Teaching & Examination Scheme and Syllabus of B. Pharm. Programme

Semester-II

Nirma University
Institute of Pharmacy
Teaching & Examination Scheme *(B.Pharm)*

Semester - II

Sr. No.	Course Code	Course Title	Teaching Scheme				Examination Scheme				
			L	LPW/PW	T	C	Duration		Component Weightage		
							SEE	LPW/PW	CE	LPW/PW	SEE
1	BP201T	Human Anatomy and Physiology II – Theory	3	-	1	4	3.0	-	0.25	-	0.75
2	BP207P	Human Anatomy and Physiology II –Practical	-	4	-	2	-	4	0.30	0.70	-
3	BP202T	Pharmaceutical Organic Chemistry I – Theory	3	-	1	4	3.0	-	0.25	-	0.75
4	BP208P	Pharmaceutical Organic Chemistry I– Practical	-	4	-	2	-	4	0.30	0.70	-
5	BP203T	Biochemistry – Theory	3	-	1	4	3.0	-	0.25	-	0.75
6	BP209P	Biochemistry – Practical	-	4	-	2	-	4	0.30	0.70	-
7	BP204T	Pathophysiology – Theory	3	-	1	4	3.0	-	0.25	-	0.75
8	BP205T	Computer Applications in Pharmacy – Theory *	3	-	-	3	-	-	1.00	-	-
9	BP210P	Computer Applications in Pharmacy – Practical*	-	2	-	1	-	2	-	1.00	-
10	BP206T	Environmental sciences – Theory *	3	-	-	3	-	-	1.00	-	-
		Total	**18**	**14**	**4**	**29**					
			32								

*** Non University Examination (NUE)**

L: *Lectures*, P/T: *Practicals/Tutorial*, C: *Credits*

LPW: *Laboratory / Project Work*

SEE: *Semester End Examination*

CE: *Continuous Evaluation*

Appendix – A
AC mtg. – 27.09.17
Noti. No. NU-131

w.e.f. academic year 2017-2018

NIRMA UNIVERSITY
Institute of Pharmacy

(B. Pharm)
(Semester - II)

L	T	P	C
3	1	-	4

Course Code	**BP201T**
Course Title	**Human Anatomy and Physiology II – Theory**

Scope:

This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives:

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

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

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Identify the structure, location of cell, tissues, muscles and various organs of the body.
2. Explain the anatomy, physiology and functions of cardiovascular, digestive, respiratory and reproductive system.
3. Outline the concepts of genetics.
4. Summarize the roles and functions of body fluids, blood and lymph.
5. Discuss various feedback mechanisms and regulation of physiological processes.
6. Perform hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc. and also record blood pressure, heart rate, pulse and respiratory volume.

Syllabus: **Teaching hours: 45 Hours**

UNIT I **10 Hours**

Body fluids and blood:

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

Lymphatic system:

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

UNIT 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.

UNIT IV **10 Hours**

Respiratory system:

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

Urinary system:

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

UNIT 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.

Tutorials: **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

Suggested Readings^: (Latest Edition)

1. Sembulingam, K. Sembulingam, P. *Essentials of Medical Physiology*. New Delhi. Jaypee Brother's Medical Publishers.
2. Wilson, K.J.W. *Anatomy and Physiology in Health and Illness*. New York. Churchill Livingstone.
3. Best and Tailor. *Physiological basis of Medical Practice*. MI USA. Williams & Wilkins Co. Riverview.
4. Guyton, A.C, Hall J.E, Miamisburg, O.H. *Text book of Medical Physiology*. U.S.A. Elsevier Saunders.
5. Tortora G, Palmetto, G.A. *Principles of Anatomy and Physiology*. U.S.A. John Wiley & sons.
6. Singh I. *Textbook of Human Histology*. New Delhi, Jaypee Brother's Medical Publishers.
7. Ghai, C.L. *Textbook of Practical Physiology*. New Delhi. Jaypee Brother's Medical Publishers.
8. Srinageswari, K., Sharma, R. *Practical workbook of Human Physiology*. New Delhi. Jaypee Brother's Medical Publishers.
9. Gandhi, T.P. et. al. *Human Anatomy, Physiology & Health Education*. B.S.Shah Prakashan, Ahmedabad.
10. Goyal, R.K. et al.: *Practical Anatomy Physiology and Biochemistry*. B.S. Shah Prakashan, Ahmedabad.

L= Lecture, T= Tutorial, P= Practical, C= Credit

^this is not an exhaustive list

(B. Pharm)
(Semester - II)

L	T	P	C
-	-	4	2

Course Code	**BP207P**
Course Title	**Human Anatomy and Physiology II – Practical**

Syllabus: **Total Hours: 60 Hours**

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 hemocytometry.
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 hemoglobin 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, Human spirometer.
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.

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(B. Pharm)
(Semester - II)

L	T	P	C
3	1	-	4

Course Code	**BP202T**
Course Title	**Pharmaceutical Organic Chemistry I - Theory**

Scope:

This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

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 Learning Outcomes (CLO):

After successful completion of the course, student will be able to -

1. Remember IUPAC rules for nomenclature of organic compounds.
2. Understand basic concepts of organic chemistry.
3. Discuss concept of reactivity for the possible chemical reactions.
4. Draw reaction, reaction mechanism and explain orientation of reactions.
5. Identify unknown organic compound.

Syllabus: **Teaching hours: 45 Hours**

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**

Classification, nomenclature and isomerism:

Classification of Organic Compounds

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

UNIT II **10 Hours**

Alkanes*, Alkenes*, Alkynes* and Conjugated dienes*:

SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins

Stabilities of alkenes, SP^2 hybridization in alkenes

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

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

UNIT III **10 Hours**

Alkyl halides*:

S_N1 and S_N2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations

SN_i versus S_N2 reactions, Factors affecting S_N1 and S_N2 reactions

Structure and uses of ethyl chloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform

Alcohols*:

Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, Isopropyl 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

Tutorials: **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus.

Suggested Readings^: (Latest edition)

1. Morrison, R. T., Boyd, R. N. *Organic Chemistry*. Prentice Hall, Inc., USA.
2. Finar, I. L. Organic Chemistry, Vol. I, ELBS.
3. Bahl, B. S. *Text Book Of Organic Chemistry {For B. Sc. Students}*. S. Chand And Company Ltd Ram Nagar; New Delhi.
4. March, J. *Advanced organic chemistry: reactions, mechanisms, and structure*. John Wiley & Sons,.
5. Soni, P. L. *Fundamental organic chemistry*. New Delhi: S. Chand.
6. Mann, F. G., & Saunders, B. C. *Practical organic chemistry*. London: Longman.
7. Solomons, T. W., Fryhle, C. B., & Johnson, R. G. *Organic chemistry*. New York: Wiley.
8. Ahluwalia, V. K. *Organic Reaction Mechanism*. New Delhi: Ane Books India.
9. Mann, F. G. *Practical organic chemistry*. Pearson Education India.
10. Vishnoi, N. K. *Advanced practical organic chemistry*. Vikas Publishing House Pvt. Limited.
11. Pavia, D. L. *Introduction to organic laboratory techniques: a small scale approach*. Cengage Learning.
12. Gurudeep, C. R., & Gurudeep, C. R. *Reaction Mechanism and Reagents in Organic Chemistry*. Bombay: Himalaya Publsihing House.
13. Furniss, B. S. *Vogel's textbook of practical organic chemistry*. Pearson Education India.

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(B. Pharm)
(Semester - II)

L	T	P	C
-	-	4	2

Course Code	**BP208P**
Course Title	**Pharmaceutical Organic Chemistry I - Practical**

Syllabus: **Teaching hours: 60 Hours**

1. Systematic qualitative analysis of unknown organic compounds like
   a. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
   b. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
   c. Solubility test

d. Functional group test like Phenols, Amides/Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.

e. Melting point/Boiling point of organic compounds

f. Identification of the unknown compound from the literature using melting point boiling point.

g. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.

h. Minimum 5 unknown organic compounds to be analysed systematically.

2. Preparation of suitable solid derivatives from organic compounds
3. Construction of molecular models

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(B. Pharm)
(Semester - II)

L	T	P	C
3	1	-	4

Course Code	**BP203T**
Course Title	**Biochemistry - Theory**

Scope:

Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

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 Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. Understand the general principles of biochemistry.
2. Discuss the basic metabolic pathways and mechanisms in biological energy transduction.

3. Report the biochemical reactions and calculate the bioenergetics of energy yielding biochemical reactions.
4. Describe the structure and function of biomolecules and their roles in energy transduction.
5. Discuss the consequences of a variety of metabolic and genetic diseases.
6. Identify the enzyme catalyzed reactions in the body with its kinetics.

Syllabus: **Teaching hours: 45 Hours**

UNIT I **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 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

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

UNIT IV **10 Hours**

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 V **07 Hours**

Enzymes and Vitamin:

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 including design of new drugs.
Coenzymes –Structure and biochemical functions.
Details of Vitamin.

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus.

Suggested Readings^: (Latest Editions)

1. Nelson, D. L., Lehninger, A. L., & Cox, M. M. *Lehninger principles of biochemistry*. Macmillan.
2. Murray, R. K., Granner, D. K., Mayes, P., & Rodwell, V. *Harper's illustrated biochemistry*. New York: McGraw-Hill.
3. Berg, J. M., Tymoczko, J. L., & Stryer, L. *Biochemistry*. New York: WH Freeman.
4. Satyanarayan, U. & Chakrapani, D. *Biochemistry*. India: Elsevier.
5. Rama Rao, A. V. S., & Devlin, T. M. *Textbook of Biochemistry: For Medical Students*. UBS publishers.
6. Deb, A. C., *Fundamentals of biochemistry*. New Central Book Agency (P) Limited.
7. Conn, E., & Stumpf, P. *Outlines of biochemistry*. John Wiley & Sons.
8. Gupta, R.C. & Bhargava, S. *Practical Biochemistry*. CBS Publishers & Distributors Pvt. Ltd
9. Mu, P., & Plummer, D. T. *Introduction to practical biochemistry*. Tata McGraw-Hill Education.
10. Rajagopal, G. & Ramakrishna S. *Practical Biochemistry for Medical Students*. orient blackswan
11. Varley, H. *Practical clinical biochemistry*. London: William Heine-mann Medical Books, Ltd.

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^this is not an exhaustive list

(B. Pharm)
(Semester - II)

L	T	P	C
-	-	4	2

Course Code	BP209P
Course Title	Biochemistry - Practical

Syllabus: **Teaching hours: 60 Hours**

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

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(B. Pharm)
(Semester - II)

L	T	P	C
3	1	-	4

Course Code	BP204T
Course Title	Pathophysiology – Theory

Scope:

Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

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 Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Recall the basic principles of Cell injury and Adaptation.
2. Understand pathophysiology of cardiovascular diseases, respiratory diseases, and renal disorders.
3. Explain hematological diseases, diseases of endocrine system, nervous system and gastrointestinal system.
4. Summarize about inflammatory disorders, liver disorders and disorders of bones and joints.
5. Discuss about pathophysiology of cancer.
6. Elaborate upon infectious diseases including sexually transmitted diseases.

Syllabus: **Teaching hours: 45 Hours**

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 B_{12} and folic acid), sickle cell anemia, thalassemia, 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, inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.

UNIT IV **8 Hours**

Disease of bones and joints:

Rheumatoid arthritis, osteoporosis and gout.

Pathophysiology of cancer:

Classification, etiology and pathogenesis of cancer.

Diseases of Genitourinary system:

Disorders of bladder and ureter, infertility.

UNIT V **7 Hours**

Infectious diseases:

Meningitis, Typhoid, Leprosy, Tuberculosis, Urinary tract infections.

Sexually transmitted diseases:

AIDS, Syphilis, Gonorrhea.

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus.

Suggested Readings^: (Latest Edition)

1. Kumar, V., Abbas, A. K., Fausto, N., & Aster, J. C. *Robbins and Cotran Pathologic Basis of Disease*, Professional Edition E-Book. Elsevier Health Sciences.
2. Mohan, H. *Textbook of pathology* (pp. 280-283). New Delhi: Jaypee Brothers Medical Publishers.
3. Laurence B, Bruce C, Bjorn K. *Goodman Gilman's The Pharmacological Basis of Therapeutics*. New York; McGraw-Hill.
4. Best and Tailor. *Physiological basis of Medical Practice*. MI USA, Williams & Wilkins Co, Riverview.
5. Walker, B. R., Colledge, N. R. *Davidson's Principles and Practice of Medicine*. E-Book. Elsevier Health Sciences.
6. Hall, J. E. Guyton and Hall. *Textbook of Medical Physiology*. E-Book. Elsevier Health Sciences.
7. Dipiro, J.T., Talbert, R.L., Yee, G.C., Matzke, G.R. Wells, B.G., Posey, M.L. *Pharmacotherapy: A Pathophysiologic Approach*. New York: Mc Graw Hills Publishers.
8. Robbins, S. L., Kumar, V., Cotran, R. S. *Robbins Basic Pathology*. Philadelphia, USA, Saunders.
9. Walker, R., & Edwards, C. *Clinical Pharmacy and Therapeutics*. Churchil Livingstone. London.
10. Sylvia, P. A., Wilson, L. M., et al. *Pathophysiology: Clinical Concepts of Disease Processes*. Elsevier Science Publishers.
11. Bullock B. A., Henze R. L. *Focus on Pathophysiology*. Lippincott Williams & Wilkins. Philadelphia.

Recommended Journals

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

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(B. Pharm)
(Semester - II)

L	T	P	C
3	-	-	3

Course Code	**BP205T**
Course Title	**Computer Applications in Pharmacy - Theory**

Scope:
This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Objectives:
Upon completion of the course the student shall be able to-
1. Know 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 Learning Outcomes (CLO):
At the end of the course, students will be able to -

1. Understand various types of computer applications in pharmacy.
2. Describe various types of databases.
3. Discuss various applications of databases in pharmacy.
4. Explain concepts of bioinformatics.
5. Identify the role of computers in data analysis.

Syllabus: **Teaching hours: 45 Hours**

UNIT I **09 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 **09 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 **09 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 **09 Hours**

Bioinformatics:

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

UNIT V **09 Hours**

Computers as data analysis in Preclinical development:

Chromatographic dada analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS).

Suggested Readings^: (Latest Edition)

1. Fasset, W. E. *Computer Application in Pharmacy*. South Washington Square, USA: Lea and Febiger.
2. Ekins, S. *Computer Applications in Pharmaceutical Research and Development*. USA: Wiley-Interscience.
3. Rastogi, S.C. *Bioinformatics-Concept, Skills and Applications*. New Delhi, CBS Publishers & Distributors.
4. Prague, C.N. *Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath*. New Delhi, Wiley Dreamtech India (P) Ltd.

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(B. Pharm)
(Semester - II)

L	T	P	C
-	-	2	1

Course Code	**BP210P**
Course Title	**Computer Applications in Pharmacy - Practical**

Syllabus: **Teaching hours: 30 Hours**

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.

L- Lecture, T- Tutorial, P= Practical, C= Credit

(B. Pharm)
(Semester - II)

L	T	P	C
3	--	--	3

Course Code	**BP206T**
Course Title	**Environmental sciences - Theory**

Scope:

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

Objectives:

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

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

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Define various natural resources.
2. Identify the renewable and non-renewable resources.
3. Describe the concepts of ecosystems.
4. Discuss the structure and function of various ecosystems.
5. Explain various types of environmental pollution.

Syllabus: **Teaching hours: 45 Hours**

UNIT I **15 Hours**

The Multidisciplinary nature of environmental studies.
Natural Resources.
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

UNIT II **15 Hours**

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

UNIT III **15 Hours**

Environmental Pollution: Air pollution; Water pollution; Soil pollution.

Suggested Readings^: (Latest edition)

1. Singh, Y.K. *Environmental Science*. Bangalore, New Age International Pvt, Publishers.
2. Agarwal, K.C. *Environmental Biology*. Bikaner, Nidhi Publ. Ltd.
3. Bharucha, E. *The Biodiversity of India*. Ahmedabad, Mapin Publishing Pvt. Ltd.
4. Brunner, R.C. *Hazardous Waste Incineration*. McGraw Hill Inc.
5. Clark, R.S. *Marine Pollution*. Oxford, Clanderson Press.
6. Cunningham, W.P., Cooper, T.H., Gorhani, E & Hepworth, M.T. *Environmental Encyclopedia*. Mumbai, Jaico Publ. House.
7. De, A.K. *Environmental Chemistry*. New Delhi, Wiley Eastern Ltd.
8. *Down to Earth*, Centre for Science and Environment. New Delhi.

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^this is not an exhaustive list