



Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore

Shri Vaishnav Institute of Paramedical Sciences

BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT II SEMESTER

Session 2023-2024

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		L	T	P	CREDITS
			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT201	CC	Basic Histology II (Anatomy & Physiology)	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will

CEO1: rationalize the fundamental knowledge of the human body system.

CEO2: understanding detailed functioning about human system histology.

CEO3: gain knowledge about clinical conditions of different body systems.

Course Outcomes (COs): Student should be able to

CO1: understand the human system with emphasis on normal and pathophysiological conditions.

CO2: acquainted with the different body systems and their prime functions.

CO3: Identification of the different clinical conditions with their signs and symptoms.

CO4: Learn some important clinical identification processes of diseases.

Unit-I

Skeletal system, bones, joints, and muscles.:

- Classification and Functions of Bones. Gross structure of an adult long bone. Development and ossification of bone.
- Classification of bone joints: Fibrous, Cartilaginous and Synovial joints
- Muscles: Types and functions. E-C coupling. Changes during muscle contraction.

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Unit-II

Nervous system II:

- Parts of nervous system. Structure of neurons. Action potential generation.
- Summary of cranial nerves.
- Autonomic nervous system: structure and functions,
- Spinal nerves.
- Special senses.

Unit-III

Urinary system II:

- Glomerular filtration. Determination of GFR.
- Urine formation with reference to Counter current mechanism.
- Nervous control in micturition process.
- Urinary tract infection, Chronic Kidney Disease, Acute Kidney Disease

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Unit-IV

The Cardiovascular System II:

- Circulations: Systemic & Pulmonary. Regional circulations: Coronary and Carotid circulations
- Blood pressure: Types of blood pressure; determination of blood pressure; Hypertension and Hypotension.
- Different cardiovascular diseases.
- Significances of ECG in different cardiac disorders.

Unit-V

Endocrine & Reproductive system II

- Secretion of Insulin. Diabetes Mellitus: Types and causes. Functions of Adrenal cortical hormones and their diseases.
- Parathyroid gland and its functions.
- Male reproduction: Spermatogenesis
- Female reproduction: Oogenesis, Menstruation, Ovulation, Implantation and Pregnancy.

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Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will

CEO1: identify various bones present in the human body.

CEO2: develop understanding about vitals of human cardiovascular system and factors affecting them.
systems.

CEO3: understand, analyze and interpret various histological tests for blood.

Course Outcomes (COs): Student should be able to

CO1: understand and identify the human bones with emphasis on general anatomy and general histology.

CO2: distinguish various human bones based on their respective

CO3: memorize and perform various clinical tests.

CO4: analyze and interpret the results of various blood tests.

List of Practical's

- Bone identification according to their anatomy.
- Determination of different superficial and deep reflexes.
- Determination of Pulse. Different factors affecting pulse.
- Determination of Blood pressure. Different factors affecting Blood pressure.
- Differential count of WBCs.

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Suggested readings:

1. G.K. Pal (2021). *Textbook of Medical Physiology, 4th edition*. Elsevier.
2. Gyton A.C and Hall J.E. (2020). *Textbook of medical physiology*, Prism Books(Pvt) ltd. Bangalore.
3. C.C. Chatterjee . *Human Physiology* Vol.1 and Vol.2, CBS Publishers & Distributers.
4. Graaff et al, (2013). *Schaum's Outline of Human Anatomy and Physiology*. McGraw Hill Education. New York City.
5. C. Shier David et al, (2012), *Hole's Human Anatomy and Physiology*, McGraw Hill Education. New York.
6. Seema Tripathi, *Human Anatomical and Physiological Systems*, Viva Books Pvt. Ltd.

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BMLT202	CC	Biochemistry II	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will -

CEO1: ingrain the understanding bioenergetics

CEO2: understand and comprehend the blood components, urine formation, endocrinology.

Course Outcomes (COs): Student should be able to -

CO1: develop profound knowledge about general biochemistry.

CO2: comprehend with principles bioenergetics.

CO3: acquainted with biomolecules metabolism.

CO4: acquainted with blood and components and related disorders.

CO5: understand urine formation, hormones and related disorders.

Unit I: Bioenergetics, Glycolysis, Kreb's cycle, oxidative phosphorylation, coupled reaction, group transfer.

Unit II: Metabolism of carbohydrates, lipids, Proteins, nucleotides

Unit III: Blood: Blood and circulation: Blood corpuscles, haemopoiesis, plasma function, blood volume, blood volume regulation, blood groups, Hemoglobin: Hemoglobin Production Disorders and Testing

Unit IV: Urine formation, urine concentration, waste elimination, micturition, regulation of water balance, electrolyte balance, acid & base.

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BMLT202	CC	Biochemistry II	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Unit V: Endocrine glands, basic mechanism of hormone action, hormones and diseases; neuroendocrine regulation.

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BMLT202(P)	CC	Biochemistry II (Practical)	00	00	00	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will-

CEO1: understand, analyze and interpret test for macronutrients, blood and Urine.

Course Outcomes (COs): Student should be able to -

CO1: memorize and perform various tests.

CO2: analyze and interpret the results of various tests.

List of Practical's:

1. Qualitative estimation of Carbohydrate
2. Quantitative estimation of Carbohydrate
3. Qualitative estimation of Protein
4. Quantitative estimation of Protein by lowry method
5. Qualitative estimation of Lipid
6. Cell counting
7. Urine components Analysis

Suggested readings:

1. U. Satyanarayana and Chakrapani. (2020). *Outlines of Biochemistry*. ELSEVIER
2. Victor W. Rodwell, David A. Bender. (2015). *Harper's Illustrated Biochemistry*. A Lange Medical book.
3. Drew Provan, Andrew Krentz. (2006). *Oxford Handbook of Clinical and Laboratory*.Oxford University Press.
4. Henry and John Bernard. (2011). *Clinical Diagnosis and Management by Laboratory Methods* Philadelphia.
5. B. Rose S. and Mileusnic, R. (1999). *The Chemistry of Life*. Penguin Press Science.
6. C. Lane, and Oxygen N. (2004). *The Molecule that Made the World*. Oxford University Press. USA.

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BMLT203	CC	MICROBIOLOGY-II	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Education Objectives

CEO1: To explain the general properties and sterilization methods of microorganisms.

CEO2: To provide basic understanding of various contagious microorganisms.

CEO3: To understand the growth requirements and control of microorganisms.

CEO4: To understand pathogenic microorganisms and address the fundamental mechanisms of their pathogenicity.

CEO5: To understand the prevention and treatment of infectious microbes and their control measures.

Course Outcomes

CO1: Students will be able to understand general properties of microorganisms.

CO2: Students will be able to understand various types of contagious microorganisms.

CO3: Students will be able to demonstrate basic microbiology laboratory techniques, that will allow them to investigate the physiology and pathogenicity of microorganisms.

CO4: Students will learn about the core concepts of pathogenic microorganisms.

CO5: Students will be able to understand metabolism, prevention, diagnosis and treatment of pathogenic microbes.

Unit-I

Introduction to Microbial Sterilization Techniques & Culture Methods

Sterilization and Disinfection, Principles, and use of equipment of sterilization, namely Hot air oven, Autoclave and serum inspissation, Pasteurization, Handling of waste, waste segregation and management including disposal. Biohazard. Aerobic and anaerobic culture methods.

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BMLT203	CC	MICROBIOLOGY-II	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

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Unit II

Parasitology

Introduction & classification of medically important parasites, Intestinal & Tissue protozoa (E.histolytica, Giardia Primary Amoebic meningoencephalitis) - Malaria parasite, Leishmanial parasites, Tapeworms, Flukes of liver and, Intestine, Intestinal nematodes, Filarial worms and other tissue nematodes.

Unit III

Human pathogenic bacteria and lab diagnosis

Definition of diseases: Epidemic, Endemic, Pandemic. Bacterial infections including, Tuberculosis, Diphtheria, Meningitis, Whooping cough, Pneumonia, Enteric fever, cholera, leprosy, syphilis, Urinary tractinfections, Gonorrhea etc.

Unit-IV

Human pathogenic Protozoa and lab diagnosis

Morphology, lifecycle, pathogenicity, clinical features, lab diagnosis, prophylaxis & treatment of Entamoebahistolytica, Entamoeba coli, Giardia lamblia, Trichomonas vaginalis, Plasmodium vivax, and Plasmodium falciparum; Difference between P. vivax, P. malariae, P. falciparum and P. ovale.

Unit V

Virology

Introduction to medical virology, Classification of infectious viruses, General characteristics of viruses, physical and biological properties of viruses. Storage of samples for viral diagnosis. Hepatitis viruses, Oncogenic viruses, HIV, SARS, Rotavirus.

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BMLT203(P)	CC	Microbiology II (Practical)	00	00	00	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

List of Practical's

1. Physical agents of control by moist heat and dry heat.
2. Identification of pathogenic organisms.
3. Mechanical agents of control UV radiation
4. Antibiotic susceptibility test.
5. Basic techniques for collection of a specimen for direct examination of pathogenic fungi
KOH. Lactophenol blue method.
6. Basic technique of collection and transport of specimens for virology studies.
7. Usage of sterilization equipments.
8. Hanging drop method for motility
9. Counting bacterial colonies by coulter colony counter.

➤ **Practical's will be modified as per the feasibility.**

Suggested readings:

- Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2014). **Prescott's microbiology**. McGraw-Hill.
- Pelczar Mj, Chan ECS and Kleig NR. (1993). **Microbiology**. Tata McGraw Hill. New York.
- LM Prescott. (2002). **Microbiology**. McGraw Hill. New York.
- Stuart Hoggy, (2005) **Essential Microbiology**, Wiley and Sons. New York.
- Copal E Hopier . 2011). **Manual of Clinical Laboratory methods**. Medical Laboratory.

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- LM Prescott. (2002). *Microbiology*. McGraw Hill. New York.
- Stuart Hoggy, (2005) *Essential Microbiology*, Wiley and Sons. New York.
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BMLT204	CC	Pathology II	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will-

CEO1: Interpret morphological changes of the disease in correlation to clinical manifestations, lab investigations and radiological findings of the disease

CEO2: Acquire the ability to identify and find appropriate solutions to medical problems

Course Outcomes (COs): Student should be able to -

CO1: develop competency in techniques of pathology branches like hematology, clinical pathology, blood bank, histopathology, and cytology.

CO2: acquire knowledge and understand the formation of blood cells, structure, functions, and methods of estimating different parameters.

CO3: understand the detailed aspects of inflammation and healing inflammation.

CO4: understand the principles of hemodynamic disorder.

CO5: acquire knowledge and understand Nutritional & Infectious Diseases in detail.

Unit-I

Introduction to histopathology:

- Different types of specimens in histopathology.
- Tissue specimen collection methods. FNAC.
- Common stains of histopathology laboratory and their compositions.

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BMLT204	CC	Pathology II	60	20	20	0	0	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Unit II

Basic Hematological II:

- Various anticoagulants, their uses, mode of action and their merits and demerits.
- Determination of Hematocrit values by macro and micro methods and their merit and demerits.
- Morphology of normal blood cells and their identification.

Unit-III

Haematological investigations –

- Physiological variations in Hb, PCV, TLC and platelet.
- Preparation and staining procedures of blood smears, study of morphology of blood cells.
- Preparation and staining procedure of Romanowsky dyes for the blood smears.

Unit-IV

Cytological analysis:

- Introduction to exfoliative cytology with special emphasis on female genital tract.
- Collection processing and staining of the Cytologic specimen.
- Different cytological staining processes.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)
Syllabus BMLT II SEMESTER
Session 2023-2024

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		L	T	P	CREDITS
			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT204	CC	Pathology II	60	20	20	0	0	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Unit-V

Pathogenesis:

- Types of cell injuries. Inflammation.
- Neoplasia: carcinogenesis diagnosis and tumour marker.
- Autoimmune and immune deficiency disease causes and identification.

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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT204(P)	CC	Pathology II (Practical)	00	00	00	30	20	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will-

CEO1: understand, analyze and interpret test for histopathology.

Course Outcomes (COs): Student should be able to -

CO1: memorize and perform various tests.

CO2: analyze and interpret the results of various tests.

List of Practical's:

- Reception, recording and labeling of histology specimens.
- Fixation and various fixatives.
- Processing of histological tissues.
- Process of tissue Embedding and embedding media.
- Various types of Decalcifications.
- Tissue section cutting.
- Staining of tissue.

Suggested readings:

- Porter R. (1997) *The greatest benefit to mankind: a medical history of humanity from antiquity to the present*. HarperCollins, London.
- B. Rosai J (1997). *Pathology: a historical opportunity*. Americal Journal of Pathology. Muir's Textbook of Pathology.
- M.I. Filipe et.al. (202). *Histochemistry in Pathology*. Churchill Livingstone. London.

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