VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

BACHELOR OF MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS)

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

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

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VIDYASAGAR UNIVERSITY
BACHELOR OF MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS)
(under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
BMLT (Hons.)	1st	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 (***only for BMLT programmes***)	2	2-0-0	10	40	50
			MDC	BMLTMDC01	Laboratory Ethics and Biosafety (***only for BMLT programmes***)	3	3-0-0	10	40	50
			VAC	BMLTVAC01	Environment and Health (***only for BMLT programmes***)	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				400
		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 (***only for BMLT prog.***)	2	2-0-0	10	40	50
			MDC	BMLTMDC02	Community Health Programme in India (***only for BMLT prog.***)	3	3-0-0	10	40	50
			VAC	BMLTVAC02	T: Basic Microbiology (***only for BMLT prog.***)	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** *(to be decided by the College)*	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-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

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SEMESTER-I

MAJOR (MJ)

MJ-1: Basic Haematology **Credits 04(FM: 75)**

MJ-1T: Basic Haematology **Credits 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. Arneth 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.
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.

MJ-1P: Basic Haematology (Practical) **Credits 01**

Practical contents:

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).
7. ESR, PCV determination.
8. Clotting Time & Bleeding Time determination.
9. MCV, MCH, MCHC determination.

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SKILL ENHANCEMENT COURSE (SEC)

SEC 1: Phlebotomy and Sample Processing **Credits 03(FM: 50)**

SEC 1P: Phlebotomy and Sample Processing **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, Urine specimen collection, Stool specimen collection, Sputum 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 processing:
   i. Specimen labelling, Specimen handling (Light, Time, Temperature).
   ii. Specimen transportation- Precaution.
   iii. Process for rejection of specimen.

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.

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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: Laboratory Ethics and Biosafety **Credits 03(FM: 50)**

Course content:

1. Laboratory ethics of patient-Safety. 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.
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 - other various aspects.
6. Obtaining an informed consent.
7. Ethics in the profession of Medical Laboratory Science

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.
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.

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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

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.
   Gastric ulcer, Gastritis, Pancreatitis.
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: 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. Neuro-Muscular system: Anatomy of Cerebral Cortex, Cerebellum, Brain and Spinal Cord. Reflex Process, Autonomic Nervous System.

MI – 1P: Basic Anatomy and physiology (Practical) **Credits 01**

Practical contents:

1. Identification of stained tissue section of Stomach, Small Intestine, Thyroid, Pancreas, Testis, Ovary, Adrenal.
2. Staining of Squamous epithelial cells.
3. Blood Pressure Recording.

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4. Analysis of Spirometry Record.
5. Oxygen saturation study by pulse oximeter.
6. p^H determination of different body fluids- Blood, plasma, serum, urine, sweat.
7. Buffer preparation of different strength.

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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.

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 ENHANCEMENT COURSE (SEC)

SEC 2: Pathological data entry in computer **Credits 03(FM: 50)**

SEC 2P: Pathological data entry in computer

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.

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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, Filaria, 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 typicalbacterial cell- size, shape, arrangement; ultra-structures- flagella, pili, cell-wall, cytoplasmicmembrane, endospore, capsule, prokaryotic cellular reservematerials.
2. Bacterial nutrition, factors influence bacterial growth.
3. Specimen collection and handing in microbiological laboratory; safety regulation of thelaboratory, 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,

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7. Types of mycoses: superficial, cutaneous, subcutaneous, systemic, and opportunistic.
8. Laboratory diagnosis of Candida, Aspergillus, Cryptococcus.
9. General properties of viruses, Classification of viruses, Study on common disease producing Virus.
10. **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 of glucose quantification in blood, Method-Strip & 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, co-enzyme, co-factor, Chemical importance of enzyme.
   Serum Amylase, Lypase 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.

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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.

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