GURU KASHI UNIVERSITY

Diploma in Medical Laboratory Technology

Session: 2022-23

Department of Paramedical Sciences

Program Learning Outcomes (POs: After completion of the program, the student will be able to:

- Demonstrate conceptual knowledge in hematology, coagulation, clinical chemistry, immunology, immunohematology, pathogenic microbiology and phlebotomy.
- Demonstrate professional conduct and interpersonal communication skills with patients, laboratory personnel, other health care professionals, and the public.
- Competently perform laboratory procedures in all areas of the clinical laboratory (i.e. Hematology, Coagulation, Urinalysis, Phlebotomy, Serology, Microbiology, Chemistry, and Immunohematology).
- Apply systematized problem solving techniques to identify and correct procedural errors, identify instrument malfunctions and seek proper supervisory assistance, and verify the accuracy of laboratory results obtained.
- Perform within the guidelines of the code of ethics of the Indian Society for Clinical Laboratory Science, the Indian Society of Clinical Pathologists, and the restrictions established by state and local regulatory authorities.
- Scope for the graduates is in the designations like R&D contractual lab assistant, junior technical executive etc. in hospital and research organizations.
- Students will learn about bio molecules, their source, classification, function and physiological importance of carbohydrate, protein and lipid etc.
- They can able to know about principle of sero-diagnostic tests like precipitation flocculation, agglutination, neutralization and coagulation etc.

Semester: 1st							
Sr. No.	Course Code	Course Name	Type of Course	L	T	P	No. of Credits
1	DML101	Introductory Biology	T	3	1	0	4
2	DML102	Basic Chemistry	T	3	1	0	4
3	DML103	General Microbiology	T	3	1	0	4
4	DML104	Elementary Physics	T	3	1	0	4
5	DML105	Introductory Biology (Practical)	P	0	0	4	2
6	DML106	Basic Chemistry (Practical)	P	0	0	4	2
7	DML107	General Microbiology (Practical)	P	0	0	4	2
8	DML108	Elementary Physics (Practical)	P	0	0	4	2
			Total	12	4	16	24

Semester: 2nd							
Sr.	**Course Code**	**Course Name**	**Type of Course**				**No. of Credits**
				L	**T**	**P**	
1	**DML201**	**Basic Principal of Biochemistry**	**T**	**3**	**1**	**0**	**4**
2	**DML202**	**Basic Haematology**	**T**	**3**	**1**	**0**	**4**
3	**DML203**	**Basics of Clinical Microbiology**	**T**	**3**	**1**	**0**	**4**
4	**DML204**	**Human Physiology and Health Education**	**T**	**3**	**1**	**0**	**4**
5	**DML205**	**Basic Principal of Biochemistry (Practical)**	**P**	**0**	**0**	**4**	**2**
6	**DML206**	**Basic Hematology(Practical)**	**P**	**0**	**0**	**4**	**2**
7	**DML207**	**Basics of Clinical Microbiology(Practical)**	**P**	**0**	**0**	**4**	**2**
8	**DML208**	**Human Physiology and Health Education(Practical)**	**p**	**0**	**0**	**4**	**2**
Total No. of Credits							**24**

Semester: 3rd							
Sr.	**Course Code**	**Course Name**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
1	**DML301**	**Anatomy & Physiology-I**	**T**	**3**	**1**	**0**	**4**
2	**DML302**	**Basic Computers and Information Science**	**T**	**3**	**0**	**0**	**3**
3	**DML303**	**Introduction to Quality and Patient Safety**	**T**	**3**	**0**	**0**	**3**
4	**DML304**	**Principles of Management**	**T**	**3**	**1**	**0**	**4**
5	**DML305**	**English and Communication Skills**	**T**	**3**	**0**	**0**	**3**
6	**DML306**	**Anatomy & Physiology I (Practical)**	**P**	**0**	**0**	**4**	**2**
7	**DML307**	**Basic Computers and Information Science (Practical)**	**P**	**0**	**0**	**4**	**2**
8	**DML308**	**Introduction to Quality and Patient Safety (Practical)**	**P**	**0**	**0**	**4**	**2**
			Total	**15**	**2**	**12**	**23**

Semester: 4th							
Sr.	Course Code	Course Name	Type of Course	L	T	P	No. of Credits
1	DML401	Human Anatomy & Physiology-II	T	3	1	0	4
2	DML402	Medical Microbiology	T	3	0	0	3
3	DML403	Haematology	T	2	1	0	3
4	DML404	Clinical Biochemistry	T	2	1	0	3
5	DML405	Histopathology	T	2	1	0	3
6	DML406	Human Anatomy & Physiology-II Practical	P	0	0	2	1
7	DML407	Medical Microbiology Practical	P	0	0	3	2
8	DML408	Haematology Practical	P	0	0	4	2
9	DML409	Clinical Biochemistry Practical	P	0	0	4	2
10	DML410	Histopathology Practical	P	0	0	4	2
			Total	12	4	17	25

Semester: 5th							
Sr.	Course Code	Course Name	Type of Course	L	T	P	No. of Credits
1	DML501	Applied Bacteriology	T	2	1	0	3
2	DML502	Applied Hematology	T	2	1	0	3
3	DML503	Applied Clinical Biochemistry	T	2	1	0	3
4	DML504	Medical Parasitology & Virology	T	2	0	0	2
5	DML505	Immunohematology/ Blood Banking	T	2	0	0	2
6	DML506	Immuno-Pathology & Cytopathology	T	3	0	0	3
7	DML507	Applied Haematology Practical	P	0	0	4	2
8	DML508	Applied Clinical Biochemistry Practical	P	0	0	4	2
9	DML509	Medical Parasitology & Virology Practical	P	0	0	4	2
10	DML510	Immunohematology/ Blood Banking Practical	P	0	0	4	2
11	DML511	Immuno-Pathology & Cytopathology Practical	P	0	0	4	2
			Total	13	3	20	26

Semester 6th							
Sr.	Course Code	Course Name	Type of Course	L	T	P	No. of Credits
1	DML601	Professional Training/Internship (6 Months)	NA	NA	NA	NA	20
			Total	0	0	0	20

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]
    i. Surprise Test (Two best out of three) - (10 Marks)
    ii. Term paper (10 Marks)
    iii. Assignment(s) (10 Marks)
    iv. Attendance (5 marks)
B. Mid Semester Test-1: [30 Marks]
C. MST-2: [20Marks]
D. End-Term Exam: [20 Marks]

Evaluation Criteria for other courses has been given separately with the Respective courses

Semester-I

Course Title: Introductory Biology
Course code: DML101

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Basic Biological Concepts: Students will gain a foundational understanding of fundamental biological concepts, such as cell structure and function, genetics, evolution, ecology, and physiology.
2. Understanding of the Scientific Method: Students will be able to demonstrate an understanding of the scientific method and its application in biology. This includes the ability to formulate testable hypotheses, design and conduct experiments, collect and analyze data, and draw appropriate conclusions based on evidence.
3. Comprehension of Molecular and Cellular Processes: Students will understand the basic principles of molecular biology, including DNA structure and replication, gene expression, protein synthesis, and cellular processes such as respiration, photosynthesis, and cell division.
4. Collaboration and Communication: Students should develop skills in collaboration and communication, as biology often involves working in teams and effectively conveying scientific ideas and findings to peers and instructors.

Course Contents

UNIT 1 **12 Hours**

Biology & Its Branches; Scientific methods in Biology; Scope of biology and career options in Medical Laboratory Sciences

UNIT 2 **16 Hours**

Structure and function of tissues - epithelial, connective, muscular and nervous

UNIT 3 **16 Hours**

1. Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit; prokaryotic and eukaryotic cell; unicellular and multicellular organisms; Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (Fluid-Mosaic model); membrane transport; cellular movement (exocytosis, endocytosis); cell organelles and their functions- nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella, ribosomes

2. Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids (DNA and RNA), Cell division: Binary fission, Cell cycle: Mitosis, Meiosis

UNIT 4 **16 Hours**

1. Continuity of life - heredity, variation; Mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance.

2. Chromosomes - bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination; DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested Readings:

1. Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V. & Jackson, R.B. (2011). Campbell Biology (9th Edition). Pearson Benjamin Cummings Publishers, San Francisco, USA.

2. Fried, G.H. & Hademenos, G.J. (2002). Schaum's Biology. Tata McGraw Hill Publications, New Delhi.

Semester: I

Course Title: Basic Chemistry
Course code: DML102

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understanding of Atomic Structure: Students will gain an understanding of atomic structure, including the organization of subatomic particles (protons, neutrons, and electrons) and their impact on the properties of elements.
2. Knowledge of Chemical Bonding: Students should comprehend different types of chemical bonds (ionic, covalent, and metallic) and their formation. They should be able to explain how bonding influences the properties and reactivity of compounds.
3. Proficiency in Chemical Nomenclature: Students should be able to name and write chemical formulas for common elements, ions, and compounds. They should understand the rules and conventions used in chemical nomenclature.
4. Understanding of Stoichiometry: Students should grasp the concept of stoichiometry, including the mole concept, balancing chemical equations, and performing calculations involving quantities of substances.

Course Contents

UNIT 1 **14 Hours**

Solid State (Periods 12) Classification of solids based on different binding forces :molecular, ionic covalent and metallic solids, amorphous and crystalline solids(elementary idea),unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids ,number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals ,conductors, semiconductors and insulators and n and p type semiconductors .

UNIT 2 **17 Hours**

Solutions (Periods 12) Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapor pressure, Raoult's law , elevation 8 of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor.

UNIT 3 **16 Hours**

Electrochemistry (Periods 14) Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.
General Principles and Processes of Isolation of Elements (Periods 8) Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminum, copper, zinc and iron.

UNIT 4 **13 Hours**

Chemical Kinetics (Periods 12) Rate of a reaction (average and instantaneous), factors affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment).Activation energy, Arrhenius equation.
Surface Chemistry (Periods 8) Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis: homogenous and ids and

suspensions; lyophilic, lyophobic multi-molecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions – types of emulsions.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-I

Course Title: General Microbiology
Course code: DML103

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understanding of Microbial Diversity: Students should acquire knowledge about the diversity of microorganisms, including bacteria, viruses, fungi, and protozoa. They should be able to describe the characteristics, morphology, and classification of different microbial groups.
2. Knowledge of Microbial Structure and Function: Students should understand the structures and functions of microbial cells, including their organelles, cell walls, membranes, and genetic material. They should be able to explain how these structures contribute to microbial growth, metabolism, and reproduction.
3. Familiarity with Microbial Growth and Control: Students should learn about the factors that influence microbial growth, such as temperature, pH, nutrient availability, and oxygen requirements. They should understand the principles of microbial control, including sterilization methods, disinfectants, and antibiotics.
4. Knowledge of Microbial Genetics: Students should be familiar with the principles of microbial genetics, including DNA replication, transcription, translation, and gene regulation. They should understand genetic variation, mutation, and the mechanisms of horizontal gene transfer in microorganisms.

Course Contents

UNIT 1 **14 Hours**

Introduction to Microbiology
Definition, Brief history, importance of microbiology

UNIT 2 **16 Hours**

Structure of bacteria
Types of bacteria, Classification of bacteria on the basis of shapes, Anatomical structure of a bacterial cell including spores, flagella and capsules, Bacterial growth and nutrition of bacteria.

UNIT 3 **12 Hours**

Microscopy
1. Principle and care, working of Simple microscope and compound microscope

2. Sterilization - definition -By dry heat, Moist heat,
3. Autoclave & hot air oven- their structure, functioning, controls and sterilization,
4. Indicators
5. Radiation and filtration

Antiseptics and disinfectants.
Definitions, types, properties, use of disinfectants and antiseptics

UNIT 4 **18 Hours**

Bacterial culture and culture techniques
Inoculations of culture media, aerobic and anaerobic culture, isolation of pure and mixed cultures.

Staining techniques
Methods of smear preparation, Gram stain, Ziehl-Neelson's (ZN) stain, Albert's stain.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

RECOMMENDED BOOKS

1. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
2. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
3. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi
6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica
7. Cheesbrough; Cambridge University Press; UK
8. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
9. Text book of Medical Microbilogy by Cruckshiank Vol. I and II

Semester-I

Course Title: Elementary Physics
Course code: DML104

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Fundamental Laws: Students will acquire knowledge of fundamental laws and principles in physics, such as Newton's laws of motion, the laws of thermodynamics, and the laws of conservation of energy and momentum.
2. Understanding of Motion and Forces: Students will understand the concepts of motion, velocity, acceleration, and the relationships between forces and motion. They should be able to analyze and solve problems related to motion and forces, including linear motion, circular motion, and projectile motion.
3. Familiarity with Energy and Work: Students will grasp the concepts of energy, work, and power. They should understand different forms of energy (kinetic, potential, thermal, etc.), the principle of energy conservation, and the relationship between work and energy transfer.
4. Knowledge of Waves and Optics: Students will learn about the properties of waves, including wave types (mechanical and electromagnetic), wave behavior (reflection, refraction, diffraction), and wave phenomena (interference, standing waves). They should also understand the basic principles of optics, including the behavior of light, lenses, and mirrors.

Course Contents

UNIT 1 **15 Hours**

SI Units

1. Need for measurement: units of measurement, system of units SI units.
2. Fundamental and derived units, length and time measurements.

UNIT 2 **15 Hours**

Magnetic Effects of Current and Magnetism

1. Concept of magnetic field, Oersted's experiment, Biot- Savart law and its application

To current carrying circular loop.

2. Ampere's law and its applications to infinitely long, straight wire, straight and toroidal solenoids.

UNIT 3 **16 Hours**

Atoms & Nuclei

1. Alpha-particle scattering experiment, Rutherford's model of atom, Bohr model,

Energy levels. Hydrogen spectrum.

2. Composition and size of nucleus, atomic masses, isotopes, isobars, isotones Radioactivity-alpha, beta and gamma particles/rays and their properties, radioactive decay law.

3. Applications of radio activity.

UNIT 4 **14 Hours**

Optics

1. Reflection of light: spherical mirrors & its types.

2. Refraction of Light: lenses & its types.

3. Image formations, magnification & power of a lens, Refraction and dispersion of light through a prism.

4. Scattering of light-blue color of the sky and reddish appearance of the sun at sunrise and sunset.

5. Microscope & their Magnifying Powers

6. Photo chromatography

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Elementary Physics by Franklin Herman Ayres

2. Exercise in Elementary Physics by Charle R.

3. Particle Physics in Laboratory by Alexander & Studiniken

Semester-I

Course Title: Introductory Biology (Practical)
Course code: DML105

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Study of Mitosis and Meiosis through animal cells (Grasshopper).

2. Study of osmosis and diffusion.

3. Study of Epithelial, Muscle, Nerve and mammalian blood cells through permanent or temporary cells.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-I

Course Title: Basic Chemistry (Practical)
Course code: DML106

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Cleaning of the laboratory glass ware.

2. Preparation of distilled water

3. Principle, working and maintenance of pH meter.

4. To prepare 0.1 N NaoH solution.

5. To prepare 0.2N HCl solution.

6. To prepare 0.1 molar H2SO4

7. To prepare 0.2 Molar Sodium carbonate solution.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-I

Course Title: General Microbiology (Practical)
Course code: DML107

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware.
3. Sterilization by autoclave and hot air oven
4. Handling and use of compound microscope
5. Staining techniques: Gram, Albert's, Ziehl – Neelson's
6. Demonstration of motility (Hanging drop method)
7. Preparation and sterilization of various culture media (Nutrient agar, Nutrient Broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen Media
8. Aerobic and anaerobic culture methods
9. Antimicrobial susceptibility testing by Stokes disc diffusion method

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-I

Course Title: Elementary Physics (Practical)
Course code: DML108

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

Demonstration of-
1-Basic Physics
2-Sound
3-Heat
4-Fundamentals of Dc Circuits
5-Ac Circuits
6-Magnetic Circuits
7-Rectification

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-II

Course Title: Basic Principle of Biochemistry
Course code: DML201

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Biomolecules: Students should acquire knowledge about the structure, properties, and functions of biomolecules, including proteins, carbohydrates, lipids, and nucleic acids. They should understand the monomers, polymers, and the basic chemical reactions involved in their synthesis and degradation.
2. Understanding of Enzymes and Enzyme Kinetics: Students should grasp the principles of enzymology, including enzyme structure, mechanism of action, enzyme-substrate interactions, and factors influencing enzyme activity. They should be able to explain and analyze enzyme kinetics, including the concepts of Michaelis-Menten kinetics and enzyme inhibition.
3. Familiarity with Metabolism: Students should understand the basics of metabolic pathways, including glycolysis, Krebs cycle, and oxidative phosphorylation. They should be able to explain the principles of energy metabolism, including the generation and utilization of ATP, and the integration of different metabolic pathways.
4. Knowledge of Bioenergetics and Thermodynamics: Students should comprehend the principles of bioenergetics and thermodynamics as applied to biochemical reactions. They should understand concepts such as free energy, entropy, enthalpy, and their relationship to chemical reactions and equilibrium.

Course Contents

UNIT 1 **16 Hours**

Spectrophotometry and colorimetry

a) Introduction
b) Theory of spectrophotometry and colorimetry
c) Lambert`s law and Beer`s law
d) Applications of colorimetry and spectrophotometry

UNIT 2 **14 Hours**

Photometry

a) Introduction
b) General principles of flame photometry
c) Limitations of flame photometry
d) Instrumentation
e) Applications of flame photometry
f) Atomic absorption spectroscopy – Principle & applications

UNIT 3 **15 Hours**

Chromatography

Introduction, definition, types of chromatography

a) Paper Chromatography: Introduction, principle, types, details for qualitative and quantitative analysis, application

b) Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations, High performance thin layer chromatography

c) Column chromatography: Introduction, principle column efficiency, application of column chromatography

d) Gas chromatography: Introduction principle, instrumentation, application

UNIT 4 **15 Hours**

Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application

Gel Chromatography: Introduction Principle and method, application and advantages

Electrophoresis: Introduction, principle, Instrumentation, types of electrophoresis - paper and gel electrophoresis, application

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-II

Course Title: Basic Hematology
Course code: DML202

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Blood Components and Functions: Students will acquire knowledge about the components of blood, including red blood cells, white blood cells, platelets, and plasma. They should understand the functions of each component and their roles in maintaining homeostasis.
2. Understanding of Hematopoiesis: Students will grasp the process of hematopoiesis, including the production and maturation of blood cells in the bone marrow. They should be able to describe the differentiation of hematopoietic stem cells into various blood cell lineages.
3. Familiarity with Blood Cell Morphology: Students will learn to identify and differentiate various blood cell types based on their morphology, including red blood cells, white blood cells, and platelets. They should be able to recognize normal and abnormal blood cell morphology in peripheral blood smears.
4. Knowledge of Hemostasis and Coagulation: Students will understand the mechanisms of hemostasis and blood coagulation. They should be able to explain the role of platelets, clotting factors, and the coagulation cascade in preventing bleeding and maintaining vascular integrity.

Course Contents

UNIT 1 **10 Hours**

Introduction to Hematology:

(a) Definition (b) Importance (c) Important equipment used.

UNIT 2 **16 Hours**

Laboratory organization and safety measures in hematology Laboratory

UNIT 3 **17 Hours**

Introduction to blood, its composition, function and normal cellular components

Formation of cellular components of blood:

a) Erythropoiesis (b) Leucopoiesis (c) Thrombopoiesis
b) Collection and preservation of blood sample for various hematological investigations

Definition, principles & procedure, Normal values, Clinical significance, errors involved, means to minimize errors for the following: Hemoglobinometry, Total leucocytes count (TLC), Differential leucocytes count (DLC),

UNIT 4 **17 Hours**

Erythrocyte Sedimentation Rate (ESR), Packed cell volume/ Hematocrit value, Red cell Indices (RCI), Absolute Eosinophil count, Reticulocyte count, Platelet count

Preparation of blood Films: types. Methods of preparation (Thick and thin smear/ film)

Staining techniques in Hematology (Romanowsky's stains): Principle, composition, preparation of staining reagents and procedure of: Giemsa, Leishman, Wright's, Field's, JSB

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested Readings:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar

2. Medical laboratory Technology by KL Mukherjee Volume-I

3. Hematology for students Practitioners by RamnikSood

4. Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib

5. Hematology (International edition)EmmanuelC.BesaHarwal Publisher

6. Practical Hematology by JB Dacie

7. Practical Hematology (8th edition) by Sir John

8. Clinical Hematology by Christopher A. Ludlam

9. Clinical Diagnosis &Management by Laboratory methods (20th edition) by John bernardHenary

10. Medical Laboratory Technology Methods &Interpretation (5th edition) by RamnikSood Punjab Technical University B.Sc. Medical Laboratory Sciences, Batch 2011

11. Atlas of haematology(5th edition)by G.A. McDonald

12. A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach

13. Haematology (Pathophysiological basis for clinical practice) by Stephen M. Robinson

Semester-II

Course Title: Basics of Clinical Microbiology
Course code: DML203

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the fundamental principles of clinical microbiology: Students will gain a solid foundation in the basic concepts and principles of clinical microbiology, including the nature of microorganisms, their structure, function, growth, and classification.

2. Identify clinically significant microorganisms: Students will learn to identify the major groups of microorganisms that are commonly associated with human infections. This includes bacteria, viruses, fungi, and parasites, as well as their pathogenicity and mechanisms of infection.
3. Develop laboratory skills for microbial identification: Students will learn various laboratory techniques used in clinical microbiology to identify and characterize microorganisms. This may include staining methods, culture techniques, biochemical tests, and molecular diagnostic methods.
4. Understand the principles of antimicrobial susceptibility testing: Students will learn about the principles and methods used to determine the susceptibility of microorganisms to antimicrobial agents. This includes interpreting susceptibility test results and understanding the mechanisms of antimicrobial resistance.

Course Contents

UNIT 1 **10 Hours**

Introduction to Microbiology
Definition, Brief history, importance of microbiology

UNIT 2 **17 Hours**

Structure of bacteria

Types of bacteria, Classification of bacteria on the basis of shapes, Anatomical structure of a bacterial cell including spores, flagella and capsules, Bacterial growth and nutrition of bacteria.

UNIT 3 **16 Hours**

Microscopy –
1. Principle and care, working of Simple microscope and compound microscope
2. Sterilization - definition
- By dry heat,
- Moist heat,
- Autoclave & hot air oven- their structure, functioning, controls and sterilization indicators.
- By radiation and filtration

Antiseptics and disinfectants.

Definitions, types, properties, use of disinfectants and antiseptics

UNIT 4 **17 Hours**

Bacterial culture and culture techniques
Bacterial culture and culture techniques, Inoculations of culture media, aerobic and anaerobic culture, isolation of pure and mixed cultures.
Staining techniques
Methods of smear preparation, Gram stain, Ziehl-Neelson's (Z-N) stain, Albert's stain.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

RECOMMENDED BOOKS

1. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
2. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
3. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth –
4. Heinemann; Oxford
5. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani
6. Publishing House, Mumbai
7. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill,
8. New Delhi
9. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica
10. Cheesbrough; Cambridge University Press; UK
11. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman,
12. Hyderabad
13. Text book of Medical Microbilogy by Cruckshiank Vol. I and II

Semester-II

Course Title: Human Physiology and Health Education
Course code: DML204

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the fundamental principles of human physiology: Students will gain a comprehensive understanding of the major systems of the human body and their functions. This includes knowledge of the cardiovascular, respiratory, nervous, digestive, endocrine, immune, and musculoskeletal systems, among others.
2. Explain the interrelationships between different physiological systems: Students will learn how different physiological systems work together to maintain homeostasis and overall health. They will understand the interconnectedness of various body systems and how they influence each other.
3. Comprehend the physiological basis of health and disease: Students will gain knowledge of the physiological mechanisms underlying health and disease. They

will learn how disruptions in normal physiological processes can lead to the development of various health conditions and diseases.

4. Explore the impact of lifestyle factors on health: Students will understand the importance of lifestyle factors, such as nutrition, exercise, sleep, stress management, and substance abuse, in maintaining optimal health. They will learn how these factors can influence physiological processes and contribute to disease development.

Course Contents

UNIT 1 **16 Hours**

Introduction to human body, its anatomy and physiology Elementary tissues of body and their classification along with brief description.

1. Digestive System:

Organs of digestion, histology of the digestive organs (stomach, small intestine, liver, pancreas), Process of digestion, Absorption and assimilation of food

2. Respiratory System, Organs of respiration and their histology (lungs and trachea), Respiration (Definition and Mechanism)

UNIT 2 **14 Hours**

The skin (Structure and functions)

1. The excretory system, Organs of excretion (kidneys, ureter, bladder), Histology of kidney and its functions, Formation of urine and its composition, Structure of nephron
2. Circulatory system, Composition and functions of blood
3. The heart anatomy and physiology, the chambers of heart, various vessels and valves, Circulation of blood, The blood pressure, Arteries and veins, Lymph and lymphatic system

UNIT 3 **15 Hours**

Nervous System

1. Central nervous system (Brain and Spinal cord)
2. Peripheral nervous system (cranial and spinal nerves)
3. The reflex action and reflex arc
4. The transmission of nerve impulse
5. The sense organs (eye, ear, tongue and nose); structure and functions

UNIT 4 **15 Hours**

Muscular System

1. Brief description of skeletal, smooth and cardiac muscles, Muscular contraction, Muscle Fatigue, Some important muscles of body
2. Skeletal System- The skeleton, important bones and their brief description, Articulation of Bones - joints
3. Endocrine System- Short description of various endocrine glands and their functions

Reproductive System

Male and female reproductive system- Histology of Gonads, The ovarian cycle and ovulation

1. .

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Books

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

Anatomy and Physiology by N-Murgeshn, Fertilization, and Fertility control

Course Title: Basic Principle of Biochemistry (Practical)
Course code: DML205

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

a) To demonstrate the principle, working & maintenance of spectrophotometer.
b) To demonstrate the principle, working & maintenance of colorimeter.
c) To demonstrate the principle, working & maintenance of flame photometer.
d) To demonstrate the principle, procedure of paper chromatography.
e) To demonstrate the principle & procedure of Gas chromatography.
f) To demonstrate the principle & demonstration of TLC.
g) To demonstrate the principle & procedure of column chromatography.
h) To demonstrate the principle & procedure of Electrophoresis.

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-II

Course Title: Basic Hematology (PRACTICAL)
Course code: DML206

L	**T**	**P**	**Cr.**
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of Equipments used in clinical Hematology.
(a) Microscope (b) Blood Cell counter (DLC) (c) Sahli's apparatus (d) Calorimeter
2. Hb Estimation (a) Sahli's method (b) Cyanmethahaemoglobin method (c) Oxyhemoglobin method
3. Total leukocyte count
4. Preparation of smear and staining with Giemsa and Leishman stain.
5. Differential leucocytes count
6. Platelets count
7. Reticulocyte count
8. Absolute Eosinophil count
9. Calculation of Red cell indices (RCI)
10 ESR (Wintrobe and Westergren method)

11. Packed cell volume (Macro & Micro)

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Course Title: Basics of Clinical Microbiology (Practical)
Course code: DML207

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic Ware.
3. Sterilization by autoclave and hot air oven
4. Handling and use of compound microscope
5. Staining techniques: Gram, Albert's, Ziehl – Neelson's
6. Demonstration of motility (Hanging drop method)
7. Preparation and sterilization of various culture media (Nutrient agar, Nutrient Broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen Media
8. Aerobic and anaerobic culture methods
9. Antimicrobial susceptibility testing by Stokes disc diffusion method

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley

2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester 2nd

Course Title: Human Physiology And Health Education(Practical)
Course code: DML208

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of human cell from slides/charts.

2. Demonstration of cell division i.e. mitosis and Meiosis from permanent mounted slides.

3. Demonstration of various tissues from permanent slides. (i) Epithelial tissue (ii) Connective tissue. (iii)Muscular tissue (iv) Nervous tissue

4. Demonstration of individual bone.

5. Demonstration of respiratory system from chart.

6. Pear expiratory flow rate (PEFR)

7. Demonstration of cardiovascular system form chart.

8. Electro cardio gram (ECG)

9. Demonstration of eye, nose, ear and tongue from model and charts.

10. To study and count spleenocytes from mammalian spleen.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Semester-III

Course Title: Anatomy & Physiology I
Course code: DML301

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Identify and describe the structure and organization of the human body: Students will gain a comprehensive understanding of the anatomical structures and their relationships within the human body. This includes knowledge of body cavities, organs, tissues, and the major systems of the body.
2. Explain the functions and processes of the major organ systems: Students will learn the functions and processes of the major organ systems in the human body, including the integumentary, skeletal, muscular, nervous, and endocrine systems, among others. They will understand how these systems work together to maintain homeostasis.
3. Describe the microscopic anatomy of tissues and cells: Students will gain knowledge of the microscopic anatomy of various tissues and cells. They will learn about the different types of tissues, such as epithelial, connective, muscle, and nervous tissues, and their characteristics and functions.
4. Understand the physiology of body systems: Students will learn the physiological processes that occur within the major organ systems. They will gain an understanding of how these systems function to support the body's overall health and well-being.

Course Contents

UNIT 1 **15 Hours**

Introduction to Anatomical terms of the human body - Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, and cavities of the body.

Organization of the human body at the cellular level - Structure of the cell comprising of cell membrane, cytoplasm, cell organelles, nucleus, cell extensions etc.

Organization of the human body at the tissue level - Epithelial, Connective, Muscular& Nervous tissue.

Blood - Composition of blood, Features of red blood cells, white blood cells, platelets.

Lymphatic system - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.

UNIT 2 **16 Hours**

Nervous system - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.

Muscular system - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

Skeletal system - Features of bones, axial skeleton, and appendicular skeleton.

Musculoskeletal system - Joints of upper & lower limb

Respiratory system - Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.

Cardiovascular system - Heart & blood vessels.

Digestive system - Oral cavity, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.

Urinary system - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

UNIT 3 **15 Hours**

Introduction to genetics - Features of chromosomes, DNA.

Reproductive system in females - External & internal genital organs, breast.

Reproductive system in males - Penis, scrotum, testes, prostate gland.

Endocrine system - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.

Special senses - Olfactory system, taste apparatus, external middle & internal ear, eye.

Skin - Features of skin, hair, sebaceous glands, sweat glands, nails.

(Physiology)

Introduction to physiology of the human body –Composition of body, Homeostasis, Introduction to chemistry of life.

Organization of the human body at the cellular level – Function of lipids, carbohydrates, proteins & cell organelles.

Organization of the human body at the tissue level – Function of Epithelial, Connective, Muscular & Nervous tissues.

UNIT 4 **16 Hours**

Blood – Hemopoesis, hemostasis, coagulation of blood, blood transfusion.

Lymphatic system – Function of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.

Resistance & immunity – Innate immunity, acquired immunity, humeral & cell mediated immunity.
Nervous system – Properties of nerve fibers, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
Muscular system – Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
Skeletal system – Functions of bones, axial skeleton and appendicular skeleton.
Musculoskeletal system – Movement in the joints of upper & lower limb**.**

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Text Books:

1. P.R Ashalatha & G Deepa 's Textbook of anatomy & physiology by
2. B.D.Chaurasia's human anatomy

Reference books:

1. SampathMadhyastha'sManipal manual of anatomy for allied health sciences
2. Krishna Garg &Madhu Joshi's Practical anatomy workbook
3. Dixit's Atlas of Histology for Medical Students
4. Basic Histology: A Color Atlas & Text
5. Jana's Exam Oriented Practical Anatomy
6. Krishan's Anatomy Mnemonics

Semester-III

Course Title: Basic Computers and Information Science
Course code: DML302

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Develop basic programming skills: Students will be introduced to the concepts and principles of programming. They will learn fundamental programming constructs, such as variables, data types, control structures, loops, and functions. They may also gain hands-on experience with a programming language, enabling them to write simple programs.
2. Understand the fundamentals of computer hardware and software: Students will gain a basic understanding of computer hardware components, such as the central processing unit (CPU), memory, storage devices, input/output devices, and networking components. They will also learn about software types, including operating systems, applications, and programming languages.
3. Demonstrate proficiency in using computer applications: Students will develop practical skills in using common computer applications, such as word processing, spreadsheets, presentation software, and database management

systems. They will learn to create, edit, and format documents, analyze data, create presentations, and manage information effectively.

4. Explore computer networks and the internet: Students will gain knowledge of computer networks, including local area networks (LANs) and wide area networks (WANs). They will learn about network topologies, protocols, and security considerations. Additionally, they will understand the basic concepts of the internet, web browsers, and internet communication.

Course Contents

UNIT 1 **12 Hours**

Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-
input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

UNIT 2 **11 Hours**

Processor and memory: The Central Processing Unit (CPU), main memory.
Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, op tical disk, mass storage devices.
Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

UNIT 3 **11 Hours**

Introduction to MS-
Word: introduction, components of a word window, creating, opening
and inserting files, editing a document file, page setting and formatting the text, savin g the document, spell checking, printing the document file, creating and editing of table, mail merge.
Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

UNIT 4 **11 Hours**

Introduction to PowerPoint: introduction, creating and manipulating presentation, vie ws, formatting and enhancing text, slide with graphs.
Introduction of Operating System: introduction, operating system concepts, types of operating system.
Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of netwo rk.
Internet and its Applications: definition, brief history, basic services (E-
Mail, File Transfer
Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
Application of Computers in clinical settings.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Raja Raman; Prentice Hall of India Pvt. Ltd., New Delhi

2. Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi

3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi

4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.

5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

8. Fundamentals of Information Technology by Leon and Leon;Vikas PublishingHouse Pvt. Ltd., Jungpura, New Delhi

9. On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi

10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

Semester-III

Course Title: Introduction To Quality and Patient Safety
Course code: DML303

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the concepts of quality improvement and patient safety: Students will gain a foundational understanding of the principles, theories, and frameworks related to quality improvement and patient safety in healthcare. They will learn about the importance of providing safe, effective, patient-centered care and the impact of quality improvement initiatives on healthcare outcomes.
2. Identify common sources of errors and adverse events: Students will learn to identify the various sources of errors and adverse events that can occur in healthcare settings. They will explore factors such as communication breakdowns,

medication errors, diagnostic errors, system failures, and human factors that contribute to patient harm.

3. Explore ethical and legal considerations in quality and patient safety: Students will examine ethical and legal issues related to quality improvement and patient safety. They will learn about patient rights, informed consent, confidentiality, and ethical responsibilities of healthcare professionals in ensuring patient safety.
4. Analyze data for quality improvement: Students will develop skills in collecting, analyzing, and interpreting data to identify areas for improvement. They will learn to use statistical methods, quality indicators, and performance measures to assess healthcare processes and outcomes. They will also understand the importance of data-driven decision-making in quality improvement efforts.

Course Contents

UNIT 1 **10 Hours**

Quality assurance and Management

Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines.

UNIT 2 **12 Hours**

Basic of Emergency care and Life support skills

Basic life support (BLS) following cardiac arrest, recognition of sudden cardiac arrest and activation of emergency response system, early cardiopulmonary resuscitation (CPR) and rapid defibrillation with an automated external defibrillator (AED)

UNIT 3 **11 Hours**

Basic emergency care

First aid, choking, rescue breathing methods, ventilation including use of bag valve master (BVMs)

Biomedical Waste Management

Definition, waste minimization, BMW-segregation, collection, transportation, treatment and disposal (Including color coding), Liquid BMW, Radioactive waste, metals/chemicals/drug waste, BMW management and methods of disinfection, use of Personal protective equipment (PPE)

UNIT 4 **12 Hours**

Infection Prevention and Control

Sterilization, Disinfection, Effective hand hygiene, use of PPE, Prevention and control of common health care associated infections, Guidelines (NABH) and JCI for hospital infection control.

Disaster preparedness and management, Fundamentals of emergency management

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

References

Texts, Materials, and Supplies:

• Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Required Readings:

• Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458

Recommended Readings:

• Medical Dictionary

Others

1.disaster management set up in India - opcw.org
www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_nov201.

2. natural disasters: hospital management | 2015-10-22 | ahc...
www.reliasmedia.com/articles/136571-natural-disasters-hospital-management

1. Biomedical waste management in India: Critical appraisal - NCBI - NIH
   www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295

2. Vital signs: Understanding what the body is telling us
   https://www.coursera.org/learn/vital-signs/
3. Patient Safety and Quality Improvement
   https://www.coursera.org/learn/patient-safety

Semester-III

Course Title: Principles of Management
Course code: DML304

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the fundamental principles and theories of management: Students should develop a comprehensive understanding of the basic principles and theories that form the foundation of modern management practices. This includes topics such as planning, organizing, leading, and controlling.
2. Apply management concepts to real-world scenarios: Students should be able to apply the principles of management to real-world situations and make informed decisions based on their understanding of management theory.
3. Develop critical thinking and problem-solving skills: The course should help students enhance their critical thinking abilities and problem-solving skills within

a management context. They should be able to analyze complex management problems, identify potential solutions, and evaluate the best course of action.

4. Enhance leadership and communication skills: Students should develop effective leadership and communication skills necessary for managerial roles. This includes understanding different leadership styles, communication techniques, and the ability to work effectively in teams.

Course Contents

UNIT 1 **15 Hours**

Ethical Principles and standards for a clinical laboratory professional, Duty to the patient, Duty to colleagues and other professionals, Duty to the society

Good Laboratory Practice (GLP) Regulations and Accreditation

Introduction to Basics of GLP and Accreditation, Aims of GLP and Accreditation, Advantages of accreditation, Brief knowledge about National and International Agencies for clinical laboratory accreditation

UNIT 2 **14 Hours**

Awareness / Safety in a clinical laboratory

General safety precautions, HIV: pre- and Post-exposure guidelines, Hepatitis B & C: pre- and Post-exposure guidelines, Drug Resistant Tuberculosis.

Patient management for clinical samples collection, transportation and preservation, sample accountability

Purpose of accountability, Methods of accountability.

Sample analysis

Introduction, Factors affecting sample analysis

Reporting results: Awareness about the following;

Basic format of a test report, Reported reference range, Clinical Alerts, Abnormal results, Turnaround time, Results from referral laboratories, Release of examination results, Alteration in reports

UNIT 3 **16 Hours**

Quality Management system

Introduction, Quality assurance, Quality control system, Internal and External quality control

Biomedical waste management in a clinical laboratory

Introduction and importance of calibration and Validation of Clinical Laboratory instruments

Introduction to Laboratory Information system (LIS), Hospital Information system (HIS) and financial management

UNIT 4 **15 Hours**

Ethics in Medical laboratory Practice

Understanding the term _Ethics‘

Ethics in relation to the following:
Pre-Examination procedures, Examination procedures, reporting of results, preserving medical records
Access to Medical laboratory Records, Inventory Control

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested reading:

Medical Laboratories Management- Cost effective methods by Sangeeta Sharma, Rachna Agarwal, Sujata Chaturvedi and Rajiv Thakur

Semester-III

Course Title: English & Communication Skill
Course code: DML305

L	T	P	Cr.
3	0	0	4

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Develop proficiency in oral communication: Students will be able to express themselves clearly and effectively in spoken English. They will develop fluency, coherence, and appropriate use of vocabulary and grammar to convey their ideas.
2. Enhance written communication skills: Students will improve their ability to write effectively in English. They will learn how to structure their writing, organize their thoughts logically, and express themselves clearly and concisely.
3. Expand vocabulary and language skills: Students will build a strong foundation of English vocabulary and grammar. They will learn new words, idiomatic expressions, and sentence structures to enhance their language proficiency.
4. Improve listening comprehension: Students will develop their ability to understand spoken English in various contexts. They will practice listening to different accents, speeds, and levels of complexity to improve their comprehension skills.

Course Structure

UNIT 1 **12 Hours**

Basics of Grammar- Part I

Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words.
Basics of Grammar – Part II

Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms
Writing Skills
Letter writing, E mail, and Essay, Articles, and Memos, one word substitutes, note making and Comprehension

UNIT 2 **11 Hours**
Writing and Reading
Summary writing, Creative writing, newspaper reading
Practical Exercise
Formal speech, Phonetics, semantics and pronunciation
Communication:
Introduction: Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals.

UNIT 3 **11 Hours**
Speaking: Importance of speaking efficiently; Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling,

Presentation skills, Individual feedback for each student, Conference/Interview technique.
Listening: Importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.

UNIT 4 **11 Hours**

Reading: What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, Improving concentration and comprehension through systematic study.
Non Verbal Communication**:** Basics of non-verbal communication, Rapport building skills using Neuro- linguistic programming (NLP).

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

RECOMMENDED BOOKS

1. English and Communication Skills, BookII
By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 5759,
Sector17,
Chandigarh
2. Essentials of Business Communication by Pal and Roruallingl; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34
Industrial Area PhaseII,
Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34
Industrial Area PhaseII,
Chandigarh,

Semester-III

Course Title: Anatomy & physiology-I (Practical)
Course code: DML306

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

Demonstration

Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.

Lymphatic system - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.

Nervous system - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.

Muscular system - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.

Skeletal system - Features of bones, axial skeleton, and appendicular skeleton.

Musculoskeletal system - Joints of upper & lower limb.

Respiratory system - Nose & Paranasal sinuses, pharynx, larynx, trachea, lungs.

Cardiovascular system - Heart & blood vessels.

Digestive system - Oral cavity, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.

Urinary system - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.

Introduction to genetics - Features of chromosomes, DNA.

Reproductive system in females - External & internal genital organs, breast.

Reproductive system in males - Penis, scrotum, testes, prostate gland.

Endocrine system - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.

Physiology Practical

Blood test:

1. Microscope
2. Hemocytometer
3. Blood
4. RBC count
5. Hb
6. WBC count
7. Differential Count
8. Hematocrit demonstration
9. ESR
10. Blood group & Rh. Type
11. Bleeding time and clotting time.

Digestion

Test salivary digestions

Excretion

1. Examination of Urine
2. Specific gravity
3. Albumin
4. Sugar
5. Microscopic examination for cells and cysts

Respiratory System:

1. Clinical examination of respiratory system
2. Spirometry
3. Breath holding test

Cardio Vascular System:

1. Measurement of blood pressure and pulse rate
2. Effect of exercise on blood pressure and pulse rate

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-III

Course Title: Basic In Computer& Information Science (Practical)

Course code: DML307

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
2. Introduction of Operating System: introduction, operating system concepts, types of operating system.
3. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of ne twork.
4. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
5. Application of Computers in clinical settings.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-III

Course Title: Introduction to Quality and Patient Safety (Practical)
Course code: DML308

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Overview of quality improvement and patient safety in healthcare.
2. Introduction to key concepts and terminology.
3. Methods for identifying quality and patient safety issues.
4. Error prevention strategies and techniques.
5. Implementing effective communication and teamwork.
6. Data collection methods and tools.
7. Analyzing and interpreting data for quality improvement initiatives.
8. Strategies to reduce healthcare-associated infections.
9. Implementing infection control practices.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-IV

Course Title: Human Anatomy & Physiology-II
Course code: DML401

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Identify and describe the structure and organization of the human body: Students will gain a comprehensive understanding of the anatomical structures and their relationships within the human body. This includes knowledge of body cavities, organs, tissues, and the major systems of the body.
2. Explain the functions and processes of the major organ systems: Students will learn the functions and processes of the major organ systems in the human body, including the integumentary, skeletal, muscular, nervous, and endocrine systems, among others. They will understand how these systems work together to maintain homeostasis.
3. Describe the microscopic anatomy of tissues and cells: Students will gain knowledge of the microscopic anatomy of various tissues and cells. They will learn about the different types of tissues, such as epithelial, connective, muscle, and nervous tissues, and their characteristics and functions.

4. Understand the physiology of body systems: Students will learn the physiological processes that occur within the major organ systems. They will gain an understanding of how these systems function to support the body's overall health and well-being.

Course Contents

UNIT 1 **15 Hours**

Classification of nervous system

Nerve – structure, classification, microscopy with examples. Neurons, classification with examples. Simple reflex arc.

Parts of a typical spinal nerve/Dermatome: Central nervous system – disposition, parts and functions Cerebrum, Cerebellum, Midbrain & brain stem Blood supply & anatomy of brain.

2. Spinal cord-anatomy, blood supply, nerve pathways Pyramidal, extra pyramidal system, Thalamus, hypothalamus, Structure and features of meninges Ventricles of brain, CSF circulation Development of nervous system & defects.

UNIT 2 **14 Hours**

Cranial nerves – (course, distribution, functions and palsy) Sympathetic nervous system, its parts and components

2. Parasympathetic nervous system Applied anatomy

Structure and function of Visual system, auditory system, gustatory system, olfactory system, Somatic sensory system. Pelvic floor, innervations Kidney, Ureter, bladder, urethra. Reproductive system of male, Reproductive system of female.

PHYSIOLOGY-

UNIT 3 **16 Hours**

Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function, Ureter, bladder, urethra

UNIT 4 **15 Hours**

Physiology of the endocrine glands– Hormones secreted by these glands, their classifications and functions.

Adrenal, Gonads Thymus, Pancreas. Pituitary, Pineal Body, Thyroid, Parathyroid

Male -Functions of testes, pubertal changes in males, testosterone -action & regulations of secretion.

Female -Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogens and progesterone -action and regulation.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Course References

Text Books:

- PR Ashalatha & G Deepa ‘s Textbook of ANATOMY & PHYSIOLOGY by
- B.D.Chaurasia’s HUMAN ANATOMY

Reference books:

- Sampath Madhyastha's Manipal manual of anatomy for allied health sciences
- Krishna Garg & Madhu Joshi's Practical anatomy workbook
- Dixit's Atlas of Histology for Medical Students
- Basic Histology: A Color Atlas & Text
- Jana's Exam Oriented Practical Anatomy
- Krishan's Anatomy Mnemonics

Semester-IV

Course Title: Medical Microbiology
Course code: DML402

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understanding of Microbial Diversity: Students should acquire knowledge about the diversity of microorganisms, including bacteria, viruses, fungi, and protozoa. They should be able to describe the characteristics, morphology, and classification of different microbial groups.
2. Knowledge of Microbial Structure and Function: Students should understand the structures and functions of microbial cells, including their organelles, cell walls, membranes, and genetic material. They should be able to explain how these structures contribute to microbial growth, metabolism, and reproduction.
3. Familiarity with Microbial Growth and Control: Students should learn about the factors that influence microbial growth, such as temperature, pH, nutrient availability, and oxygen requirements. They should understand the principles of microbial control, including sterilization methods, disinfectants, and antibiotics.
4. Knowledge of Microbial Genetics: Students should be familiar with the principles of microbial genetics, including DNA replication, transcription, translation, and gene regulation. They should understand genetic variation, mutation, and the mechanisms of horizontal gene transfer in microorganisms.

Course Contents

UNIT 1 **11 Hours**

Introduction to Microbiology: Definition, history, relationship of microorganisms to man, safety in a microbiology laboratory.

Morphology of Bacteria: Anatomy of a bacterial cell including spores, flagella and capsules

Growth and Nutrition of Bacteria: A typical growth curve and bacterial nutrition

Classification of micro-organisms with special reference to bacteria – general classification, biological classification

UNIT 2 **11 Hours**

Sterilization: Definition, sterilization by dry heat, moist heat (below, at and above 1000C) Autoclave, its structure and functioning, autoclave controls and sterilization indicators, sterilization by radiation and filtration

Antiseptics and Disinfectants: Definitions, types, properties and uses of disinfectants and antiseptics, In-use test

Microscopy: Structure and working of simple and compound microscope. Principles of dark field, fluorescent, phase contrast and electron microscope

UNIT 3 **11 Hours**

Staining Techniques: Methods of smear preparation, fixation, simple stains, grams stain, AFB staining, Albert's stain, Neisser's stain, staining of spores, capsules

Culture Media: Definition, Purpose, classification of culture media. Liquid and solid media, defined and synthetic media, routine laboratory media (Basal, enriched, selective, enrichment, indicator, transport and storage or preservation)

Bacterial Culture: Inoculation of culture media, aerobic and anaerobic culture, isolation of pure cultures and disposal of cultures

UNIT 4 **12 Hours**

Morphological and biochemical identification of bacteria by: Microscopic morphology, Colony characteristics, Biochemical, Carbohydrate Utilization test, Catalase, oxidase, urease, coagulase, Indole, citrate, MR, VP, TSIA, Nitrate Reduction, Motility.

Morphological, cultural, biochemical characteristics and laboratory diagnosis of:

Staphylococci and Micrococci, Streptococci and pneumococci, Coryne bacterium diphtheria,

Enterobactereacae-I (E.Coli, Klebsiella, Enterobacter), Enterobactereacae-II (Salmonella, Shigella, Proteus)

Pseudomonas, Vibrio Cholerae, Neisseria, Mycobacteria, Clostridia, Treponema pallidum

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Practical Medical Microbiology by Mackie and Mac. Cartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker& Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monica Cheesbrough
6. Text book of Microbiology by Prescott

Semester-IV

Course Title: Hematology
Course code: DML403

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Blood Components and Functions: Students will acquire knowledge about the components of blood, including red blood cells, white blood cells, platelets, and plasma. They should understand the functions of each component and their roles in maintaining homeostasis.
2. Understanding of Hematopoiesis: Students will grasp the process of hematopoiesis, including the production and maturation of blood cells in the bone marrow. They should be able to describe the differentiation of hematopoietic stem cells into various blood cell lineages.
3. Familiarity with Blood Cell Morphology: Students will learn to identify and differentiate various blood cell types based on their morphology, including red blood cells, white blood cells, and platelets. They should be able to recognize normal and abnormal blood cell morphology in peripheral blood smears.
4. Knowledge of Hemostasis and Coagulation: Students will understand the mechanisms of hemostasis and blood coagulation. They should be able to explain the role of platelets, clotting factors, and the coagulation cascade in preventing bleeding and maintaining vascular integrity.

Course Contents

UNIT 1 **11 Hours**

Introduction to Hematology

1. Apparatus and Instruments: Parts, functions principles and working of compound microscope, centrifuge, water bath and cell counter
2. Cleaning of Glass Ware: General and volumetric apparatus cleaning

Introduction to Blood

1.Erythropoiesis, Leucopoiesis, formation of platelets (Thrombopoiesis)

2.Definition, composition and functions of blood

3. Anticoagulants: Definition and various types along with their mode of action, merits and demerits of each

UNIT 2 **12 Hours**

Collection of Blood;

1. Collection of blood; venous and capillary, Various equipment used for collection of blood samples
2. Romanowsky Stains
3. Preparation and theory, Choice of slide and spreader and preparation of blood film, Characteristics of good film preparation.

UNIT 3 **11 Hours**

Hemoglobinometery

1.Types of Hemoglobin and its function, Various methods of estimation, Formation of Hemoglobin and its breakdown

2. Differential Leucocyte Counting: Blood Cell Morphology in Health and Disease

Preparation of Blood Smear

For malarial parasite (thick and thin smear), Study of life cycle of malarial parasite and its laboratory diagnosis

UNIT 4 **11 Hours**

Haemo-cytometery

1. Various counting chambers (Neubaeur, Burker, Fuch-Rosenthal)
2. Methods of counting of RBC, WBC and platelets, Errors involved
3. Physiological Variation in the Normal Values of Tests (HB, TLC, DLC, PCV/ESR, Platelets Etc.)
4. Routine Examination of Urine (Microscopic, Macroscopic and Chemical)

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested reading:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Medical laboratory Technology by K.L. Mukherjee Volume-I
3. Haematology for students Practitioners by RamnikSood
4. Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib
5. Haematology (International edition) Emmanuel C. BesaHarwal Publisher
6. Practical Haematology by J.B. Dacie
7. Practical Haematology (8th edition) by Sir John
8. Clinical Haematology by Christopher A. Ludlam
9. Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henary
10. Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood
11. Atlas of Haematology (5th edition) by G.A. McDonald

12. A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach
13. Haematology (Patho-physiological basis for clinical practice) by Stephen M. Robinson

Semester-IV

Course Title: Clinical Biochemistry
Course code: DML404

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Biomolecules: Students should acquire knowledge about the structure, properties, and functions of biomolecules, including proteins, carbohydrates, lipids, and nucleic acids. They should understand the monomers, polymers, and the basic chemical reactions involved in their synthesis and degradation.
2. Understanding of Enzymes and Enzyme Kinetics: Students should grasp the principles of enzymology, including enzyme structure, mechanism of action, enzyme-substrate interactions, and factors influencing enzyme activity. They should be able to explain and analyze enzyme kinetics, including the concepts of Michaelis-Menten kinetics and enzyme inhibition.
3. Familiarity with Metabolism: Students should understand the basics of metabolic pathways, including glycolysis, Krebs cycle, and oxidative phosphorylation. They should be able to explain the principles of energy metabolism, including the generation and utilization of ATP, and the integration of different metabolic pathways.
4. Knowledge of Bioenergetics and Thermodynamics: Students should comprehend the principles of bioenergetics and thermodynamics as applied to biochemical reactions. They should understand concepts such as free energy, entropy, enthalpy, and their relationship to chemical reactions and equilibrium.

Course Contents

UNIT 1 **12 Hours**

Introduction to Biochemistry
Definition, Importance of bio-chemistry, SI units and their use, Volumetric apparatus and their calibration

UNIT 2 **12 Hours**

Cleaning of Laboratory Glass Ware
Cleaning and care of glass-ware, Different cleaning agents (soaps detergents, chromic acid), Methods of cleaning

UNIT 3 **10 Hours**

Important Instruments: Principle working and care of:
Balance (Analytical, electrical/electronic), Centrifuge
Colorimeter, Spectrophotometer, Flame photometer

UNIT 4 **11 Hours**

Blood Chemistry
Composition of blood and its functions, Use of various anticoagulants, Separation of serum and plasma,
Process of sterilizing blood collecting equipment, Different protein precipitation agents, Preparation of Protein Free Filtrate (PFF) and uses

Collection and Preservation of Biological Specimens:
Blood – Sputum, Body fluids - Stool

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

1. Text book of Medical Laboratory Technology by P. B. Godker
2. Medical Laboratory Technology by KL Mukherjee volume III
3. Practical Clinical Biochemistry by Harold Varley
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by ChaterjeeShinde

Semester-IV

Course Title: Histopathology
Course code: DML405

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of histopathology: Students will develop a solid understanding of the fundamental principles and concepts of histopathology, including tissue fixation, processing, embedding, sectioning, staining, and microscopy.

2. Identify normal and abnormal tissue structures: Students will learn to identify and differentiate between normal and abnormal tissue structures under the microscope. They will become proficient in recognizing cellular and tissue abnormalities associated with various diseases and conditions.

3. Interpret histopathological slides: Students will develop the skills to interpret histopathological slides accurately. They will learn to correlate histological features with clinical presentations and diagnose various diseases and conditions based on microscopic examination.

4. Perform histopathological techniques: Students will gain hands-on experience in performing histopathological techniques, including tissue processing, embedding, sectioning, and staining. They will learn to handle and prepare tissue samples for microscopic analysis.

Course Contents

UNIT 1 **11 Hours**

Definitions, sources and types of histological specimen (Biopsy), histological preservations.

Labeling, fixation, properties, classification and composition of fixatives

Paraffin embedding, dehydration, clearing, impregnation and casting

UNIT 2 **12 Hours**

Cutting of Tissue Sections Care and use of microtomes, microtome knives: honing and stropping techniques, attachment of block to block holder, trimming, section cutting, errors in sectioning and remedies, collection of sections to slide from tissue floatation bath

UNIT 3 **11 Hours**

Principles and staining techniques of;
Routine- Haemotoxylin and Eosin
Special, Reticulin, PAS, Iron, PTAH, AFB, Calcium, Fat (Lipid)
Decalcification of bones
Process of decalcification and methods, Reagents used for decalcification, Bone cutting without decalcification

UNIT 4 **11 Hours**

Frozen sections
1. Freezing microtome and cryostat- its care and uses, Technique of cutting frozen section
2. Principles of special stains used and their preparation
3. Preparation of museum specimen, Care of Museum specimen
4. Preparation of fixatives and mounting solutions, Mounting and after care of mounted specimen, Cataloguing of museum specimen, Cataloguing of slides and blocks, dispatch of reports, maintenance of records.

Autopsy
Care of instruments, Preparation and performance of autopsy in brief

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested reading:

1. An introduction to Med. Lab. Technology by F.J. Baker & R.E. Silverton, Pb. London Butterworth and Co. Ltd.
2. Handbook of Histopathological Techniques by C.F.A Culling
3. Medical Lab. Technology by Lynch
4. Theory & Practice of Histological Techniques by Johan D Bancroft & Gamble Handbook of Histopathological & Histochemical Techniques by CFA Culling

Semester-IV

Course Title: Human Anatomy & Physiology-II (Practical)
Course code: DML406

L	T	P	Cr.
0	0	2	1

Total Hours 15

Course Contents

Anatomy Practical

1. Identification and description of all anatomical structures.
2. Demonstration of dissected parts
3. Demonstration of skeleton-articulated and disarticulated.
4. Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

Physiology Practical

1. Enumerate Physiology of kidney
2. Explain Physiology of lower Urinary tract
3. Label Physiology of the endocrine glands
4. Enumerate Physiology of reproductive system

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-IV

Course Title: Medical Microbiology (Practical)
Course code: DML407

L	T	P	Cr.
0	0	3	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of safety rules in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning glassware
3. Preparation of material for sterilization in an autoclave and hot air oven
4. Sterilization by an autoclave and hot air oven
5. Sterilization by filtration

6. In-use test
7. Handling and care of different types of microscopes
8. Staining techniques: Gram‘s stain, Z.N stain, Albert's stain, Spore and capsule staining
9. To demonstrate the instruments used to seed culture media
10. To learn techniques for Inoculation of bacteria on culture media
11. Demonstration of motility
12. Preparation of culture media
13. Aerobic and anaerobic culture methods
14. To isolate specific bacteria from a mixture of organisms.
    Preparing media for different biochemical and
    Inoculations and incubation biochemical,
    Reporting bio-chemicals
15. Testing antimicrobial susceptibility of bacteria by Stoke's disc diffusion method
16. To prepare the reagent and demonstrate following biochemical tests with positive and negative control bacteria:
    Catalase, Coagulase, Indole, Methyl Red (MR), Voges-Proskauer (VP), Urease, Citrate, Oxidase, TSIA,
    Nitrate reduction, Carbohydrate fermentation, Demonstration and motility
17. Demonstration of Morphological and Biochemical identification of bacteria
    Staphylococcus, Streptococcus & Pneumococcus, Corynebacterium, Escherichia coli, Klebsiella,
    Citrobacter, Enterobacter, Proteus, Salmonella, Shigella, Vibrio cholera, Pseudomonas

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-IV

Course Title: Hematology (Practical)
Course code: DML408

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical’s / Experiments:

1. Parts of microscope; its functioning and care
2. Parts of centrifuge; its functioning and care
3. Cleaning and drying of glassware
4. Preparation of various anticoagulants
5. Collection of venous and capillary blood
6. Cleaning of glass-syringes and its sterilization
7. Preparation of the stains and other reagents

8. Preparation of peripheral blood film (PBF)
9. Staining of PBF
10. Hemoglobin estimation methods (Sahli's, Oxyhemoglobin, and Cyanmethaemoglobin)
11. Differential leukocyte count (DLC)
12. Recognition and staining of various types of blood cells (normal and abnormal)
13. Preparation of thick and thin blood smear for malarial parasite (Leishman/Giemsa/JSB)
14. RBC counting
15. WBC counting
16. Platelet counting
17. Routine Examination of urine

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-IV

Course Title: Clinical Biochemistry (Practical)
Course code: DML409

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Cleaning of glass ware
2. Sterilization of glass ware
3. Standardization of glass ware
4. Handing and Maintenance of each instrument
5. Preparation of various anticoagulants and specimen collection bottle
6. Collection of blood
7. Separation of serum and plasma
8. Preparation of different protein precipitating gents, PFF preparation

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-IV

Course Title: Histopathology (Practical)
Course code: DML410

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Receiving specimen, labeling and cataloguing

2. Preparation of fixatives, fixing of specimen
3. Dehydrating, making solution of various reagents, clearing, impregnation and casting
4. Embedding and cutting of sections
5. Preparation of stains
6. Routine (H & E) and special staining
7. Preparation of various reagents
8. Decalcification
9. Demonstrating of cataloguing of slides blocks
10. Demonstration of dispatching reports and maintenance of records
11. Demonstration of freezing microtone
12. Examination of stained frozen section slides
13. Preparation of museum fixatives

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-V

Course Title: Applied Bacteriology
Course code: DML501

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of bacteriology: Students will develop a comprehensive understanding of the fundamental principles and concepts of bacteriology, including the structure and function of bacteria, bacterial growth and metabolism, genetics, and bacterial pathogenesis.

2. Identify and classify bacteria: Students will learn to identify and classify different types of bacteria based on their morphological, cultural, biochemical, and genetic characteristics. They will become proficient in using microscopy and laboratory techniques to differentiate between various bacterial species.

3. Analyze the role of bacteria in infectious diseases: Students will gain knowledge about the role of bacteria in causing infectious diseases in humans, animals, and plants. They will learn about the mechanisms of bacterial pathogenesis, host-pathogen interactions, and the immune response to bacterial infections.

4. Perform microbiological techniques: Students will develop practical skills in performing a range of microbiological techniques used in applied bacteriology. This may include bacterial isolation, culturing, identification, antimicrobial susceptibility testing, and molecular techniques such as PCR (Polymerase Chain Reaction) and DNA sequencing.

Course Contents

UNIT 1 **11 Hours**

Laboratory Diagnosis of Infectious Diseases
Septicemia and bacteremia, Respiratory tract infections, Wound and skin infections, Urinary tract infections,
Genital tract infections, Meningitis, Gastro intestinal infections, Enteric fever

Bacteriological examination of water, milk and air

UNIT 2 **12 Hours**

Nosocomial Infections
Introduction, Common types of Nosocomial infections, Sources of infections, Surveillance (Bacteriological) and control of Nosocomial infections

UNIT 3 **11 Hours**

General characteristics of medically important fungi

UNIT 4 **11 Hours**

Culture media for fungi
SDA (Saboraud's Dextrose Agar), CMA (Corn Meal Agar), RSA (Rice starch Agar)

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested Readings:

1. Practical Medical Microbiology by Mackie and MacCartney Volume 1 and 2
2. Text book of Microbiology by Ananthanarayanan
3. Medical Microbiology by Paniker& Satish Gupte
4. Medical laboratory Technology vol. I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol. II Microbiology by Monica Cheesbrough

Semester-V

Course Title: Applied Hematology
Course code: DML502

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Knowledge of Blood Components and Functions: Students will acquire knowledge about the components of blood, including red blood cells, white blood cells, platelets, and plasma. They should understand the functions of each component and their roles in maintaining homeostasis.
2. Understanding of Hematopoiesis: Students will grasp the process of hematopoiesis, including the production and maturation of blood cells in the bone marrow. They should be able to describe the differentiation of hematopoietic stem cells into various blood cell lineages.
3. Familiarity with Blood Cell Morphology: Students will learn to identify and differentiate various blood cell types based on their morphology, including red blood cells, white blood cells, and platelets. They should be able to recognize normal and abnormal blood cell morphology in peripheral blood smears.
4. Knowledge of Hemostasis and Coagulation: Students will understand the mechanisms of hemostasis and blood coagulation. They should be able to explain the role of platelets, clotting factors, and the coagulation cascade in preventing bleeding and maintaining vascular integrity.

Course Contents

UNIT 1 **11 Hours**

Erythrocyte Sedimentation Rate (ESR)
Introduction, Various methods of estimation, Factors on which ESR and PCV depends, Interpretation

UNIT 2 **11 Hours**

Various color indices; their brief description
1. Absolute eosinophil counting, Introduction, Various methods, Clinical importance
2. Reticulocyte counting, Introduction, Various methods of counting, Clinical importance

UNIT 3 **12 Hours**

LE cell phenomenon
1. Theory of formation of LE cell, its differentiation from tart cell
2. Preparation and staining of smear and its examination, Clinical importance
Anemia
1. Definition and types of anemia; factor causing anemia
Plasma hemoglobin and fetal hemoglobin estimation
2. Laboratory diagnosis of hemolytic anemia
Red cell fragility test, Principle and setting up the test, Clinical importance

UNIT 4 **11 Hours**

Coagulation

Theories, Coagulation defects
Principles and methods of Prothrombin Time (PT), Prothrombin Time Index (PTI), Prothrombin Time with Kaolin (PTTK) – Bleeding Time (BT) Clotting Time (CT), and Clot Retraction Test
Bone-marrow examination
Structure and function of bone-marrow, Collection of bone-marrow, Preparation, staining and examination of bone-marrow smears, Significance of bone-marrow examination Leukemia's- Classification (FAB), Automation in hematology, Quality control in hematology

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested reading:

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Medical laboratory Technology by KL Mukherjee Volume-I
3. Haematology for students Practitioners by RamnikSood
4. Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib
5. Haematology (International edition) Emmanuel C. BesaHarwal Publisher
6. Practical Haematology by J.B. Dacie
7. Practical Haematology (8th edition) by Sir John
8. Clinical Haematology by Christopher A. Ludlam
9. Clinical Diagnosis &Management by Laboratory methods (20th edition) by John Bernard Henary
10. Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood
11. Atlas of Haematology (5th edition) by G.A. McDonal.

Semester-V

Course Title: Applied Clinical Biochemistry
Course code: DML503

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of clinical biochemistry: Students will develop a comprehensive understanding of the fundamental principles and concepts of clinical biochemistry, including biochemical pathways, metabolism, enzyme kinetics, and the role of biomarkers in health and disease.
2. Perform and interpret routine biochemical tests: Students will gain practical skills in performing and interpreting routine biochemical tests used in clinical laboratories. They will learn techniques for measuring biomarkers such as glucose, lipid profiles, liver function markers, renal function markers, and electrolytes.
3. Analyze and interpret abnormal biochemical profiles: Students will learn to analyze and interpret abnormal biochemical profiles obtained from patient samples. They will understand the clinical significance of abnormal results and their implications for disease diagnosis, prognosis, and monitoring
4. Understand the role of biochemistry in disease diagnosis: Students will learn about the biochemical basis of various diseases and the role of clinical biochemistry in their diagnosis. They will understand the biochemical changes associated with different diseases, including metabolic disorders, endocrine disorders, cardiovascular diseases, and liver and kidney diseases.

Course Contents

UNIT 1 **11 Hours**

Blood sugar estimation and G.T.T

1. Principle and methods of estimation, Normal and abnormal values, True and apparent sugar, Metabolism of sugar, Precautionary measures, Renal threshold

2. Importance and performance of GTT, Clinical importance of blood sugar and GTT

3. Serum urea, Formation and excretion of urea, Principles and procedures of different methods of urea estimation, Normal and abnormal levels, Clinical importance

UNIT 2 **12 Hours**

Plasma and serum proteins

1. Definition, Formation of plasma proteins, Different methods of estimation including principles and procedures, Normal and abnormal values, Clinical importance
2. Serum cholesterol

Formation and estimation of cholesterol, various methods of estimation including principles and procedures, Normal and abnormal values, Clinical importance

UNIT 3 **11 Hours**

Serum bilirubin

Formation and excretion of bilirubin, Metabolism of bile pigments, Conjugated and unconjugated bilirubin, Principles and procedures of serum bilirubin estimation, Normal and abnormal values,

Clinical importance

Inorganic phosphorus

Principles and procedures of estimation, Normal and abnormal values, Clinical importance

Creatinine estimation

Principles and procedures of estimation, Normal and abnormal/ values, Clinical importance

UNIT 4 **11 Hours**

Serum calcium

Principles and procedures estimation, Normal and abnormal values, Clinical importance

Uric acid estimation

Principles and procedures estimation, Normal and abnormal values, Clinical importance

Electrolytes and trace elements

Functions of electrolytes like Na+, K+ and CI. Other essential trace elements like Ca2+, Fe+2 etc.

Metabolism of these ions, Principles and procedures of estimation, Normal and abnormal values

Clinical importance of radioisotopes. Their brief description and use.

Quality control in clinical bio-chemistry

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

Text book of Medical Laboratory Technology by P. B. Godker
Medical Laboratory Technology by K.L. Mukherjee volume III
Practical Clinical Biochemistry by Harold Varley
Principal of Biochemistry by M. A. Siddiqi
Instrumental Analysis by ChatwalAnand
Text book of Medical Biochemistry by ChaterjeeShinde

Semester-V

Course Title: Medical Parasitology & Virology
Course code: DML504

L	T	P	Cr.
2	0	0	2

Total Hours 30

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of medical parasitology and virology: Students will develop a comprehensive understanding of the fundamental principles and concepts of medical parasitology and virology. They will learn about the classification, morphology, life cycles, pathogenesis, and epidemiology of parasitic organisms and viruses.
2. Identify and differentiate parasitic organisms: Students will learn to identify and differentiate various parasitic organisms, including protozoa, helminthes (worms), and arthropods. They will become proficient in recognizing the morphological features, life stages, and diagnostic characteristics of different parasites.
3. Identify and differentiate viral pathogens: Students will learn to identify and differentiate different viral pathogens. They will understand the structure, replication cycle, and genetic characteristics of viruses associated with human diseases. They will also learn about the mechanisms of viral pathogenesis and transmission.
4. Analyze the impact of parasitic infections and viral diseases on human health: Students will gain knowledge about the impact of parasitic infections and viral diseases on human health. They will understand the mechanisms of host-parasite interactions and viral-host interactions and the resulting consequences for human health and disease.

Course Contents

UNIT 1 **7 Hours**

Introduction to Medical Parasitology
General characteristics of protozoa and helminthes

UNIT 2 **6 Hours**

Collection, transport, processing and preservation of samples for routine parasitological investigations

UNIT 3 **8 Hours**

Morphology, life cycle and lab-diagnosis of Giardia and Entamoeba

Morphology, Life cycle and lab-diagnosis of Roundworms and Hookworms
Morphology, life cycle and lab-diagnosis of T. solium and T. saginata
Morphology, life cycle and lab-diagnosis of malarial parasite with special reference to P.vivax and P. falciparum
Laboratory diagnosis of hydated cyst and cysti-cercosis
Concentration techniques for demonstration of Ova and cysts (principles and applications)

UNIT 4 **9 Hours**

Introduction to medical virology
Classification of viruses
Classification of medically important viruses (Rabies, Polio, HIV, Influenza)
Collection, transportation and storage of samples for viral diagnosis
Processing of samples for viral diagnosis (Egg inoculation and tissue culture)

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested Readings:

Practical Medical Microbiology by Mackie and MacCartney Volume 1 and 2
Text book of Microbiology by Ananthanarayanan
Medical Microbiology by Paniker& Satish Gupte
Medical laboratory Technology vol.I ,II, III by Mukherjee
District Laboratory Practice in tropical countries Vol II Microbiology by Monica Cheesbrough
Parasitology in relation to Clinical Medicine by K.D. Chhatterjee
Medical Entomology by A.K. Hati Pub. Allied Book Agency

Semester-V

Course Title: Immuno-Hematology/Blood Banking
Course code: DML505

L	T	P	Cr.
2	0	0	2

Total Hours 30

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of immunohematology and blood banking: Students will develop a comprehensive understanding of the fundamental principles and concepts of immunohematology and blood banking. They will learn about blood group systems, antigen-antibody reactions, immune responses, blood typing, compatibility testing, and blood transfusion practices.

2. Perform and interpret blood grouping and cross-matching tests: Students will gain practical skills in performing blood grouping and cross-matching tests.

They will learn laboratory techniques for determining ABO and Rh blood groups, performing antibody screening, and cross-matching blood for compatibility prior to transfusion.

3. Understand the principles of blood component preparation and storage: Students will learn about the principles and techniques involved in the preparation, storage, and preservation of blood components such as packed red blood cells, platelets, and fresh frozen plasma. They will understand the indications and requirements for different blood components in transfusion medicine.

4. Analyse and interpret immune-mediated haemolytic reactions: Students will learn to analyse and interpret immune-mediated haemolytic reactions, including haemolytic transfusion reactions and haemolytic disease of the new-born. They will understand the mechanisms, clinical manifestations, and laboratory findings associated with these reactions.

Course Contents

UNIT 1 **7 Hours**

Historical introduction to blood grouping
Antigen and antibodies – role in blood grouping

UNIT 2 **7 Hours**

Blood collection, preservation of blood in blood bank, anticoagulants used in blood banking, Preparation of donor, criteria of an ideal blood donor, history of donor.

UNIT 3 **7 Hours**

ABO grouping and its subgroups
Rh grouping, Cleaning and care of glassware in blood banking

UNIT 4 **9 Hours**

Cross matching - major and minor cross matching, preparation of working antiglobulin, serum, principle and importance of cross matching,
Preparation and preservation of various blood components for transfusion
Coomb's test - preparation of antisera, principle, types and importance of Coomb's test
Transfusion reactions - brief introduction
Screening of blood for- AIDS, Hepatitis, Syphilis

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested readings:

Introduction to Medical Laboratory Technology – FJ Baker
Medical Laboratory Technology (Volume I & II) by Kanai,L Mukherjee, Swarajit Ghosh
Lynch's Medical Lab. Technology by Stanley S. Raphael
Practical Hematology by JB Dacie
Transfusion Science by over field, Hamer
Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein

Semester-V

Course Title: Immuno-Pathology & cytopathology
Course code: DML506

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Learning Outcomes: On Successful Completion of This Course, The Students Will Be Able to:

1. Understand the principles of immuno-pathology: Students will develop a comprehensive understanding of the fundamental principles and concepts of immuno-pathology. They will learn about the immune system, immune responses, immunological disorders, and the role of immunology in disease processes.

2. Comprehend the principles of cytopathology: Students will gain knowledge of the principles and techniques of cytopathology. They will learn about cellular morphology, cell identification, and the interpretation of cellular changes associated with various diseases.

3. Interpret immunological markers in disease diagnosis: Students will learn to interpret immunological markers used in disease diagnosis. They will understand the principles and techniques of immunohistochemistry and immunofluorescence and their application in the identification and characterization of specific antigens in tissues and cells.

4. Perform immunological staining techniques: Students will develop practical skills in performing immunological staining techniques used in immuno-pathology. They will learn laboratory techniques for immunohistochemistry, immunofluorescence, and other immunological staining methods to visualize and detect specific antigens in tissues and cells.

Course Contents

UNIT 1 **11 Hours**

Immunopathology

Cells and organs of the immune system.
Antigens, antibodies and humeral immune response.

UNIT 2 **12 Hours**

Allergy
Rheumatological diseases and investigations.
Infection and the immune system.
Cancer Immunology.
Tissue typing for kidney transplant.

UNIT 3 **11 Hours**

Cytopathology
Exfoliative cytology
Preparation of vaginal and cervical smears
PAP smears and its fixation, Preparation of PAP stains, cell blocks, Staining techniques (PAP, H&E and Giemsa), Interpretation of results
Various body fluid processing like Urine, Sputum, Fluids (Pleural, Pericardial and Peritoneal), CSF etc.

UNIT 4 **11 Hours**

Aspiration Cytology principles, indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics, Barr body analysis

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Suggested Readings:

Immunology by Ivan Roitt, JonathanBrostoff and David Male
Medical Immunology by Daniel P Stites
Basic & Clinical Immunology by P. Daniel Fudenberg. H. Hugh and Stites
Introduction to Medical Laboratory Technology – F.J. Baker
Medical Laboratory Technology (Volume I & II) by Kanai,L. Mukherjee,Swarajit Ghosh
Lynch's Medical Lab. Technology by Stanley S. Raphael

Semester-V

Course Title: Applied Hematology (Practical)
Course code: DML507

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. ESR estimations (Wintrobe and Westergreen)
2. PCV (Wintrobe and capillary)
3. Absolute Eosinophil counting
4. Reticulocyte counting
5. Red cell fragility test
6. Plasma hemoglobin estimation
7. Fetal hemoglobin test
8. Examination of color indices
9. Bleeding time and clotting time, PT, PTI, PTTK
10. Clot retraction test
11. Examination of Bone-marrow (from stained slide)
12. Demonstration of LE Cell Smear and its examination (from stained slide)
13. Recognition of various types of blast cells and leukemia (from stained slide)

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-V

Course Title: Applied Clinical Biochemistry (Practical)
Course code: DML508

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Estimation of blood Sugar (Folin-Wu method, enzyme methods etc.)
2. Performance of GTT
3. Serum Urea estimation
4. Plasma and serum protein estimation
5. Serum cholesterol estimation
6. Estimation of electrolyte level (Na+, K+ and CI by flame photometer and kit methods)
7. Preparation all types of reagents
8. Estimation of Serum bilirubin
9. Estimation of Phosphorous
10. Estimation of Serum calcium
11. Estimation of Serum creatinine
12. Estimation of Serum uric acid

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-V

Course Title: Medical Parasitology & Virology (Practical)
Course code: DML509

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Routine stool examination for detection of intestinal parasites with concentration methods:
2. Saline preparation
3. Iodine preparation
4. Floatation method
5. Centrifugation method
6. Formal ether method
7. Zinc sulphate method
8. Identification of adult worms from models/slides
9. Tapeworm segments

Ascaris

1. Hookworms
2. Pinworms
3. Malarial parasite:
4. Preparation of thin and thick blood smears
5. Staining of smears
6. Examination of smears for malarial parasites (P. vivax and P. falciparum)
7. Demonstration of various stages of life cycle of malarial parasites from stained slides
8. To demonstrate structure of viruses and their multiplication from charts etc.
9. To perform Giemsa's stain, Seller's stain.
10. Demonstration of fertilized hen egg
11. Demonstration of various inoculation routes in fertilized hen egg

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-V

Course Title: Immuno-Hematology / Blood Banking (Practical)
Course code: DML510

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Demonstration of equipment/material for blood collection
2. Cleaning of glassware
3. ABO and Rh grouping
4. Cross match - Major and Minor
5. Preparation of ACD and CPO anticoagulants

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-V

Course Title: Immuno-Pathology & Cytopathology (Practical)
Course code: DML511

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Contents

List of Practical's / Experiments:

1. Cell separation by density gradient
2. ELISA
3. Serum electrophoresis
4. Immuno-electrophoresis
5. Pregnancy test for HCGH
6. PAP staining and interpretation of results
7. To perform Papnicolaou's stain on cervical smear
8. To process samples using cytospin
9. To perform Guard's staining for demonstration sex chromatin (Barr bodies on a buccal smear)
10. Liquid based Cytology : Principle and Preparation

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Semester-VI

Course Title: Professional Training/ Internship
Course code: DML601

L	T	P	Cr.
NA	NA	NA	20

Total Hours 300

TRAINING REPORT

Students have to carry out a Training Report (on any topic related to laboratory) under the supervision of a faculty. The training report has to be prepared on the basis of the research work carried out. The assessment is done on the basis of the work done and the presentation and viva.