

DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA

Gangaram Chak, Chak Shyampur, Debra, West Bengal



PROPOSED SYLLABUS (DRAFT) OF

BACHELOR OF MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS)

4-YEAR UNDERGRADUATE PROGRAMME
(w.e.f. Academic Year 2024-2025)

Based on

**Curriculum & Credit Framework for Undergraduate
Programmes (CCFUP), 2023 & NEP, 2020**

| Level | YR. | SEM | Course Type | Course Code | Course Title | Credit | L-T-P | Marks | | | |
|-----------------|-----------------|--------------------------|-------------------------|-------------------|---|----------|--------------|-----------|-----------|------------|------------|
| | | | | | | | | CA | ESE | TOTAL | |
| BMLT (Hons.) | 1 st | I | SEMESTER-I | | | | | | | | |
| | | | Major-1 | BMLTHMJ101 | T: Basic Haematology; P: Practical | 4 | 3-0-1 | 15 | 60 | 75 | |
| | | | SEC | BMLTSEC01 | P: Phlebotomy and Sample Processing; P: Practical | 3 | 0-0-3 | 10 | 40 | 50 | |
| | | | AEC | BMLTAEC01 | Basic diagnostic Instrumentation (<i>only for BMLT programmes</i>) | 2 | 2-0-0 | 10 | 40 | 50 | |
| | | | MDC | BMLTMDC01 | Laboratory Ethics and Biosafety (<i>only for BMLT programmes</i>) | 3 | 3-0-0 | 10 | 40 | 50 | |
| | | | VAC | BMLTVAC01 | Environment and Health (<i>only for BMLT programmes</i>) | 4 | 2-0-2 | 50 | 50 | 100 | |
| | | | Minor-1 | BMLTMI01 | T: Basic Anatomy and Physiology; P: Practical | 4 | 3-0-1 | 15 | 60 | 75 | |
| | | | Semester-I Total | | | | | | 20 | | |
| | | II | SEMESTER-II | | | | | | | | |
| | | | Major-2 | BMLTHMJ102 | T: Basic Pathology; P: Practical | 4 | 3-0-1 | 15 | 60 | 75 | |
| | | | SEC | BMLTSEC02 | P: Pathological data entry in computer ; P: Practical | 3 | 0-0-3 | 10 | 40 | 50 | |
| | | | AEC | BMLTAEC02 | Diagnostic Laboratory Waste Management (<i>only for BMLT prog.</i>) | 2 | 2-0-0 | 10 | 40 | 50 | |
| | | | MDC | BMLTMDC02 | Community Health Programme in India (<i>only for BMLT prog.</i>) | 3 | 3-0-0 | 10 | 40 | 50 | |
| | | | VAC | BMLTVAC02 | T: Basic Microbiology (<i>only for BMLT prog.</i>) | 4 | 4-0-0 | 10 | 40 | 50 | |
| | | | Minor-2 | BMLTMI02 | T: Fundamental Biochemistry; P: Practical | 4 | 3-0-1 | 15 | 60 | 75 | |
| | | | Summer Intern. | CS | Internship Service to Hospital (<i>to be decided by the College</i>) 15 days with submission of report | 4 | 0-0-4 | - | - | 50 | |
| | | Semester-II Total | | | | | | 24 | | | 400 |
| | | TOTAL of YEAR-1 | | | | | | 44 | | | 800 |

MJ = Major, MI = Minor Course, SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-TutorialPractical, MIL = Modern Indian Language, ENV5 = Environmental Studies

**PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF BACHELOR OF
MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS) 4-YEAR
UNDERGRADUATE PROGRAMME**

**SEMESTER- I
MAJOR (MJ)**

Major-1

Basic Haematology

Credits 04 (FM: 75)

Basic Haematology (Theo)

Credit- 03

Course content:

1. Basic concept of blood, plasma and serum, Differences between plasma and serum and their separation.
2. Cellular components of blood- RBC structure, Erythropoiesis in brief and its importance, WBC types- Description of each type. Arneht Index, Leucopoiesis in brief, Function.
Platelets- Structure, Formation and Function of platelets.
3. Blood film preparation and staining.
4. Clotting Time and Bleeding Time- Definition, Determination, and Importance.
5. Blood group: ABO-System & Rh typing, Basic method of blood group detection.
Importance of blood grouping in brief.
6. Plasma protein-Types, Importance of each type. Plasmapheresis.
7. PCV, ESR, Hb concentration-types-MCH, MCHC, Hb- quantification-Sahli's method.
8. Anticoagulants- Types, Uses in blood for processing, Merits and Demerits.
9. Anaemia-General concept, Types-Causes, Detection of Anaemia.
10. Concept of Thalassemia in brief. Types, Causes, Complications
11. Leukaemia- Causes, Complications

Basic Haematology

Credit- 01

Practical

1. Blood film preparation and staining.
2. Separation of plasma and serum from blood.
3. Blood cell count-Total count, Differential count.
4. Identification of different types of WBC.
5. Haemoglobin estimation by Sahli's method.
6. Blood group by Ag-Ab reaction (Agglutination)-ABO Blood grouping & Rh-typing.
7. ESR, PCV determination.
8. Clotting Time & Bleeding Time determination.
9. MCV, MCH, MCHC determination.
10. Arneht Index assessment, Shift to the Left and Right. Schelling Index.

SKILL ENHANCEMENT COURSE (SEC)

SEC 1: Phlebotomy and Sample Processing
SEC 1P: Phlebotomy and Sample Processing

Credits 03(FM: 50)
Credits 03

Course Outline:

1. Phlebotomy Equipment and Supplies:
 - i. Gloves, Tourniquet
 - ii. Alcohol pads, Gauze
 - iii. Needle and needle holder
 - iv. Evacuated blood collection tube and tube inversion technique
 - v. Blood specimen in Phlebotomy
 - vi. Lancet
 - vii. Centrifuge
2. Capillary blood collection procedure, specimen collection, Throat swab specimen collection:
 - i. Venipuncture using a syringe
 - ii. Venipuncture using a butterfly needle
 - iii. Venipuncture using a multisampling needle
 - iv. Dermal puncture
3. Specimen collection other than Blood
 - i. Urine specimen collection
 - ii. Stool specimen collection
 - iii. Sputum collection
4. Specimen processing:
 - i. Specimen labelling, Specimen handling (Light, Time, Temperature).
 - ii. Specimen transportation- Precaution.
 - iii. Process for rejection of specimen.
5. Waste disposal system of collected specimen
6. Separation of serum and plasma.
7. SOP and GLP in Laboratory Medicine.

ABILITY ENHANCEMENT COURSE (AEC)

AEC 1T: Basic diagnostic Instrumentation

Credits 02 (FM: 50)

Course content:

1. Microscope: Light microscope, Compound microscope, Phase Contrast microscope, Fluorescent, Polarized, Electron Microscope.
2. Colorimeter: Working Principle, components, and its application.
3. Spectrophotometer: Working Principle, components, and its application.
4. Centrifuges: Working Principle, types and its application g and rpm.
5. Laminar flow: Working Principle, components, and its application.
6. Autoclave: Types, Working Principle, and its application.
7. Incubator: Working Principle, types, and its application.
8. Blood cell counter: Working Principle, and its application.
9. Semi and full auto-analyser: Working Principle, and its application.
10. Demonstration:
 - a) Demonstration and operation of different microscope (Light microscope, Compound microscope).
 - b) Demonstration and operation of Colorimeter and spectrophotometer.
 - c) Demonstration and operation of centrifuges.
 - d) Demonstration and operation of incubator, hot air oven, laminar flow, and autoclave.

MULTIDISCIPLINARY COURSE (MDC)

MDC 1T: Biosafety and Laboratory Ethics **content:**

Credits 03 (FM: 50) Course

1. Safety of Laboratory - Code of good and safe laboratory practice for support staff and responsibilities of the workers regarding Biosafety. ISO rules for laboratory medicine. Laboratory Biosafety Level Criteria (BSL-1-4).
2. Chemical, electrical, fire and radiation safety. Safety organization. General Safety checklist. Safety equipment. Safety signs.
3. Handling, transfer, and shipment of specimen. Decontamination and disposal. Treatment and disposal technologies for health-care waste. Responsibility from acquisition of the specimen to the production of data. Cross contamination-Factor influencing
4. Medical ethics - Definition - Goal – Scope, Basic principles of medical ethics Confidentiality.
5. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records, it's importance for last 10 years - other various aspects.
6. Obtaining an informed consent (English, Hindi and Regional Language).
7. Ethics in the profession of Medical Laboratory Science, Good behaviour with patients.

VALUE ADDED COURSE (VAC)

VAC 1T: Environment and Health

Credits 04(FM: 100)

Course content:

1. Basic idea about environment, Relation between environment and health. Types of pollutants.
2. Water Pollution-Water related diseases (biological and chemical), water pollution law, water quality criteria and standards, controlling measures of water pollution. Heavy metal pollution of water –Pb, Cd, Hg, As pollution- Sources and Health Hazards.
3. Air pollution- Sources of air pollutants, types, Health hazards by air pollutants, ventilation and its standards, controlling measures of air pollution, air stress indices- heat stress, cold stress, global warming.
4. Noise pollution- Sources, Types of health hazards by noise pollutant. Protection against noise pollution.
5. Pesticides, fertilizers and food preservative link pollution and its impact on human health in general.
6. Food Pollutants-Food additives, adulteration, contaminants.
7. Radioactive pollution- Types, effects.

8. Hygiene, Sanitation and Health

MINOR (MI)

MI – 1: Basic Anatomy and Physiology

Credits 04(FM: 75)

MI – 1T: Basic Anatomy and Physiology

Credits 03

Course contents:

1. Basic concept of Homeostasis in Physiological system- Specially- Blood Pressure, Heart Rate, Blood Coagulation, Endocrine System, feedback system, PH in blood by Buffers.
2. Digestive System- Anatomy of different parts of digestive tract and digestive organs in brief (Stomach, Liver, Gall bladder, Small and Large Intestine).
Digestion of Carbohydrate, Protein and Fat.
3. Excretory System: Anatomy of Excretory duct and Excretory organ- Kidney, Urinary bladder. GFR. Renal failure in brief, Renal function Test-Brief description.
4. Endocrine and Reproductive System- Anatomy of Endocrine and Reproductive organs- Functions of Thyroid, Ant. And Post. Pituitary. Pancreatic, Adrenal glands and gonads. Spermatogenesis and oogenesis. Ovulation. Menstrual Cycle in brief.
5. Cardiovascular System: Anatomy of Heart, Heart Rate, Cardiac Cycle, Heart Sound, Blood pressure, Superficial vein and their anatomical location in details.
6. Respiratory System: Anatomy of Lungs and Trachea, Breathing Process, Mechanism of O₂ and CO₂ transport, Hypoxia, Lung Volume, and its significance. Blood O₂ saturation level and clinical importance.
7. Neurone- system: Anatomy of Cerebral Cortex, Cerebellum, Brain and Spinal Cord. Reflex Process, Autonomic Nervous System.
8. Muscular system-Voluntary and non-voluntary muscle, structure of muscle fibre & muscle contraction.

MI – 1P: Basic Anatomy and physiology (Practical)

Credits 01

Practical contents:

1. Identification of stained tissue section of Stomach, Small Intestine, Large Intestine, Thyroid, Pancreas, Testis, Ovary, Adrenal, Artery, Vein, Oesophagus, Trachea
2. Staining of Squamous epithelial cells.
3. Blood Pressure Recording.
4. Analysis of Spirometry Record.
5. Oxygen saturation study by pulse oximeter.
6. pH determination of different body fluids- Blood, plasma, serum, urine, sweat.
7. Buffer preparation of different strength.

SEMESTER-II

MAJOR (MJ)

MJ-2: Basic Pathology

Credits 04 (FM: 75)

MJ-2T: Basic Pathology

Credits 03

Course content:

1. Introduction Pathology, Different domains. Clinical importance of pathological studies. 2. Pathological samples for clinical diagnosis: Collection procedure, Storing, Processing, Transportation-Precaution in above steps.
3. Composition of urine, collection & preservation of urine
 - a) Physical examination- Colour, pH & specific gravity
 - b) Chemical examination – Protein, Sugar, ketone body, bile salt, bile pigment, blood.
 - c) Microscopic examination. - Cells, casts, crystals
4. Detection of micro albumin & 24 hrs urinary total protein estimation.
5. Stool sample collection, Routine processing, Routine diagnostic tests.
6. Sputum collection, Smear preparation- Routine diagnostic tests.
7. Screening of different common diseases through strip test.

MJ-2P: Basic Pathology (Practical)

Credits 01 Practical

contents:

1. Routine analysis of urine sample: Physical, Chemical (Protein, Sugar, ketone body, bile salt, bile pigment, blood) and Microscopical tests.
2. Sputum: Smear preparation, Staining (AFB).
3. Stool: Collection, Routine diagnosis, Cysts, Ova of Helminth, Occult blood test.

SKILL ENHANCEMENTCOURSE (SEC)

SEC 2P: Pathological data entry in computer

Credits 03 (FM: 50)

Course Outline:

1. Operation of personal computer.
2. Computer data entry using MS Word and MS Excel.
3. Presentation of data through histogram.
4. Presentation of data through Bar diagram, Line diagram.

5. Laboratory Report proforma preparation in computer.
6. Data storage through file with patient registration no.
7. Mean computation of data.

ABILITY ENHANCEMENT COURSE (AEC)

AEC 2T: Diagnostic Laboratory Waste Management

Credits 02 (FM: 50)

Course content:

1. Introduction about health care waste and diseases
2. Infectious waste, Geno-toxic waste, waste sharps
3. Biomedical waste categories categorization, composition of biomedical waste
4. Colour coding, Sources of health care waste
5. Health impact of biomedical waste-direct and indirect
6. Persons at risk of health care waste, legislation policies for management

MULTIDISCIPLINARY COURSE (MDC)

MDC 2T: Community Health Programme in India

Credits 03(FM: 50)

Course content:

1. Brief idea about National Health Programme-Programme formulation, implementation, monitoring, and evaluation.
2. National Vector Borne Disease Control Programme- Malaria, Filariasis, Dengue, Chikungunya.
3. National Leprosy Eradication Programme.
4. Revised National Tuberculosis Programme.
5. National AIDS Control Programme.
6. National Programme for Control of Blindness.
7. Iodine Deficiency Disorders Programme.
8. Universal Immunization Programme.

VALUE ADDED COURSE (VAC)

VAC 2T: Basic Microbiology

Credits 04 (FM: 50)

Course content:

1. Bacterial taxonomy; characteristics of bacterial pathogens; Morphology-structure of a typical bacterial cell- size, shape, arrangement; ultra-structures- flagella, pili, cell wall, cytoplasmic membrane, endospore, capsule, prokaryotic cellular reserve materials.
2. Bacterial nutrition, factors influence bacterial growth.
3. Specimen collection and handing in microbiological laboratory; safety regulation of the laboratory, basic laboratory procedures of diagnostic laboratory.
4. Gram- positive and Gram- negative Staining- Method, Features
5. Fungal taxonomy; morphology, cell structure & reproduction of medically important fungi in brief.
6. Fungal sample collection techniques from mycoses-suspected patient. 7. Types of mycoses: superficial, cutaneous, subcutaneous, systemic, and opportunistic.
7. Laboratory diagnosis of Candida, Aspergillus, Cryptococcus.
8. General properties of viruses, Classification of viruses, Study on common disease producing Virus.
9. Demonstration:
 - a. Sterilization techniques and cleaning of glassware.
 - b. Preparation of culture media
 - c. Culture techniques of different clinical specimens
 - d. Semi-quantitative urine analysis
 - e. Staining techniques: Gram staining, AFB stain.

MINOR (MI)

MI – 2: Fundamental Biochemistry

Credits 04

(FM: 75)

MI – 2T: Fundamental Biochemistry

Credits 03

Course contents:

1. Carbohydrate- Definition, Source, Classification, Functions and Importance, Major types of carbohydrates present in blood and urine. Detection of different carbohydrates in urine by chemical testing. Importance of glucose quantification in blood, MethodStrip & GOD-POD in brief. Blood Glucose level- Fasting, Postprandial.
2. Protein & Amino acids- Definition, Source, Classification, First class and Second Class, Essential and Non-essential amino acid.
Presence of protein in urine: Qualitative testing and Clinical importance.

Protein in plasma, Clinical Importance, Quantitative measurement of plasma protein, Biochemical method in brief.
3. Lipid-Types, Classification, and function. Saturated and unsaturated fatty acid, Cholesterol- Level, Types. Blood level of Cholesterol.

4. Vitamin-Definition, Classification, Function and Clinical Importance. Only name of method for quantification of vitamin by specific method (Principle).
5. Enzymes – Definition, Classification, Mechanism of action, Factors affecting enzyme action, coenzyme, co-factor, Chemical importance of enzyme. Serum Amylase, Lipase ACP, GOT, GPT study and their normal level.
6. Minerals- Na, K, Ca, Fe, Phosphorus- Level in blood. Clinical condition of Hyper and Hypo mineralization. Name of the method for their quantification in blood/ serum.
7. Ketone body-Types, Clinical Importance of their presence in urine. Name of the method for quantification.

MI – 2P: Fundamental Biochemistry (Practical)

Credits 01

Practical contents:

1. Qualitative analysis of Glucose, Albumin, Ketone bodies, Fructose, Protein in Urine. General and specific test.
2. Determination of Blood Glucose by Glucometer, GOD-POD method
3. Determination of SGOT & SGPT using kit.
4. Quantification of Na, K using kit.