GURU KASHI UNIVERSITY

Diploma in Medical Laboratory Technology (DMLT)

Session: 2025-26

Faculty of Health & Allied Sciences

Programme Structure

Semester: 1st									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext**	**Total Marks**
DML101	Introductory Biology	Core	3	0	0	3	30	70	100
DML102	Basic Chemistry	Core	3	0	0	3	30	70	100
DML103	General Microbiology	Core	3	0	0	3	30	70	100
DML104	Elementary Physics	Core	3	0	0	3	30	70	100
DML105	Introductory Biology (Practical)	Technical Skills	0	0	4	2	30	70	100
DML106	Basic Chemistry (Practical)	Technical Skills	0	0	4	2	30	70	100
DML107	General Microbiology (Practical)	Technical Skills	0	0	4	2	30	70	100
DML108	Elementary Physics (Practical)	Technical Skills	0	0	4	2	30	70	100
Total			**12**	**0**	**16**	**20**	**240**	**560**	**800**

Semester: 2nd									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext**	**Total Marks**
DML201	Basic Principal of Biochemistry	Core	3	0	0	3	30	70	100
DML202	Basic Hematology	Core	3	0	0	3	30	70	100
DML203	Basics of Clinical Microbiology	Core	3	0	0	3	30	70	100
DML204	Human Physiology and Health Education	Core	3	0	0	3	30	70	100
DML205	Basic Principal of Biochemistry (Practical)	Technical Skills	0	0	4	2	30	70	100
DML206	Basic Hematology(Practical)	Technical Skills	0	0	4	2	30	70	100
DML207	Basics of Clinical Microbiology(Practical)	Technical Skills	0	0	4	2	30	70	100
DML208	Human Physiology and Health Education(Practical)	Technical Skills	0	0	4	2	30	70	100
Total			**12**	**0**	**16**	**20**	**240**	**560**	**800**

Semester: 3rd									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext**	**Total Marks**
DML301	Anatomy & Physiology-I	Core	3	0	0	3	30	70	100
DML302	Basic Computers and Information Science	Core	3	0	0	3	30	70	100
DML303	Introduction to Quality and Patient Safety	Core	3	0	0	3	30	70	100
DML304	Principles of Management	Core	3	0	0	3	30	70	100
DML305	English and Communication Skills	Core	3	0	0	3	30	70	100
DML306	Anatomy & Physiology I (Practical)	Technical Skills	0	0	4	2	30	70	100
DML307	Basic Computers and Information Science (Practical)	Technical Skills	0	0	4	2	30	70	100
DML308	Introduction to Quality and Patient Safety (Practical)	Technical Skills	0	0	4	2	30	70	100
Total			**15**	**0**	**12**	**21**	**240**	**560**	**800**

Semester: 4th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext**	**Total Marks**
DML401	Human Anatomy & Physiology-II	Core	3	1	0	4	30	70	100
DML402	Medical Microbiology	Core	3	0	0	3	30	70	100
DML403	Hematology	Core	2	1	0	3	30	70	100
DML404	Clinical Biochemistry	Core	2	1	0	3	30	70	100
DML405	Histopathology	Core	2	1	0	3	30	70	100
DML406	Human Anatomy & Physiology-II (Practical)	Technical Skills	0	0	2	1	30	70	100
DML407	Medical Microbiology (Practical)	Technical Skills	0	0	2	1	30	70	100
DML408	Hematology (Practical)	Technical Skills	0	0	2	1	30	70	100
Total			**12**	**4**	**6**	**19**	**240**	**560**	**800**

Semester: 5th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**	**Int**	**Ext**	**Total Marks**
DML501	Applied Bacteriology	Core	2	1	0	3	30	70	100
DML502	Applied Hematology	Core	2	1	0	3	30	70	100
DML503	Applied Clinical Biochemistry	Core	2	1	0	3	30	70	100
DML504	Medical Parasitology & Virology	Core	2	0	0	2	30	70	100
DML505	Immunohematology/ Blood Banking	Core	2	0	0	2	30	70	100
DML506	Immuno-Pathology & Cytopathology	Technical Skills	3	0	0	3	30	70	100
DML507	Applied Hematology(Practical)	Technical Skills	0	0	4	2	30	70	100
DML508	Applied Clinical Biochemistry (Practical)	Technical Skills	0	0	4	2	30	70	100
Total			**13**	**3**	**8**	**20**	**240**	**560**	**800**

Semester 6th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**C**	**Int.**	**Ext.**	**Total Marks**
DML601	Internship (Six months)	Skill Based	0	0	0	8	30	70	100
DML602	Dissertation	Skill Based	0	0	0	12	30	70	100
Total			0	0	0	**20**	**60**	**140**	**200**
Grand Total			**64**	**7**	**58**	**120**			

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]

CA1- Surprise Test (Two best out of three) (10 Marks)
CA2- Assignment(s) (10 Marks)
CA3- Term paper/ Quiz/Presentation (05 Marks)

B. Attendance (05 Marks)
C. Mid-Semester Test: (30 Marks)
D. End-Semester Exam: (40 Marks)

Semester 1st

Course Title: Introductory Biology
Course code: DML101

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Contents

UNIT I9Hours

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

UNIT II **8Hours**

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

UNIT III **14Hours**

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 IV **14Hours**

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-Answer

Suggested Readings:

- *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.*
- *Fried, G.H. & Hademenos, G.J. (2002). Schaum's Biology. Tata McGraw Hill Publications, New Delhi.*
- *"Biology" by Neil A. Campbell and Jane B. Reece.*
- *"Biology: How Life Works" by James Morris, Daniel Hartl, Andrew Knoll, and Robert Lue.*
- *"Life: The Science of Biology" by David E. Sadava, David M. Hillis, H. Craig Heller, and Sally D. Hacker.*

Course Title: Basic Chemistry
Course code: DML102

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **14 Hours**

Solid State- 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 II **17 Hours**

Solutions- 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 III **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 IV **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-Answer

Suggested Readings

- *Rao, C. N. R. (2019). Applied Chemistry: A Textbook for Engineers and Technologists. New Delhi, India: Universities Press.*
- *Chaudhuri, M. (2018). Principles of Applied Chemistry. Kolkata, India: Academic Publishers.*
- *Sharma, O. P. (2017). Applied Chemistry: Fundamentals and Applications. Mumbai, India: Nirali Prakashan.*
- *Kapoor, H. L. (2016). Applied Chemistry: A Practical Approach. New Delhi, India: Pearson Education India.*
- *Singh, K. (2015). Concepts and Applications of Applied Chemistry. Chennai, India: S. Chand Publishing.*
- *Gupta, S. K. (2014). Applied Chemistry: Principles and Practice. Jaipur, India: Ane Books Pvt. Ltd.*

Course Title: General Microbiology
Course code: DML103

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **14 Hours**

Introduction to Microbiology
Definition, Brief history, importance of microbiology

UNIT II **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 III **12 Hours**

Microscopy-Principle and care, working of Simple microscope and compound microscope, Sterilization- definition -By dry heat, Moist heat, Autoclave & hot air oven- their structure, functioning, controls and sterilization,IndicatorsRadiation and filtration Antiseptics and disinfectants. Definitions, types, properties, use of disinfectants and antiseptics.

UNIT IV **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-Answer

Suggested Readings:

- *Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi*
- *Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi*
- *An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth –Heinemann; Oxford*
- *Textbook of Medical Laboratory Technology by Praful B Godkar; BhalaniPublishing House, Mumbai*
- *Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi*
- *Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK*
- *Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad*
- *Text book of Medical Microbiology by Cruickshank Vol. I and II*

Course Title: Elementary Physics
Course code: DML104

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **15 Hours**

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

UNIT II **15 Hours**

Magnetic Effects of Current and Magnetism, Concept of magnetic field, Oersted's experiment, Biot- Savart law and its application. To current carrying circular loop.Ampere's law and its applications to infinitely long, straight wire, straight and toroidal solenoids.

UNIT III **16 Hours**

Atoms & Nuclei-Alpha-particle scattering experiment, Rutherford's model of atom, Bohr model, Energy levels. Hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars, isotones Radioactivity-alpha,beta and gamma particles/rays and their properties, radioactive decay law. Applications of radio activity.

UNIT IV **14 Hours**

Optics- Reflection of light: spherical mirrors & its types. Refraction of Light: lenses & its types. Image formations, magnification & power of a lens, Refraction and dispersion of light through a prism. Scattering of light-blue color of the sky and reddish appearance of the sun at sunrise and sunset.Microscope & their Magnifying Powers**,** Photo chromatography

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested readings:

- *Elementary Physics by Franklin Herman Ayres*
- *Exercise in Elementary Physics by Charle R.*
- *Particle Physics in Laboratory by Alexander & Studiniken*
- *"Concepts of Modern Physics" by Arthur Beiser*

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-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

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-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

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 plasticware.
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
8. Broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen MediaAerobic and anaerobic culture methods
9. Antimicrobial susceptibility testing by Stokes disc diffusion method

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

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-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *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 Contents

UNIT I **16 Hours**

Spectrophotometry and colorimetry- Introduction, Theory of spectrophotometry and colorimetry, Lambert`s law and Beer`s law, Applications of colorimetry and spectrophotometry

UNIT II **14 Hours**

Photometry-Introduction, General principles of flame photometry, Limitations of flame photometry, Instrumentation, Applications of flame photometry, Atomic absorption spectroscopy – Principle & applications

UNIT III **15 Hours**

Chromatography- Introduction, definition, types of chromatographya) Paper Chromatography: Introduction, principle, types, details for qualitative and quantitative analysis, applicationb) Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations, High performance thin layer chromatographyc) Column chromatography: Introduction, principle column efficiency, application of column chromatographyd) Gas chromatography: Introduction principle, instrumentation, application

UNIT IV **15 Hours**

a) Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application b) Gel Chromatography: Introduction Principle and method, application and advantages c) Electrophoresis: Introduction, principle, Instrumentation, types of electrophoresis - paper and gel electrophoresis,application

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*

- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

Course Title: Basic Hematology
Course code: DML202

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **10Hours** Introduction to Hematology: (a) Definition (b) Importance (c) Important equipment used.

UNIT II **16 Hours**

Laboratory organization and safety measures in hematology Laboratory

UNIT III **17 Hours**

Introduction to blood, its composition, function and normal cellular components, Formation of cellular components of blood: Erythropoiesis, Leucopoiesis, Thrombopoiesis, 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 IV **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, and JSB

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings:

- *Text book of Medical Laboratory Technology by Paraful B. Godkar*
- *Medical laboratory Technology by KL Mukherjee Volume-I*
- *Hematology for students Practitioners by RamnikSood*
- *Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib*
- *Hematology (International edition)EmmanuelC.BesaHarwal Publisher*
- *Practical Hematology by JB Dacie*

- *Practical Hematology (8th edition) by Sir John*
- *Clinical Hematology by Christopher A. Ludlam*
- *Clinical Diagnosis &Management by Laboratory methods (20th edition) by John bernardHenary*
- *Medical Laboratory Technology Methods &Interpretation (5th edition) by RamnikSood Punjab Technical University B.Sc. Medical Laboratory Sciences, Batch 2011*
- *Atlas of haematology(5th edition)by G.A. McDonald*
- *A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach*
- *Haematology (Pathophysiological basis for clinical practice) by Stephen M. Robinson*

Course Title: Basics of Clinical Microbiology
Course code: DML203

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **10 Hours**
Introduction to Microbiology, Definition, Brief history, importance of microbiology

UNIT II **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 III **16 Hours**
Microscopy –Principle and care, working of Simple microscope and compound microscope, 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 IV **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, and Albert's stain.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

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

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

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **15 Hours**

Introduction to human body, its anatomy and physiology Elementary tissues of body and their classification along with brief description. Digestive System: Organs of digestion, histology of the digestive organs (stomach, small intestine, liver, pancreas), Process of digestion, Absorption and assimilation of food,Respiratory System, Organs of respiration and their histology (lungs and trachea), Respiration (Definition and Mechanism)

UNIT II **15 Hours**

The skin (Structure and functions), 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, 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 III **15 Hours** Nervous System- Central nervous system (Brain and Spinal cord), Peripheral nervous system (cranial and spinal nerves), The reflex action and reflex arc, the transmission of nerve impulse, the sense organs (eye, ear, tongue and nose); structure and functions.

UNIT IV **15 Hours**

Muscular System, brief description of skeletal, smooth and cardiac muscles, Muscular contraction, Muscle Fatigue, Some important muscles of body, skeletal System- The skeleton, important bones and their brief description, Articulation of Bones – joints, 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

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *Anatomy & Physiology by Ross and Wilson*
- *Anatomy and Physiology: Understanding the Human Body by Clark*
- *Anatomy and Physiology for nurses by Evelyn Pearce*
- *Anatomy and Physiology for nurses by Sears*
- *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:

1. To demonstrate the principle, working & maintenance of spectrophotometer.
2. To demonstrate the principle, working & maintenance of colorimeter.
3. To demonstrate the principle, working & maintenance of flame photometer.
4. To demonstrate the principle, procedure of paper chromatography.
5. To demonstrate the principle & procedure of Gas chromatography.
6. To demonstrate the principle & demonstration of TLC.
7. To demonstrate the principle & procedure of column chromatography.
8. To demonstrate the principle & procedure of Electrophoresis.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

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-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *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-Answer

Suggested Readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *Biochemistry by Stryer*

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-Answer

Suggested readings:

- *Practical Clinical Biochemistry by Harold Varley*
- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by Mukherjee*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by Chaterjee Shinde*
- *Principal of Biochemistry by Lehninger*
- *Biochemistry by Voet & Voet*
- *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 Contents

UNIT I **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 II **15 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 III **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.

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 **15 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-Answer

Suggested Readings

- *SampathMadhyastha'sManipal 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 P.R Ashalatha & G Deepa 's Textbook of anatomy & physiology by B.D.Chaurasia's Human Anatomy*

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

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Contents

UNIT I **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 II **11 Hours**

Processor and memory: The Central Processing Unit (CPU), main memory.Storage D evices: Sequential and direct access devices, magnetic tape, magnetic disk, optical 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 III **11 Hours**

MS Word Introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, sa ving 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 IV **11 Hours**

Introduction to PowerPoint: introduction, creating and manipulating presentation views, 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 n etwork.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-Answer

Recommended Books

- *Fundamentals of Computer by V Raja Raman; Prentice Hall of India Pvt. Ltd., New Delhi*
- *Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi*
- *Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New*
- *Age International Publishers, New Delhi*
- *Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.*
- *Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt.Ltd., Jungpura, New Delhi*
- *A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd.,Jungpura, New Delhi*
- *Computer Fundamentals by PK Sinha; BPB Publication, New Delhi*
- *Fundamentals of Information Technology by Leon and Leon;Vikas PublishingHouse Pvt.Ltd., Jungpura, New Delhi*
- *On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, PrenticeHall of India Pvt. Ltd., New Delhi*
- *Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar*

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

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Contents

UNIT I **10 Hours**

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

UNIT II **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 III **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 IV **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-Answer

Suggested Readings

- *Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458*
- *Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458*
- *Disaster management set up in India - opcw.org*

- *www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_nov201.*
- *Natural disasters: hospital management | 2015-10-22 | ahc...*
- *www.reliasmedia.com/articles/136571-natural-disasters-hospital-management*
- *Biomedical waste management in India: Critical appraisal - NCBI - NIH*
- *www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295*
- *Vital signs: Understanding what the body is telling us*
- *https://www.coursera.org/learn/vital-signs/*
- *Patient Safety and Quality Improvement*
- *https://www.coursera.org/learn/patient-safety*

Course Title:Principles of Management
Course code: DML304

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNIT I **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 II **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 III **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 IV **15 Hours**

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

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested reading:

- *Medical Laboratories Management- Cost effective methods by Sangeeta Sharma, Rachna Agarwal, Sujata Chaturvedi and Rajiv Thakur.*
- *"The Principles of Scientific Management" by Frederick Winslow Taylor.*
- *"Management: Tasks, Responsibilities, Practices" by Peter F. Drucker.*
- *"The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management" by Peter F. Drucker.*

- *"Principles of Management" by Henri Fayol.*

Course Title:English & Communication Skill
Course code: DML305

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Structure

UNIT I **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 II **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 III **11 Hours**

Speaking: Importance of speaking efficiently; Voice culture, Preparationof 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 IV **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-Answer

Suggested Readings

- *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*
- *Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons*
- *The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India*
- *New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area PhaseII, Chandigarh,*
- *New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34Industrial Area PhaseII*,Chandigarh,

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:

1. **Lymphatic system** - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
2. **Nervous system** - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.
3. **Muscular system** - Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body.
4. **Skeletal system** - Features of bones, axial skeleton, and appendicular skeleton.
5. **Musculoskeletal system** - Joints of upper & lower limb.
6. **Respiratory system** - Nose & Paranasal sinuses, pharynx, larynx, trachea, lungs.
7. **Cardiovascular system** - Heart & blood vessels.
8. **Digestive system -** Oral cavity, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas.
9. **Urinary system** - Kidneys, juxtaglomerular apparatus, ureters, urinary bladder, urethra.
10. **Introduction to genetics** - Features of chromosomes, DNA.
11. **Reproductive system in females** - External & internal genital organs, breast.
12. **Reproductive system in males** - Penis, scrotum, testes, prostate gland.
13. **Endocrine system** - Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *SampathMadhyastha'sManipal 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 P.R Ashalatha & G Deepa 's Textbook of anatomy & physiology by B.D.Chaurasia's Human Anatomy*

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 network.
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 intern et.
5. Application of Computers in clinical settings.

Transaction Modes
Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

Suggested Readings

- *Fundamentals of Computer by V Raja Raman; Prentice Hall of India Pvt. Ltd., New Delhi*
- *Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi*
- *Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New*
- *Age International Publishers, New Delhi*
- *Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.*
- *Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi*
- *A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi*
- *Computer Fundamentals by PK Sinha; BPB Publication, New Delhi*
- *Fundamentals of Information Technology by Leon and Leon;Vikas PublishingHouse Pvt. Ltd., Jungpura, New Delhi*

- *On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi*
- *Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar*

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-Answer

Suggested Readings

- *Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458*
- *Turgeon, Mary Louise. (2015). Clinical Laboratory Science, 7th ed. Maryland Heights, MO: Mosby. ISBN 9780323225458*
- *Disaster management set up in India - opcw.org*
- *www.opcw.org/sites/default/files/documents/event_photos/2010/tabletop_exercise_poland_nov201.*
- *Natural disasters: hospital management | 2015-10-22 | ahc...*
- *www.reliasmedia.com/articles/136571-natural-disasters-hospital-management*
- *Biomedical waste management in India: Critical appraisal - NCBI - NIH*
- *www.ncbi.nlm.nih.gov/pmc/articles/PMC5784295*
- *Vital signs: Understanding what the body is telling us*
- *https://www.coursera.org/learn/vital-signs/*
- *Patient Safety and Quality Improvement*
- *https://www.coursera.org/learn/patient-safety*

Semester-IV

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

L	T	P	Cr.
3	1	0	4

Total Hours 60

Course Contents

UNITI **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.

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

UNITII **14 Hours**

Cranial nerves – (course, distribution, functions and palsy) Sympathetic nervous system, its parts and components, 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 III **16 Hours**

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

UNIT IV **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-Answer

Suggested Readings

- *PR Ashalatha & G Deepa 's Textbook of Anatomy& Physiology by B.D.Chaurasia's Human Anatomy*
- *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*

Course Title:Medical Microbiology
Course code: DML402

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Contents

UNIT I **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 II **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 III **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, and isolation of pure cultures and disposal of cultures

UNIT IV **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, Corynebacterium 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-Answer

Suggested readings:

- *Practical Medical Microbiology by Mackie and Mac. Cartney 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*
- *Text book of Microbiology by Prescott*

Course Title: Hematology
Course code: DML403

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Contents

UNIT I **11 Hours**

Introduction to Hematology1. Apparatus and Instruments: Parts, functions principles and working of compound microscope, centrifuge, water bath and cell counter2. Cleaning of Glass Ware: General and volumetric apparatus cleaning Introduction to Blood1.Erythropoiesis, Leucopoiesis, formation of platelets (Thrombopoiesis)2.Definition, composition and functions of blood3. Anticoagulants: Definition and various types along with their mode of action, merits and demerits of each.

UNIT II **12 Hours**

Collection of Blood;1. Collection of blood; venous and capillary, Various equipment used for collection of blood samples2. Romanowsky Stains3. Preparation and theory, Choice of slide and spreader and preparation of blood film, Characteristics of good film preparation.

UNIT III **11 Hours**

Hemoglobinometery1.Types of Hemoglobin and its function, various methods of estimation, Formation of Hemoglobin and its breakdown2. 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 IV **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-Answer

Suggested reading:

- *Text book of Medical Laboratory Technology by Paraful B. Godkar*
- *Medical laboratory Technology by K.L. Mukherjee Volume-I*
- *Haematology for students Practitioners by RamnikSood*
- *Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib*

- *Haematology (International edition) Emmanuel C. BesaHarwal Publisher*
- *Practical Haematology by J.B. Dacie*
- *Practical Haematology (8th edition) by Sir John*
- *Clinical Haematology by Christopher A. Ludlam*
- *Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henary*
- *Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood*
- *Atlas of Haematology (5th edition) by G.A. McDonald*
- *A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach*
- *Haematology (Patho-physiological basis for clinical practice) by Stephen M. Robinson*

Course Title:Clinical Biochemistry
Course code: DML404

L	T	P	Cr.
2	1	0	3

Course Contents

UNIT I **12 Hours**

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

UNIT II **12 Hours**

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

UNIT III **10 Hours**

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

UNIT IV **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-Answer

Suggested readings:

- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by KL Mukherjee volume III*
- *Practical Clinical Biochemistry by Harold Varley*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by ChaterjeeShinde*

Course Title:Histopathology
Course code: DML405

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Contents

UNIT I **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 II **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 III **11 Hours**

Principles and staining techniques of; Routine- Haemotoxylin and EosinSpecial, 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 IV **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-Answer

Suggested reading:

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

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

L	T	P	Cr.
0	0	2	1

Total Hours 15

Course Contents

Anatomy

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

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-Answer

Suggested Readings

- *PR Ashalatha & G Deepa 's Textbook of Anatomy & Physiology by B.D.Chaurasia's Human Anatomy*
- *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*

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-Answer

Suggested readings:

- *Practical Medical Microbiology by Mackie and Mac. Cartney 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*
- *Text book of Microbiology by Prescott*

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-Answer

Suggested reading:

- *Text book of Medical Laboratory Technology by Paraful B. Godkar*
- *Medical laboratory Technology by K.L. Mukherjee Volume-I*
- *Haematology for students Practitioners by RamnikSood*
- *Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib*
- *Haematology (International edition) Emmanuel C. BesaHarwal Publisher*
- *Practical Haematology by J.B. Dacie*
- *Practical Haematology (8th edition) by Sir John*
- *Clinical Haematology by Christopher A. Ludlam*
- *Clinical Diagnosis & Management by Laboratory methods (20th*

edition) by John Bernard Henary

- *Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood*
- *Atlas of Haematology (5th edition) by G.A. McDonald*
- *A Manual of Laboratory & Diagnostic Tests (6th edition) by Frances Fischbach*
- *Haematology (Patho-physiological basis for clinical practice) by Stephen M. Robinson*

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-Answer

Suggested readings:

- *Text book of Medical Laboratory Technology by P. B. Godker*
- *Medical Laboratory Technology by KL Mukherjee volume III*
- *Practical Clinical Biochemistry by Harold Varley*
- *Principal of Biochemistry by M. A. Siddiqi*
- *Instrumental Analysis by Chatwal Anand*
- *Text book of Medical Biochemistry by ChaterjeeShinde*

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-Answer

Suggested reading:

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

Semester-V

Course Title:Applied Bacteriology
Course code: DML501

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Contents

UNIT I **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 feverBacteriological examination of water, milk and air

UNIT II **12 Hours**

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

UNIT III **11 Hours**

General characteristics of medically important fungi

UNIT IV **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-Answer

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*

Course Title:Applied Hematology
Course code: DML502

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Contents

UNIT I **11 Hours**

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

UNIT II **11 Hours**

Various color indices; their brief description1. Absolute eosinophil counting, Introduction, Various methods, Clinical importance 2. Reticulocyte counting, Introduction, Various methods of counting, Clinical importance

UNIT III **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 Anemia1. 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 IV **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-Answer

Suggested reading:

- *Text book of Medical Laboratory Technology by Paraful B. Godkar*
- *Medical laboratory Technology by KL Mukherjee Volume-I*
- *Haematology for students Practitioners by RamnikSood*
- *Hand book of Medical Laboratory Technology (IInd edition) by V.H. Talib*
- *Haematology (International edition) Emmanuel C. BesaHarwal Publisher*
- *Practical Haematology by J.B. Dacie*
- *Practical Haematology (8th edition) by Sir John*

- *Clinical Haematology by Christopher A. Ludlam*
- *Clinical Diagnosis &Management by Laboratory methods (20th edition) by John Bernard Henary*
- *Medical Laboratory Technology Methods & Interpretation (5th edition) by RamnikSood*
- *Atlas of Haematology (5th edition) by G.A. McDonal*

Course Title:Applied Clinical Biochemistry
Course code: DML503

L	T	P	Cr.
2	1	0	3

Total Hours 45

Course Contents

UNIT I **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 II **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 III **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 IV **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-Answer

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*

Course Title:Medical Parasitology & Virology
Course code: DML504

L	T	P	Cr.
2	0	0	2

Course Contents

UNIT I **7 Hours**

Introduction to Medical Parasitology, General characteristics of protozoa and helminthes

UNIT II **6 Hours**

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

UNIT III **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 IV **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-Answer

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*

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

L	T	P	Cr.
2	0	0	2

Total Hours 30

Course Contents

UNIT I **7 Hours**

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

UNIT II **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 III **7 Hours**

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

UNIT IV **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-Answer

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*

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

L	T	P	Cr.
3	0	0	3

Total Hours 45

Course Contents

UNIT I **11 Hours**

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

UNIT II **12 Hours**

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

UNIT III **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 IV **11 Hours**

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

Transaction Modes

Video based teaching, Collaborative teaching, Case based teaching, Question-Answer

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

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-Answer

Suggested reading:

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

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-Answer

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*

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-Answer

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*

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-Answer

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*

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-Answer

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-VI

Course Title:Professional Training/ Internship
Course code: DML601

L	T	P	Cr.
-	-	-	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.