Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24
Semester 1
Detailed Syllabus

Course: Fundamentals of Anatomy and Physiology **Fundamentals of Anatomy and Physiology Lab**	
Course Code: BMLC101+BMLC191	**Semester: I**
	Maximum Marks: 100+100
Teaching Scheme	**Examination Scheme**
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 2	Continuous Assessment: 25
Credit: 3+2	Practical/Seasonal internal continuous evaluation: 40
	Practical/Seasonal external examination: 60

SL No.	Course Objective
1	The course is designed to provide a working knowledge and skills on cells and tissues and to understand anatomy of human body.
2	Students will be able to develop an understanding of the structure and function of organs and organ systems in normal human body.
3	The course is designed to provide a working anatomical and physiological knowledge and skills on cardiovascular system, musculoskeletal system, genitourinary system, renal system, digestive system, endocrine system, respiratory system.

	Course Outcomes	Mapped module/Unit
CO 1	Able to apply the concepts and knowledge of the general terminology of the human anatomy and understand the cell and tissue structure.	U1
CO 2	Illustrate the knowledge and apply the concept and principles of blood and cardiovascular system.	U1, U2
CO 3	Describe the structure of skeletal, muscular, renal system anatomy and physiology.	U3
CO 4	Recognise the parts of digestive system and develop physiological knowledge of gastrointestinal system.	U4
CO 5	Explain the physiological function and anatomical knowledge of respiratory system, develop physiological knowledge of endocrine system and apply the knowledge, concept of reproductive physiology.	U5
CO 6	Demonstrate the position and structure of cardiovascular system, respiratory system, digestive system, endocrine glands, male and female reproductive organs. Apply the skill in diagnostic laboratory by using the modern tools and techniques and correlate between interdisciplinary branches.	U2, U3, U4, U5

Learning Outcome/Skills:

The candidate will be able to acquire a substantial amount of knowledge on the fundamentals of Anatomy and Physiology and their respective areas which comprise circulatory system, muscular System, skeletal system, digestive system, respiratory and endocrine system. The knowledge will surely help them to work with confidence in the areas which involve the complexities of human body.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	**5**	**10**	**1**	**NA**
U2	**12**	**30**	**1, 2**	**NA**
U3	**8**	**15**	**1, 2**	**NA**
U4	**8**	**15**	**1, 2, 3**	**NA**
U5	**12**	**30**	**1, 2, 3**	**NA**
	45	**100%**		

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Course Code:	**BMLC101**	
Course:	**Fundamentals of Anatomy and Physiology**	Credits: 3.0
Contents		
Chapter	**Name of the Topic**	**Hours**
Unit-I	Terminology and General Plan of the Body, Body Parts and Areas, Terms of Location and Position, Body Cavities and Their Membranes. Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division. Tissue: Types, Structure, Location and Function.	5
Unit-II	Blood-composition, function, cellular component & their function, blood groups and coagulation. Lymphatic system-Composition & function of lymph, Cardiovascular system-general arrange, heart, arteries, veins and capillaries, heart structure and function, cardiac cycle, heart sounds, heart rate, blood pressure, mechanism of circulation, definition of hypertension & shock	12
Unit-III	Musculoskeletal System and Renal physiology: Basic anatomy of important muscles and bones, Structure of skeletal muscle. Muscle contraction and relaxation. Renal physiology: Structure and function of renal system. Urine formation, micturition, renal clearance test, renal buffer system.	8
Unit-IV	Digestive system: basic anatomy. Gastrointestinal physiology: Organs of GIT and their structure & function, secretion, digestion, absorption and assimilation, gastrointestinal hormones, physiology of digestion of carbohydrates, proteins & lipids, Structure & function of liver, spleen, gall bladder & pancreas, Jaundice, Cirrhosis & Pancreatitis	8
Unit-V	Respiratory system and Endocrine system: parts of respiratory system, mechanism of respiration, pulmonary function, pulmonary circulation, lungs volume, Gas transport between lungs and tissues, Definition of hypoxia, dyspnoea, cyanosis, asphyxia and obstructive airways diseases Different hormones in endocrine system. Action of pituitary, thyroid, parathyroid, adrenal and gonadal hormones. Body temperature regulatory process in human - role of endocrine and nervous system. Male and female reproductive organs, Gametogenesis, Ovulation, Menstrual Cycle.	12
	Total:	45

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Course Code: BMLC191	**Course: Fundamentals of Anatomy and Physiology Lab**
Credit: 2	**Practical**
1	Cardiovascular system - Demonstration from model of heart, cardiovascular system, Lymphatic System.
2	Digestive system-demonstration from model, different digestive organs
3	Respiratory system –demonstration from model.
4	Endocrine System - Demonstration of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal from chart.
5	Genitourinary system - Demonstration of male and female reproductive organs from model and chart.
6	Collection of blood sample and separate serum and plasma.
7	To perform total platelet count, RBC count, leucocyte count bleeding time and clotting time
8	To perform Haemoglobin by Sahli's Method and Haemoglobin by CMG method.
9	To measure pulse rate, blood pressure and Demonstration of ECG
10	Demonstrate microscopic structure of bones and muscles with permanent slides

List of Books

Sr. No.	Name of Author	Title of the BOOK	Edition/Publication
1	Chaurasia B D	(2016), Human Anatomy	7th edition, CBS publishers
2	Samaresh Mitra	Anatomy	7the edition, Academic Publishers
3	Ross & Wilson	(2014), Anatomy & Physiology in health & illness	11th edition, Elsevier Publications
4	Gerard J. Tortora and Bryan H.Derrickson	Principles of Anatomy and Physiology	14th edition, Wiley Publications

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Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24
Semester 1
Detailed Syllabus

Course: General Microbiology and Parasitology, Virology and Mycology **General Microbiology and Parasitology, Virology and Mycology Lab**	
Course Code: BMLC102+BMLC192	**Semester: I**
	Maximum Marks: 100+100
Teaching Scheme	**Examination Scheme**
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 2	Continuous Assessment: 25
Credit:3+2	Practical/Seasonal internal continuous evaluation: 40
	Practical/Seasonal external examination: 60

Sl No.	**Course Objective**	
1	This course prepares the students with handling of instruments and sterilization techniques.	
2	Students shall be able to identify and differentiate bacteria, fungus in biological samples and give basic knowledge of virus and parasite in a sample.	
	Course Outcomes	**Mapped module/Unit**
CO 1	Build the basic knowledge of microbiology	U1
CO 2	Acquire the knowledge of parasitology	U1, U2
CO 3	Explain the nature and properties of viruses. Apply the knowledge of different viral diseases.	U1, U3
CO 4	Acquire the knowledge of mycology	U4
CO 5	Understand the mode of infection and safety measure taken in microbiology laboratory. Define the different equipment used in microbiology Lab.	U5
CO 6	Utilize the knowledge and skill in diagnostic laboratory to perform different tests related to microbiology.	U1, U2, U3, U4, U5

Learning Outcome/Skills:

The candidate will accumulate a detailed understanding and knowledge of the contributions of different experts in the field of microbiology, parasitology, virology and mycology further the general characteristics of the microorganism's role functions and the special activities will help the candidate move with a rational approach.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	**8**	**15**	**1**	**NA**
U2	**8**	**15**	**1, 2**	**NA**
U3	**12**	**30**	**1, 2, 3**	**NA**
U4	**10**	**30**	**1, 2, 3**	**NA**
U5	**7**	**10**	**1, 2, 3**	**NA**
	45	**100%**		

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Course Code:	**BMLC102**	
Course:	**General Microbiology and Parasitology, Virology and Mycology** Credits: 3.0	
Contents		
Chapter	**Name of the Topic**	**Hours**
Unit-I	Contribution of Pasteur, Koch & Alexender Fleming, Anton von, Leuwenhock, Joseph, Lister, Edward Jenner. Classification of bacteria, bacteria based on size, shape, arrangement. Detailed structure of bacteria- cell wall, cell membrane, flagella, capsule, pilli, fimbrae, endospore. Growth and nutrition of bacteria.	8
Unit-II	Introduction of parasitology, parasites, Host, classification of parasite (Protozoa, Helaninths). Classification of parasite.	8
Unit-III	Introduction of virology, Characteristics of viruses, Classification of viruses, Baltimore Classifications, DNA and RNA viruses, Brief description of pox virus, Herpes virus, HIV, Hepatitis B, Hepatitis C, Influenza virus. Brief description of antiviral agent, mentioning their mode of action.	12
Unit-IV	Definition of mycology, characteristics of Fungus, Definition of mycoses, Types of mycoses, Pathogens of Fungal infection, Laboratory method of isolating and identifying clinically important fungi.	10
Unit-V	Definition of sterilization, Disinfection, Antiseptic. Physical method of sterilization (Heat, Radiation, Filtration). Chemical methods of sterilization.	7
	Total:	45

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Course Code: BMLC192	**Course: General Microbiology and Parasitology, Virology and Mycology Lab**
Credit: 2	**List of practical**
1	Demonstration of Microscope and its parts.
2	Demonstration of glassware used in microbiology.
3	Demonstration of autoclave and sterilization of glass wares and of media
4	Demonstration of Hot air oven and sterilization of glass wares.
5	Demonstration of Laminar airflow, biosafety cabinet and media preparation
6	Demonstration of Centrifuge.
7	Demonstration of Incubator and preservation of cultures.
8	Preparation of media.
9	Preparation of culture plates
10	To perform Gram staining.
11	To perform Indian ink staining.
12	To perform Acid fast staining (Zeihl Neelsen staining).

List of Books

Sl. No.	Name of Author	Title of the Book	Edition & Publisher
1	Ananthanarayan R. and Paniker C.K.J.	(2009) Textbook of Microbiology	8th edition, University PressPublication
2	Jawetz, Melnick & Adelberg	Medical Microbiology	26th Edition, McGraw-Hill, New York.
3	Goering R., Dockrell H., Zuckerman M. and Wakelin D.	Mims' Medical Microbiology	4th edition, Elsevier
4	Willey JM, Sherwood LM, and Woolverton CJ.	(2013) Prescott, Harley and Klein's Microbiology	9thedition. McGraw Hill Higher Education

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Semester II
Detailed Syllabus

Course: Fundamentals of Pathology **Fundamentals of Pathology Lab**	
Course Code: BMLC201 + BMLC291	**Semester: II**
	Maximum Marks: 100+100
Teaching Scheme	**Examination Scheme**
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 2	Continuous Assessment: 25
Credit:3+2	Practical/Seasonal internal continuous evaluation: 40
	Practical/Seasonal external examination: 60

Sl. No.	**Course Objective**
1.	This curriculum will provide an introductory nature and build the concepts of how human system work in altered and diseased stage under the influence of various internal and external stimuli.

	Course Outcomes	**Mapped module/Unit**
CO 1	Tell the basic knowledge about the history and terminology of pathology.	U1
CO 2	Demonstrate the knowledge of inflammation hypertension and other pathological condition	U1, U2
CO 3	Demonstrate the knowledge of hypertension and other pathological condition	U1, U3
CO 4	Explain the different metabolic disorder like diabetes, protein energy malnutrition and others. Infer the pathological condition of different infectious diseases.	U4
CO 5	Illustrate the knowledge about the cancer and related topics.	U5
CO 6	Apply the skill to draw the blood sample and able to perform few basic tests related to pathology.	U1, U2, U3, U4, U5

Learning Outcome/Skills:

The candidate will be in a position to understand the fundamentals of the history of Pathology, general features, the concepts of tissue and its respective characteristics. The importance of protein molecule in eliminating the various deficiencies, the role of minerals and vitamins to maintain a good health and a detailed overview of cancer, its features, possibility of cure, the various stages and the malignant texture of this deadly disease. All these will be extremely necessary and helpful for the candidate invest the best in the career chosen and by them.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	**7**	**15**	**1**	**NA**
U2	**6**	**10**	**1, 2**	**NA**
U3	**8**	**15**	**1, 2**	**NA**
U4	**12**	**30**	**1, 2, 3**	**NA**
U5	**12**	**30**	**1, 2, 3**	**NA**
	45	**100%**		

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Course Code:	**BMLC201**	
Course:	**Fundamentals of Pathology** Credits: 3.0	
Chapter	**Name of the Topic**	**Hours**
Unit-I	Introduction & History of pathology, Basic definitions and familiarization with the common terms used in pathology, Causes and mechanisms of cell injury, reversible and irreversible injury, Introduction of hyperplasia, hypoplasia, hypertrophy, atrophy, metaplasia, necrosis and apoptosis	**7**
Unit-II	General features of acute and chronic inflammation: Vascular changes, cellular events, Cells and mediators of inflammation, Phagocytosis and its mechanism	**6**
Unit-III	Tissue Renewal and Repair, healing and fibrosis, cirrhosis, introduction of oedema, hyperemia, congestion, hemorrhage, haemostasias, thrombosis, embolism, infarction, shock and hypertension.	**8**
Unit-IV	Protein energy malnutrition, deficiency diseases of vitamins and minerals, nutritional excess and imbalances. Role and effect of metals (Zinc, Iron and Calcium) and their deficiency diseases, Aetiology and pathophysiology of diabetes, arteriosclerosis, myocardial infarction, respiratory diseases (COPD), Parkinson disease, Infectious Diseases: pathogenesis & overview of modes of infections, prevention and control with suitable examples like Typhoid, Dengue	**12**
Unit-V	Cancer: Definitions, nomenclature, characteristics of benign and malignant neoplasm, metastasis, Carcinogens and cancer, concept of oncogenes, tumor suppressor genes, DNA repair genes and cancers stem cells.	**12**
	Total:	**45**

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Course Code: BMLC291	**Course: Fundamentals of Pathology LAB**
Credit: 2	**List of practical**

1	Haemoglobin by CMG method.
2	To perform Total RBC count.
3	To perform total leucocyte count.
4	To perform differential leucocyte count.
5	To perform PCV
6	To calculate Red cell indices.
7	To perform total platelet count.
8	To perform bleeding time.
9	To perform clotting time.
10	To study about CSF examination.
11	Microscopic examination of urine
12	Examination of urine
13	Examination of sputum

List of Books

Sr. No.	Name of Author	Title of the BOOK	Publication
1	Harshmohan	Textbook of Pathology,	7th edition, Jaypee Publications
2	Robbins, (2012)	Text book of Pathology	3rd edition, Elsevier Publications

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Semester II

Detailed Syllabus

Course: GENERAL BIOCHEMISTRY **GENERAL BIOCHEMISTRY LAB**	
Course Code: BMLC202+BMLC292	**Semester: II**
	Maximum Marks: 100+100
Teaching Scheme	**Examination Scheme**
Lecture: 3	End semester Exam: 70
Tutorial: 0	Attendance: 5
Practical: 2	Continuous Assessment: 25
Credit: 3+2	Practical/Seasonal internal continuous evaluation: 40
	Practical/Seasonal external examination: 60

Sl. No.	**Course Objective**
1.	The syllabus of biochemistry introduces the students about the basic knowledge and functions different biomolecules like carbohydrates, amino acids, proteins, enzymes, lipids, nucleic acids, vitamins and minerals.
2.	Students will know the basics of reagent preparation, instruments handling and can perform common analytical test.

	Course Outcomes	**Mapped module/Unit**
CO 1	Demonstrate about different types carbohydrates, which we are taking as meal for generation of energy by metabolic pathways and understand the disease related to carbohydrates.	U1
CO 2	Illustrate the structure, properties and significance of amino acids and proteins, and the catalytic activity of enzymes.	U2
CO 3	Explain the lipid with its function and related disease	U3
CO 4	Understand about the nucleic acids present in human body, Demonstrate about functions of the vitamin, minerals and its deficiency disease.	U4
CO 5	Demonstrate the activities conducted in diagnostic lab.	U5
CO 6	Apply the knowledge and skill in diagnostic laboratory to perform biochemical test	U1, U2, U3, U5

Learning Outcome/Skills:

The candidate will be able to concentrate and gain knowledge adequately on the six basic elements of a balanced diet. Moreover, a knowledge on nucleic acids, the structure, function, types and the specimens of blood, urine and plasma with their respective tones and textures will surely help the candidate to come up confidently and face the world of medicines.

Unit	Total Hours	% of Questions	Bloom's Taxonomy	Remarks, if any
THEORY				
U1	**10**	**15**	**1, 2**	**NA**
U2	**10**	**30**	**1, 2, 3**	**NA**
U3	**10**	**20**	**1, 2**	**NA**
U4	**10**	**25**	**1, 2**	**NA**
U5	**5**	**10**	**1, 2**	**NA**
	45	**100%**		

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Course Code:	**BMLC202**	
Course:	**GENERAL BIOCHEMISTRY** Credits:3.0	
Chapter	**Name of the Topic**	**Hours**
Unit-I	Carbohydrate – Definition, Source, Classification, Functions and Importance, Physiological importance of major type of carbohydrates. Carbohydrate metabolism – Glycolysis, HMP shunt, TCA cycle, Glycogenesis, Glycogenolysis, Neoglucogenesis, Blood sugar level.	**10**
Unit-II	Protein – Definition, Source, Classification, Function and Importance of major type of proteins. Protein metabolism – Transamination, Trans methylation, Deamination, Urea synthesis, inborn error of metabolism. Enzymes: Definition, Classification of enzyme, Cofactor & Coenzymes, Concept of active sites and general mode of action of enzymes, units for measuring enzyme activity, factor affecting enzyme activity, factor responsible for abnormal enzyme secretion.	**10**
Unit-III	Lipids - Definition, Source, Classification, Function of major type of lipids. Saturated and Unsaturated type of fatty acids, Essential fatty acids and their importance. Phospholipids and their importance. Lipid metabolism – Fatty acid oxidation, Ketone bodies, Metabolism of cholesterol, Arteriosclerosis and Obesity.	**10**
Unit-IV	Nucleic acids: Structure, Function and types of DNA and RNA, Nucleotides, Nucleosides, Nitrogen bases, purines and pyrimidine and role of Nucleic acid. Vitamins: classification, function and disease associated with vitamins. Minerals and ions: Requirement, function and biological importance of Calcium, Iron, Iodine, Zinc, Phosphorus, Copper, Sodium and Potassium.	**10**
Unit-V	Specimen collection and processing of blood, urine & CSF, separation of serum and plasma, deproteinization of sample, Handling of specimens for testing, preservation of specimen, transport of specimen, factors affecting the clinical results, effect of storage on sample.	**5**
	Total:	**45**

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Course Code: BMLC292	**Course: GENERAL BIOCHEMISTRY LAB**
Credit: 2	**List of practical**

1	Demonstration of glass and plastic apparatus and equipment (Colorimeter, spectrophotometer, Water distillation plant, pH meter) used in the Biochemistry Lab.
2	Handling and cleaning of the apparatus and equipment.
3	Preparation of different percentage, normal, molar solutions and Preparation of solution by dilution.
4	Preparation of different buffers used in pathological laboratory and determine their PH.
5	Determine of total protein and albumin (quantitative estimation)
6	Determination of Ketone bodies, Bile salt, Bile pigments and urobilinogen in given sample.
7	Determination of cholesterol and triglyceride.
8	Determination of urea in blood.
9	Determination of creatinine in blood.
10	Determination of uric acid.

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List of Books

Sr. No.	Name of Author	Title of the BOOK	Publication
1	D M Vasudevan	(2011), Textbook of Medical Biochemistry	6th edition Jaypee Publishers
2	M N Chatterjea & Rana Shinde	(2012), Textbook of Medical Biochemistry	8th edition,Jaypee Publishers
3	D M Vasudevan & S K Das	Practical text Book of Biochemistry for medical Students	Second edition, Jaypee Brothers Medical Publishers (P) Ltd
4	Nelson & Cox	Principles of Biochemistry	Lehninger
5	J Berg J Tymoczko & L Stryer	Biochemistry	7th Edition, W. H. Freeman and Company, NewYork
6	Voet & Voet	Biochemistry	John Wiley & Sons, Inc
7	R K Murray, D K Granner, P A Mayes, V W Rodwell	Illustrated Biochemistry	31st edition, MC Graw Hill Education (LANGE)