

**MRSPTU B.Sc. MEDICAL LABORATORY SCIENCE SYLLABUS 2016 BATCH
ONWARDS**

(Approved in 1st MRSPTU Standing Committee of Academic Council on 20.12.2016)

B.Sc. MEDICAL LABORATORY SCIENCE (1st YEAR)

Total Contact Hours = 28

Total Marks = 800

Total Credits = 24

| SEMESTER 1 st | | Contact Hrs | | | Marks | | | Credits |
|--------------------------|--|-------------|----------|----------|------------|------------|------------|-----------|
| Subject Code | Subject Name | L | T | P | Int. | Ext. | Total | |
| BMLS1-101 | Cell Biology & Human Genetics | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-102 | Haematology & Haematological Techniques- I | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-103 | Microbiology | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-104 | Human Anatomy & Physiology- I | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-105 | Basics of Biochemistry | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-106 | Microbiology Lab | 0 | 0 | 4 | 60 | 40 | 100 | 2 |
| BMLS1-107 | Haematology & Haematological Techniques- I Lab | 0 | 0 | 2 | 60 | 40 | 100 | 1 |
| BMLS1-108 | Basics of Biochemistry Lab | 0 | 0 | 2 | 60 | 40 | 100 | 1 |
| Total | Theory = 5 Labs = 3 | 20 | 0 | 8 | 380 | 420 | 800 | 24 |

B. Sc. MEDICAL LABORATORY SCIENCES (1ST Year)

Total Contact Hrs. = 24

Total Marks = 700

Total Credits= 21

| SEMESTER 2 nd | | Contact Hrs | | | Marks | | | Credits |
|--------------------------|--|-------------|----------|----------|------------|------------|------------|-----------|
| Subject Code | Subject Name | L | T | P | Int. | Ext. | Total | |
| BMLS1-209 | Systematic Bacteriology | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-210 | Haematology & Haematological Techniques- II | 3 | 0 | 0 | 40 | 60 | 100 | 3 |
| BMLS1-211 | Biochemical Metabolism | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-212 | Human Anatomy & Physiology- II | 4 | 0 | 0 | 40 | 60 | 100 | 4 |
| BMLS1-213 | Environmental Sciences | 3 | 0 | 0 | 40 | 60 | 100 | 3 |
| BMLS1-214 | Systematic Bacteriology Laboratory | 0 | 0 | 4 | 60 | 40 | 100 | 2 |
| BMLS1-215 | Haematology & Haematological Techniques- II Laboratory | 0 | 0 | 2 | 60 | 40 | 100 | 1 |
| Total | Theory = 5 Lab = 2 | 18 | 0 | 6 | 320 | 380 | 700 | 21 |

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CELL BIOLOGY & HUMAN GENETICS

Subject Code: BMLS1-101

L T P C

Duration: 45 Hrs.

4 0 0 4

Learning Objectives

To make aware the students regarding various cell organelles and their functioning with special stress on human chromosome.

UNIT-I (9 Hrs)

Cell as a Basic Unit of Living Systems: Cell Theory. Prokaryotic and Eukaryotic Cell, Eukaryotic Cell – Shape Size, Volume, and Number. Broad Classification of Cell Types: Pplos, Bacteria, Plant and Animal Cells. A Detail Classification of Cell Types within an Organism. Cell, Tissue, Organ and Organisms at Different Levels of Organization

UNIT-II (11 Hrs)

Structure and Functions of Cell Organelles: Ultra Structure of Cell Membranes, Cytosol, Golgi bodies, Endoplasmic Reticulum (Rough and Smooth), Ribosome, Cytoskeletal Structure (Actins, Microtubule etc.), Mitochondria, Chloroplasts, Lysosomes, Peroxisomes, and Nucleus (Nuclear Membrane, Nucleoplasm, Nucleolus and Chromatin). Cell Division, Cell Cycle and Cell Growth.

UNIT-III (12 Hrs)

Nature of Genetic Material: Nucleic Acids, DNA Replication, Mendelian Laws of Inheritance, Gene Interaction. Sex Determination in Plants and Animals. Sex Linkage, Non-Disjunction as a Proof of Chromosomal Theory of Inheritance. Linkage Mapping of Genes, Interference, Coincidence in Prokaryotes and Eukaryotes.

UNIT-IV (13 Hrs)

Chromosome: Chemical Composition: Structural Organization of Chromatids, Centromeres, Chromatin, Telomeres, Nucleosomes, Euchromatin and Heterochromatin. Special Types of Chromosomes (E.G. Polytene and Lampbrush Chromosomes); Mutations; Spontaneous and Induced; Chemical and Physical Mutagens, Banding Patterns in Human Chromosome, Structural and Numerical Changes in Chromosomes, Hereditary Defects. Extra-Chromosomal Inheritance, Sex-Linked Inheritance in Humans, Mutation at Phenotypic Level, Biochemical Level and Molecular Level. Gene Frequencies in Population, Hardy-Weinberg Law.

Recommended Books

1. E.D.P. De Robertis., E.M.F. Jr. De Robertis, 'Cell and Molecular Biology', 8th Edn., Lea & Febiger Publishers.
2. H.F. Lodish, A. Berk, C.A. Kaiser, M. Krieger, M.P. Scott, 'Molecular Cell Biology', 6th Edn., W.H. Freeman & Co.
3. P.K. Gupta, 'Genetics', Rastogi Publications, 2007.
4. R.J. Brooker, 'Genetics Analysis and Principles', Jim Green, 1999.

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HEMATOLOGY & HEMATOLGICAL TECHNIQUES-I

Subject Code: BMLS1- 102

L T P C

Duration: 45 Hrs

4 0 0 4

Learning Objectives

To introduce regarding various components of blood, their functions and techniques for their study.

UNIT-I (10 Hrs)

Introduction to Haematology: Definition, Importance, Important Equipment Used, Lab safety and Instrumentation, Blood, its Components Formation (Erythropoiesis, Leucopoiesis, Thrombopoiesis), Composition, Function.

UNIT-II (9 Hrs)

Anticoagulants, Preservation of Blood: Various Anticoagulants, Their Uses, Mode of Action, Their Merits and Demerits, Collection and Preservation of Blood for Various Haematological Investigations.

UNIT-III (15 Hrs)

Haematological Instrumentations: Clinical Significance, Errors involved in the Haemoglobinometry, Haemocytometry, Procedures for Cell Counts I.E. TLC, DLC, ESR, PCV/Haematocrit Value, Red Cell Indices (RCI), Absolute Eosinophil Count, Reticulocyte Count Platelet Counts (Visual as well as Electronic).

UNIT-IV (11 Hrs)

Blood Morphology & Staining's: Morphology of Normal Blood Cells and Their Identifications, Romanowsky's Dyes (Giemsa, Leishman, Wright's, Field's, Jsb)- Principle, Composition, Preparation and Procedure, Preparation of Blood Films- Types, Methods of Preparation), Thick and Thin Smear.

Recommended Books

1. K.L. Mukherjee, 'Med. Lab. Technology', Volume-I.
2. Paraful B. Godkar, 'Med. Lab. Technology'.
3. Ramnik Sood, 'Med. Lab. Technology Methods and Interpretation', 5th Edn.
4. Christopher A. Ludlam, 'Clinical Hematology'.
5. Ramnik Sood, 'Hematology for Students Practitioners'.
6. Stephen M. Robinson, 'Hematology (Pathophysiological basis for Clinical Practice)'.

MICROBIOLOGY

Subject Code: BMLS1- 103

L T P C

Duration: 45 Hrs

4 0 0 4

Learning Objectives

To introduce to the students regarding various kinds of microbes in terms of their structure, growth etc. & collection of clinical samples their processing and identification.

UNIT-I (13 Hrs)

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Introduction to Microbiology & Microscopy: Brief History of Microbiology- Louis Pasteur, Robert Koch, Joseph Lister, Edward Jenner, Characteristics of Bacteria and Fungi, Bright Field, Dark Field, Phase Contrast and Fluorescence and Electron Microscope, Gram, Negative, Spore and Acid- Fast Staining.

UNIT-II (11 Hrs)

Nutrition and Growth of Bacteria: Types of Nutritional Requirements, Types and Preparation of Culture Media, Bacteria Cell Division, Growth Phase, Batch and Continuous Culture, Growth of Aerobic and Anaerobic Bacteria.

UNIT-III (12 Hrs)

Principles and Method of Sterilization: Physical (Heat, Temperature, Radiation, Filtration) and Chemical Agents (Alcohol, Aldehyde, Halogens, Phenols, Gases) to Control Growth of Microbes.

UNIT-IV (9 Hrs)

Collection and Transportation of Specimens, Disposal of Laboratory/ Hospital Waste: General Principles, Collection, Transportation (Urine, Faeces, Sputum, Pus, Body Fluids, Swab and Blood), Non- Infectious Waste, Infected Sharp Waste Disposal, Infected Non-Sharp Waste Disposal.

Recommended Books

1. M.J. Jr., Pelczar, E.C.S., Chan and R. Krieg, 'Microbiology', McGraw Hill.
2. G.J. Tortora, B.R. Funke and C.L. Case, 'Microbiology-An Introduction', Benjamin Cummings.
3. B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsber, 'Microbiology', Harper & Row, Publishers.
4. R.Y. Stainer, J.L. Ingraham, M.L. Wheelis and P.R. Palmer, 'General Microbiology', MacMilan Press Ltd.

HUMAN ANATOMY & PHYSIOLOGY-I

Subject Code: BMLS1-104

**L T P C
4 0 0 4**

Duration: 45 Hrs.

Learning Objectives

Students will be able to learn the terminology of the subject and basic knowledge of cells, tissues, blood and to understand anatomy and physiology of human body.

UNIT-I (11 Hrs)

General Anatomy, Cell & Tissue: Introduction to Anatomical Terms and Organization of the Human Body, Structure, Classification and Function. Cell Division (Mitosis and Meiosis), Tissues Definitions, Types, Characteristics, Classification, Location, Functions and Formation.

UNIT-II (9 Hrs)

Systemic Anatomy: Musculoskeletal System: Bones – Types, Structure, Axial & Appendicular Skeleton. Bone Formation and Growth, Joints – Classification and Structure. Role of Ligaments, Cartilages.

UNIT-III (13 Hrs)

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Muscle & Respiratory System: Structure in Brief, Mechanism of Muscle Contraction, Isotonic and Isometric Contractions, Energy Sources of Muscle Contractions, Motor Unit, Components; Structure, Function and Mechanism of Respiration, Transport of Respiratory Gases, Lung Function Test. Definition of Various Terms Involved in Respiratory System, Methods of Artificial Respiration.

UNIT-IV (12 Hrs)

Blood, Cardiovascular & Lymphatic System: Haematocrit, ESR, Blood Volume Measurements. RBC, WBC & Platelet Counts, Developmental Stages and Fate of RBC. Functions of RBC, WBC and Platelets. Study of Blood Groups and Coagulation., Anatomy and Physiology of Heart, Cardiac Cycle, Heart Sounds, Definition and Measurements of Cardiac Output, Stroke Volume, ECG – Methods of Recording and ECG Waves. Normal Values of Blood Pressure, Heart Rate and Their Regulation in Brief, Gross and Microscopic Structure of Lymphatic Tissue and Function.

Recommended Books

1. Ross and Wilson, 'Anatomy & Physiology'.
2. Clark, 'Anatomy and Physiology: Understanding the Human Body'.
3. Evelyn Pearce, 'Anatomy and Physiology for Nurses'.
4. Sears, 'Anatomy and Physiology for Nurses'.
5. 'Anatomy and Physiology for Nurses', Pearson.

BASICS OF BIOCHEMISTRY

Subject Code: BMLS1-105

L T P C

Duration: 45 Hrs.

4 0 0 4

Learning Objectives

The main objective of the subject is to impart the knowledge of apparatus, units, equipment's, and volumetric analysis in the laboratory of clinical Biochemistry.

UNIT-I (11 Hrs)

Introduction to Medical Laboratory Technology: Study of Medical Laboratory Technologies, Ethics and Ethical Responsibilities, Safety Measures (First Aid and Emergency Treatment).

UNIT-II (9 Hrs)

Cleaning, Care of Glassware & Equipment, Distilled Water: Preparation of Washing Reagents and Solutions for Cleaning of Soda Lime and Borosil Glasses, Types of Distilled Water, Preparation and Storage.

UNIT-III (13 Hrs)

Units of Measurements, Measurements of Volumes and Analytical Balance: S. I. Units, Measurements of Volume, Volumetric Apparatus (Pipettes, Flasks, Cylinders) and their Calibrations, Principle, Working and Maintenance of Balance.

UNIT-IV (12 Hrs)

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Concept of pH, Standard Solution Preparations, Osmosis: Definition of pH, Henderson–Hassel Balch Equation, Principle, Working, Maintenance & Calibration of pH Meter, Mole Concept, Molar and Normal Solutions Preparations; Definition of Osmosis, Dialysis, Types of Osmosis, Factor affecting of Osmotic Pressure, Applications of Osmosis & Dialysis.

Recommended Books

1. U. Satyanaryna, U. Chkrapani, ‘Biochemistry’, 4th Edn., Elsevier.
2. D.L. Nelson, L.A. Lehninger, M. Cox, M., Lehninger ‘Principles of Biochemistry’, 5th Edn., W.H. Freeman.
3. P.B. Godkar and D.P. Godkar, ‘Text Book of Medical Laboratory Technology’ Volume 1 and 2’, 3rd Edn., Bhalani.
4. M.K. Sateesh, ‘Bioethics and Biosafety’, I. K. International Pvt. Ltd.
5. K. Wilson and J. Walker, ‘Principles and Techniques of Biochemistry and Molecular Biology’, 7th Edn., Cambridge University Press.
6. D.T. Plummer, ‘An Introduction to Practical Biochemistry’, 3rd Edn., Tata- McGraw- Hill,
7. J.B. Yadav, ‘Practical Physical Chemistry’, Krishna’s Educational Publishers.

MICROBIOLOGY LABORATORY

Subject Code: BMLS1-106

L T P C

Duration: 36 Hrs.

0 0 4 2

1. Introduction to Use of Different Laboratory Instruments and Their Safety Precautions.
2. To Demonstrate the Working & Handling of Compound Microscope.
3. Washing, Cleaning and Sterilization Glassware.
4. Media Preparation and Sterilization.
5. To Prepare Working Dilution of Commonly Used Disinfectants.
6. To Demonstrate Aerobic Culture.
7. To Demonstrate of Anaerobic Culture.

Recommended Books

1. G. James, G. Cappuccino and Natalie Sherman, ‘Microbiology: A Laboratory Manual’, Benjamin Cummings.
2. K.R. Aneja, ‘Experiments in Microbiology, Plant Pathology and Biotechnology’, New Age Publishers.

HEMATOLOGY & HEMATOLOGICAL TECHNIQUES- I LABORATORY

Subject Code: BMLS1-107

L T P C

Duration: 24 Hrs

0 0 2 1

1. Demonstration of equipment used in clinical field: Microscope, Blood cell, counter, Sahil’s apparatus, calorimeter.
2. Hb Estimation: Sahil’s methods, Cyanmethahaemoglobin, Oxyhaemoglobin methods.
3. TLC, DLC, platelet and Reticulocyte, Absolute Eosinophil counts.
4. Preparation of smear and staining with Giemsa and Leishman stain.

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5. Calculation of Red Cell Indices (RCI).
6. Packed cell volume (Macro and Micro methods).
7. ESR (Wintrobe and Westergren methods).

Recommended Books

1. K.L. Mukherjee, 'Med. Lab. Technology', Volume-I.
2. Paraful B. Godkar, 'Lab. Technology'.
3. Ramnik Sood, 'Med. Lab. Technology Methods and Interpretation', 5th Edn.
4. Christopher A. Ludlam, 'Clinical Hematology'.
5. Ramnik Sood, 'Hematology for Students Practitioners'.
6. Stephen M. Robinson, 'Hematology (Pathophysiological Basis for Clinical Practice)'.

BASICS OF BIOCHEMISTRY LABORATORY

Subject Code: BSMLT-108

**L T P C
0 0 2 1**

Duration: 24 Hrs

1. Methods of Cleaning of the Laboratory Glassware.
2. Distillation of The Water.
3. Principle, Working & Maintenance of pH Meter.
4. Principle, Working & Maintenance Analytical Weighing Balance.
5. To Prepare 0.1N NaOH Solution
6. To Prepare 0.2N HCl Solution.
7. To Prepare 0.2N H₂SO₄ and 0.2M Na₂CO₃ Solution.
8. Demonstration of Osmosis and Dialysis.

Recommended Books

1. P.B. Godkar and D.P. Godkar 'Text Book of Medical Laboratory Technology', volume 1 & 2, 3rd Edn., Bhalani.
2. D.T. Plummer, 'An Introduction to Practical Biochemistry', 3rd Edn., Tata-McGraw- Hill.
3. K. Wilson, J. Walker, 'Principles and Techniques of Biochemistry and Molecular Biology', 7th Edn., Cambridge University Press.
4. J.B. Yadav, 'Practical Physical Chemistry', Krishna's Educational Publishers.

SYSTEMATIC BACTERIOLOGY

Subject Code: BMLS1-209

**L T P C
4 0 0 4**

Duration: 45 Hrs.

Learning Objectives

Students will learn the morphology cultural characteristics, biochemical characteristics & laboratory diagnosis of various bacteria.

UNIT-I (5 Hrs)

Staining Techniques in Bacteriology: Principle, Procedures and Interpretation

Simple, Negative, Gram, Albert's, Ziehl-Nelsen, Capsule, Flagella and Spore stainings.

UNIT-II (16 Hrs)

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Biochemical Tests for the Identification of Different Bacteria

Catalase, Coagulase, Indole, Methyl Red, Voges Proskauer, Urease, Citrate, Oxidase, TSIA, Nitrate reduction, Carbohydrate fermentation, H₂S production, Decarboxylases, CAMP.

UNIT-III (10 Hrs)

Morphology, Culture Characteristics, Pathogenesis and Laboratory Diagnosis of the Gram Positive Bacteria

Staphylococci, Streptococci, Corynebacteria, Mycobacteria, Clostridium.

UNIT-IV (14 Hrs)

Morphology, Culture Characteristics, Pathogenesis and Laboratory Diagnosis of the Gram Negative Bacteria

Pseudomonas, Enterobacteriaceae: Escherichia, Klebsiella, Citrobacter, Enterobacter, Proteus, Salmonella, Shigella, Yersinia; Neisseria, Vibrio, Mycoplasma, Rickettsia & Chlamydia.

Recommended Books

1. James G. Cappuccino and Natalie Sherman, 'Microbiology: A Laboratory Manual', Benjamin Cummings.
2. K.R. Aneja, 'Experiments in Microbiology, Plant Pathology and Biotechnology', New Age Publishers.
3. M. Cheesbrough, 'District Laboratory Practice in Tropical Countries', Cambridge University Press.
4. R. Ananthanarayan, C.K.J. Panikar, 'Textbook of Microbiology', 6th Edn., Orient Longman Private Limited.

HEMATOLOGY & HEMATOLOGICAL TECHNIQUES-II

Subject Code: BMLS1-210

L T P C

Duration: 36 Hrs

3 0 0 3

Learning Objectives

To understand the detailed aspects of blood and its coagulation behaviour.

UNIT-I (6 Hrs)

Blood Group Systems

History and discovery of blood group system; ABO and Rhesus blood group system; Compatibility tests in blood transfusion, complications and hazards of blood transfusion.

UNIT-II (8 Hrs)

Hemoglobin Studies

Hemoglobin, its synthesis, functions and degradation; Hemoglobin, pigments and their measurements; Abnormal hemoglobin's, their identification and estimation.

UNIT-III (10 Hrs)

Blood Coagulation

Hemostatic mechanism and theories of blood coagulation; Classification and physio-chemical properties of coagulation factors.

UNIT-IV (12 Hrs)

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Blood Coagulation Reagents and Procedures

Preparation and standardization of various coagulation; Screening coagulation procedures such as Bleeding and clotting time, Hess test, prothrombin time (PT) and Activated Partial Thromboplastin time (APTT).

Recommended Books

1. Paraful B. Godkur, 'Text Book of Med. Lab. Technology'.
2. V.H. Talib, 'Hand Book of Med. Lab. Technology', 2nd Edn.
3. J.B. Dacie, 'Med. Lab. Tech. Methods and Interpretation', Practical Hematology.
4. Christopher A. Ludlam, 'Clinical Haematology'.
5. G.A. McDonald, 'Atlas of Hematology'.
6. Stephen M. Robinson, Hematology (Pathophysiological basis for clinical practice 3rd Edn.).

BIOCHEMICAL METABOLISM

Subject Code: BMLS1-211

**L T P C
4 0 0 4**

Duration: 45 Hrs.

Learning Objectives

To introduce the students regarding various pathways of metabolism of carbohydrates, lipids, proteins, amino acids and to relate these with body functions.

UNIT-I (12 Hrs)

Carbohydrates

Outline of Glycolysis, TCA, and Gluconeogenesis, Glycogen metabolism (glycogenesis, glycogenolysis, glycogen storage diseases, and hormone regulation), biomedical importance of HMP, GTT and its regulation.

UNIT-II (11 Hrs)

Lipids

β fatty acid oxidation along with inborn errors, fatty acid synthesis, Cholesterol synthesis, catabolism & regulation, brief about atherosclerosis, Lipoproteins, ketosis, lipid peroxidation and role of antioxidants.

UNIT-III (13 Hrs)

Amino Acids

Oxidative and nonoxidative deamination, transamination and decarboxylation, transamination, transport and function of ammonia, urea cycle, metabolism of specialized products like glycine, phenylalanine, tyrosine, tryptophan, methionine, cysteine, histidine and branched chain amino acids, creatine metabolism.

UNIT-IV (9 Hrs)

Nucleic acids, Enzymes and Vitamins

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Types of nucleic acids, functions, importance of nucleosides and nucleotides, properties and classification of enzymes, Factor affecting the enzymes activity, applications of enzymes, concept of water soluble & fat soluble vitamins.

Recommended Books

1. U. Satyanaryana, U. Chkrapani, 'Biochemistry', 4th Edn., Elsevier.
2. D.L. Nelson, L.A. Lehninger, M. Cox, M., Lehninger, 'Principles of Biochemistry', 5th Edn., W.H. Freeman.
3. J.M. Berg, J.L. Tymoczko, L. Stryer, 'Biochemistry', 5th Edn., W.H. Freeman.
4. D. Voet, J.G. Voet, 'Biochemistry', 4th Edn., John Wiley & Sons.

HUMAN ANATOMY & PHYSIOLOGY- II

Subject Code: BMLS1-212

L T P C

Duration: 45 Hrs.

4 0 0 4

Learning Objectives

Students will be able to learn the terminology of the subject and basic knowledge of the cell structure and function of organs, organ systems and body fluids in normal human body.

UNIT-I (11 Hrs)

Body Fluids

Important terms, types of body fluid, total body water, avenues by which water leaves and enters body, general principles for fluid balance, cardinal principle, how body fluids maintain Homeostasis, Electrolytes & ions Function of electrolytes, how electrolyte imbalance leads to fluid imbalance

UNIT-II (9 Hrs)

Digestive System

Structure & Function (Mouth, Tongue, Teeth, Oesophagus, Pharynx, Stomach, Intestine, Rectum, Anus; Digestive glands; physiology of digestion of carbohydrates, lipids & proteins, Structure and function of liver.

UNIT-III (13 Hrs)

Genitourinary System

Structure & function of kidney; structure of Nephron; physiology of excretion & mechanism of urine formation; renal function test Structure and Gametogenesis of male and female reproductive system; menstrual cycle

UNIT-IV (12 Hrs)

Nervous & Endocrine System

Structure of neuron, nerve impulse; structure & function of brain & spinal cord, Spinal & Cranial nerves; all & none principal, role of neurotransmitters in transmission of nerve impulse, Structure & Functions of different types of glands, their location, secretions and metabolic disorders

Recommended Books

1. Ross and Wilson, 'Anatomy & Physiology.

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2. Clark, 'Anatomy and Physiology: Understanding the Human Body'.
3. Pearce, 'Human Anatomy for Nurses'.

ENVIRONMENTAL SCIENCES

Subject Code: BMLS1-213

L T P C

Duration: 36 Hrs.

3 0 0 3

Learning Objectives

To impart knowledge concerned with those aspects of human behaviour which are more directly related to man's interaction with bio-physical environment and ability to understand the pollution and environmental degradation.

UNIT-I (10 Hrs)

Ecosystem Inter- relationship

Basic concepts, components of ecosystem, Trophic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, energy efficiencies, Importance of gaseous and sedimentary cycles; Carbon, Nitrogen, Phosphorus and Sulphur Cycles, Global Oxygen Cycles, Hydrological cycles.

UNIT-II (8 Hrs)

Natural Resources & Sustainable Management

Water resources; Surface water and ground water, watershed management, water harvesting, Land resources; Land use pattern, eco generation of wastelands, soil erosion and conservation, soil reclamation, The concept of sustainable development; Environmental degradation and conservation issue; Global change and sustainability issues.

UNIT-III (8 Hrs)

Environmental Pollution

Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management; Causes, effects and control measure of urban and industrial wastes.

UNIT-IV (10 Hrs)

Environmental Health Science & Toxicology

Concept of toxins, toxicity and toxicology, Classification of toxic compounds, Dose effect and Dose response relationship, levels of toxicity – acute, sub-acute and chronic, Types of toxicants, classification of toxicants – factors that affect environmental concentration of toxicants, Chemical and biological factors influencing toxicity, physiological responses of man to relevant stresses in the environment, industrial toxicology and its relationship with occupation and hygiene and also diseases.

Recommended Books

1. D.B. Botkin and E.A. Keller, 'Environment Science: Earth as a Living Planet', 3rd Edn., John Wiley and Sons Inc.
2. D.K. Asthana, M. Asthana, 'A Text Book of Environmental Studies', S. Chand & Co., 2006.

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3. L.G. Cockerham and B.S. Shane, 'Basic Environmental Toxicology', CRC Press, Boca Raton, USA.
4. J.P. Shukla and Pandey, 'Elements of Toxicology', Radha Publications, New Delhi.
5. I. Sethi, 'Environmental Pollution Causes, Effects & Control', Neha Publishers & Distributors.

SYSTEMATIC BACTERIOLOGY LABORATORY

Subject Code: BMLS1-214

L T P C

Duration: 36 Hrs.

0 0 4 2

1. Demonstration of staining procedures: Simple Stain

- a) Negative stain
- b) Gram stain
- c) Albert's stain
- d) Ziehl-Nelsen stain
- e) Capsule stain
- f) Flagella stain
- g) Spore stain

2. Demonstration of Biochemical Test: Catalase

- a) Coagulase
- b) Indole
- c) Methyl Red
- d) Voges Proskauer
- e) Urease
- f) Citrate
- g) Oxidase
- h) TSIA
- i) Nitrate reduction
- j) Carbohydrate fermentation
- k) H₂S production
- l) Decarboxylases
- m) CAMP

3. Morphology, culture characteristics of commonly bacterial isolates: Escherichia coli, Enterobacter aerogenes, Staphylococcus aureus, Klebsiella pneumoniae, vibrio.

Recommended Books

1. James G. Cappuccino and Natalie Sherman, 'Microbiology: A Laboratory Manual', Benjamin Cummings.
2. K.R. Aneja, 'Experiments in Microbiology, Plant Pathology and Biotechnology', New Age Publishers.
3. M. Cheesbrough, 'District Laboratory Practice in Tropical Countries', Cambridge University Press.

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4. J.G. Collee, A.G. Fraser, B.P. Marimon, A. Simmons, 'Mackie & McCartney Practical Medical Microbiology', 4th Edn., Churchill Livingstone.

HEMATOLOGY & HEMATOLOGICAL TECHNIQUES- II LABORATORY

Subject Code: BMLS1-215

L T P C

Duration: 24 Hrs.

0 0 2 1

1. To measure the levels of Met, Carboxy and Sulpha-haemoglobin
2. To determine PT, PTI, INR and APTT of the given sample
3. To determine platelet, count of the given sample using phase contrast microscope
4. To prepare the following in lab: Thromboplastin, Cephalin, Thrombin, M/u Calc2 and Kaolin solution.

Recommended Books

1. Paraful B. Godkur, 'Text Book of Med. Lab. Technology'.
2. V.H. Talib, 'Hand Book of Med. Lab. Technology', 2nd Edn.
3. J.B. Dacie, 'Med. Lab. Tech. Methods and Interpretation', Practical Hematology.
4. Christopher A. Ludlam, 'Clinical Hematology'.
5. G.A. McDonald, 'Atlas of Hematology'.
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