorial periods : 10</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td colspan="2">Total marks in the end semester : 50</td></tr>
<tr><td>2</td><td>1</td><td></td><td>3</td><td colspan="2">Minimum of class tests to be conducted : 02</td></tr>
<tr><td>Prerequisites</td><td colspan="6">Basic common fundamental studied in higher secondary education</td></tr>
<tr><td>Course objectives</td><td colspan="6">Upon completion of the course the student shall be able to
1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy</td></tr>
<tr><td>Course Contents</td><td colspan="6">UNIT – I 06 hours
Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One’s complement ,Two’s complement method, binary multiplication, binary division
Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project
UNIT –II
06 hours
Web technologies :Introduction to HTML, XML,CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database
UNIT – III 06 hours
Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring
Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System
UNIT – IV 06 hours
Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery
UNIT-V 06 hours
Computers as data analysis in Preclinical development: Chromatographic dada analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMS)</td></tr>
<tr><td>Course outcomes</td><td colspan="6">1. Design and develop solutions to analyze pharmaceutical problems using computers.
2. Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities</td></tr>
</table>

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	3. Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.
Text books	1. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA) 2. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath –Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002
Reference books	1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330. 2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA

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Bachelor of Pharmacy
Semester-II
2023-24

<table>
<tr><td>Course Title</td><td colspan="5">Environmental Studies-Theory</td></tr>
<tr><td>Course Code</td><td colspan="4">BSCPH206T</td><td>Total theory periods : 30 Hrs</td><td>Total Tutorial periods : 10</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>Details</td><td colspan="2" rowspan="2">Total marks in the end semester : 50
Minimum of class tests to be conducted : 02</td></tr>
<tr><td>2</td><td>1</td><td></td><td>3</td></tr>
<tr><td>Prerequisites</td><td colspan="6">Basic common knowledge studied in higher secondary education</td></tr>
<tr><td>Course objectives</td><td colspan="6">Upon completion of the course the student shall be able to
1. Create the awareness about environmental problems among learners
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with nature.</td></tr>
<tr><td>Course Contents</td><td colspan="6">Unit-I
The Multidisciplinary nature of environmental studies
Natural Resources
Renewable and non-renewable resources:
Unit-II
Natural resources and associated problems
a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.
Unit-III
Ecosystems
Concept of an ecosystem.
Structure and function of an ecosystem.
Unit-IV
Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
Unit- V
Environmental Pollution: Air pollution; Water pollution; Soil pollution</td></tr>
<tr><td>Course outcomes</td><td colspan="6">1. This program shall create awareness about environmental problems; develop an attitude towards of concern for the environment.</td></tr>
</table>

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	2. Students gain knowledge about Enivronmental conditions, hazards,contaminants and their analysis.
Text books	**Recommended Books (Latest edition):** 1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner. 2. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India, 3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
References books	1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore 2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p 3. Clark R.S., Marine Pollution, Clanderson Press Oxford.

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Bachelor of Pharmacy
Semester-II
2023-24

Course Title	**Human Anatomy and Physiology II -Practical**				
Course Code	**BPH201P**				**Total Practical periods : 04 Hrs / week**
Course Credits	**L**	**T**	**P**	**Credits**	**Total marks in the end semester : 35**
			4	**2**	
Prerequisites	**Student must have Basic knowledge of different system of body**				
Course objectives	Upon completion of this course the student should be able to: 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 4. Appreciate coordinated working pattern of different organs of each system				
Course Contents	Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject**.** 1. Introduction to haemocytometer. 2. Enumeration of white blood cell (WBC) count 3. Enumeration of total red blood corpuscles (RBC) count 4. Determination of bleeding time 5. Determination of clotting time 6. Estimation of haemoglobin content 7. Determination of blood group. 8. Determination of erythrocyte sedimentation rate (ESR). 9. Determination of heart rate and pulse rate. 10. Recording of blood pressure. 11. Determination of tidal volume and vital capacity. 12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens. 13. Recording of basal mass index . 14. Study of family planning devices and pregnancy diagnosis test. 15. Demonstration of total blood count by cell analyser 16. Permanent slides of vital organs and gonads.				
Course outcomes	1. Students would have studied about the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body. Learn about visual activity, sense, auditory, differential WBC etc. 2. They would have studied in detailed about energy and metabolism.				

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	3. Students would able to identify the various organs of different systems of human body.
Text books	1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview,MI USA. 2. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brother's medical publishers, New Delhi.
Reference books	1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York.

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Bachelor of Pharmacy
Semester-II
2023-24

Course Title	**Pharmaceutical Organic Chemistry I -Practical**				
Course Code	**BPH202P**				**Total Practical periods : 04 Hrs / week**
Course Credits	**L**	**T**	**P**	**Credits**	**Total marks in the end semester : 35**
			4	**2**	
Prerequisites	**Basic details studied in previous II sem. Pharmaceutical Organic Chemistry**				
Course objectives	Upon completion of the course the student shall be able to 1. write the structure, name and the type of isomerism of the organic compound 2. write the reaction, name the reaction and orientation of reactions 3. account for reactivity/stability of compounds, 4. identify/confirm the identification of organic compound				
Course Contents	Systematic qualitative analysis of unknown organic compounds like 1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc. 2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test 3. Solubility test 4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides. 5. Melting point/Boiling point of organic compounds 6. Identification of the unknown compound from the literature using melting point/ boiling point.				
Course Contents	7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boil 8. Minimum 5 unknown organic compounds to be analysed systematically. 9. Preparation of suitable solid derivatives from organic compounds 10. Construction of molecular models.				
Course outcomes	Understand the preparation, properties, general reaction and mechanism of basic reactions like substitution, elimination, addition etc. To perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration, etc				

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Text books	1. Organic Chemistry by Morrison and Boyd 2. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl. 3. Organic Chemistry by P.L.Soni 4. Practical Organic Chemistry by Mann and Saunders.
Reference books	1. Organic Chemistry by I.L. Finar , Volume-I 2. Vogel's text book of Practical Organic Chemistry

Course Title	**Biochemistry -Practical (BP209P)**				
Course Code	**BPH203P**				**Total Practical periods : 04 Hrs / week**
Course Credits	**L**	**T**	**P**	**Details**	**Total marks in the end semester : 35**
			4	**2**	
Prerequisites	**Basic fundamental studied in previous chemistry & diploma course**				
Course objectives	Upon completion of course student shell able to 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.				
Course Contents	1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch) 2. Identification tests for Proteins (albumin and Casein) 3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)				

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	4. Qualitative analysis of urine for abnormal constituents 5. Determination of blood keratinises. 6. Determination of blood sugar 7. Determination of serum total cholesterol 8. Preparation of buffer solution and measurement of pH 9. Study of enzymatic hydrolysis of starch 10. Determination of Salivary amylase activity 11. Study the effect of Temperature on Salivary amylase activity. 12. Study the effect of substrate concentration on salivary amylase activity.
Course outcomes	1. Understand the knowledge of biochemical reactions and pathways and efficiency diseases, structures functions of DNA and RNA. 2. To acquire knowledge in qualitative and quantitative estimation of the biological macromolecules. 3. To know the interpretation of data emanating from a Clinical Test Lab. 4. To know how physiological conditions influence the structures and re -activities of biomolecules. 5. To understand the basic principles of protein and polysaccharide structure.
Text books	1. Biochemistry by Stryer. 2. Biochemistry by D. Satyanarayan and U.Chakrapani 3. Textbook of Biochemistry by Rama Rao. 4. Textbook of Biochemistry by Deb.
Reference books	1. Principles of Biochemistry by Lehninger. 2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.

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Course Title	**Computer Applications in Pharmacy-Practical (BP210P)**				
Course Code	**BSCCPH 205P**				**Total Practical periods : 02 Hrs / week**
Course Credits	**L**	**T**	**P**	**Credits**	**Total marks in the end semester : 15**
			2	**1**	
Prerequisites	**Basic common knowledge studied in higher secondary education**				
Course objectives	Upon completion of the course the student shall be able to 1.know the various types of application of computers in pharmacy 2.know the various types of databases 3.know the various applications of databases in pharmacy				
Course Contents	1. Design a questionnaire using a word processing package to gather information about a particular disease. 2. Create a HTML web page to show personal information. 3. Retrieve the information of a drug and its adverse effects using online tools 4. Creating mailing labels Using Label Wizard , generating label in MS WORD 5. Create a database in MS Access to store the patient information with the required fields Using access 6. Design a form in MS Access to view, add, delete and modify the patient record in the database 7. Generating report and printing the report from patient database 8. Creating invoice table using – MS Access 9. Drug information storage and retrieval using MS Access 10. Creating and working with queries in MS Access 11. Exporting Tables, Queries, Forms and Reports to web pages 12. Exporting Tables, Queries, Forms and Reports to XML pages				
Course outcomes	1. Design and develop solutions to analyze pharmaceutical problems using computers. 2. Integrate and apply efficiently the contemporary IT tools to all Pharmaceutical related activities 3. Solve and work with a professional context pertaining to ethics, social, cultural and regulations with regard to Pharmacy.				
Text books	1. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA) 2. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath –Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi 110002				

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Reference books	1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330. 2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Inter science, A John Willey and Sons, INC., Publication, USA

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