GURU KASHI UNIVERSITY

Bachelor of Science in Medical Laboratory Technology

Session: 2024-25

Department of Paramedical Sciences

Graduate Outcomes of the Programme:

The programme B.Sc. MLT imparts to the students an intensive knowledge of Medical Laboratory Technology. Graduates of the programme will be competent enough to perform routine Medical Laboratory procedures within acceptable quality control parameters in Hematology, Clinical-biochemistry, Immunohematology, and Clinical-Microbiology under the supervision of a Medical Laboratory Scientist or Pathologist.

Programme Learning Outcomes: After completion of this Programme learner will be able to:

1. Perform routine medical laboratory procedures within acceptable quality control parameters in hematology, biochemistry, immunohematology, and microbiology.
2. Function in an ethical and professional manner without bias against any ethnicity, race, religion, caste, or gender with a high degree of credibility, integrity, and social concern.
3. Handle, Operate, and maintain laboratory equipment utilizing appropriate quality control and safety procedures.
4. Recognize the impact of laboratory tests in a global and environmental context.
5. Apply problem-solving techniques in the identification and correction of pre-analytical, post-analytical & analytical variables.
6. Formulate technical skills, social behavior, and professional awareness for functioning effectively as a laboratory technician.

Programme Structure

Semester: I							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML101	General Anatomy	Core	4	0	0	4
2	BML102	General Physiology	Core	4	0	0	4
3	BML109	Hematology- I	Core	4	0	0	4
4	BML104	General Anatomy Lab (Practical)	Skill Based	0	0	4	2
5	BML105	General PhysiologyLab (Practical)	Skill Based	0	0	4	2
6	BML110	Hematology- ILab (Practical)	Skill Based	0	0	2	1
7	BML114	Communication & Soft Skills	Compulsory Foundation	2	0	0	2
8	BML199	Human Rights and Duties	Multidisciplinary	3	0	0	3
Disciplinary Elective-I (Any one of the following)							
9	BML112	Medical Ethics	DisciplinaryElective-I	3	0	0	3
10	BML113	Introduction to Quality and Patient Safety					
			Total	**17**	**0**	**12**	**25**

Semester: II							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML210	Immunology & serology	Core	4	0	0	4
2	BML211	Biochemical Metabolism	Core	4	0	0	4
3	BML212	Hematology- II	Core	4	0	0	4
4	BML213	Immunology & serology Lab (Practical)	Skill Based	0	0	2	1
5	BML214	Biochemical Metabolism Lab (Practical)	Skill Based	0	0	2	1
6	BML215	Hematology- II Lab (Practical)	Skill Based	0	0	2	1
7	BML220	Hospital Infection control practices	Value Added Course	2	0	0	2
8	BML299	XXXX	MOOC	-	-	-	3
9	BML221	Environmental Science	Compulsory Foundation	2	0	0	2
Disciplinary Elective-II (Any one of the following)							
10	BML216	Museum Techniques	Disciplinary Elective-II	3	0	0	3
11	BML222	Health Education and Health Communication.					
			Total	**20**	**0**	**6**	**25**

Semester: III							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML321	Histopathological Techniques	Core	4	0	0	4
2	BML322	Clinical Bacteriology	Core	4	0	0	4
3	BML323	Clinical Bacteriology Lab (Practical)	Skill Based	0	0	4	2
4	BML324	Histopathological Techniques Lab (Practical)	Skill Based	0	0	2	1
5	BML325	Medical Terminology & Record keeping	Elective Foundation	3	0	0	3
6	BML399	XXXX	MOOC	0	0	0	3
Disciplinary Elective-III (Any one of the following)							
7	BML326	Biomedical Techniques	Disciplinary Elective-III	3	0	0	3
8	BML327	Introduction to Blood Banking					
Disciplinary Elective-IV(Any one of the following)							
9	BML328	Analytical Biochemistry	Disciplinary Elective-IV	3	0	0	3
10	BML329	Cell Pathology					
Open Elective Course (from other Department)							
11	XXXX	XXXX	IDC	2	0	0	2
			Total	**19**	**0**	**6**	**25**
Open Elective Courses (for other Department)							
12	OEC004	Biomedical waste Management	Open Elective	2	0	0	2
13	OEC016	Health care and Nutrition					

Semester: IV							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML419	Histopathological Diseases & Cytopathology	Core	4	0	0	4
2	BML411	Mycology and Virology	Core	4	0	0	4
3	BML420	Basic Histopathological Diseases Lab (Practical)	Skill Based	0	0	4	2
4	BML415	Mycology and Virology Lab (Practical)	Skill Based	0	0	4	2
5	BML421	Drug Abuse	VAC	2	0	0	2
6	BML425	Human psychology	Multidisciplinary	3	0	0	3
7	BML422	Innovation, creativity and Entrepreneurial mind set	Entrepreneurship skills	0	0	4	2
Disciplinary Elective-V(Any one of the following)							
8	BML417	Community Medicine	Disciplinary Elective-V	3	0	0	3
9	BML418	Clinical Endocrinology					
Disciplinary Elective-VI(Any one of the following							
10	BML423	Molecular Cell Biology	Disciplinary Elective-VI	3	0	0	3
11	BML424	Medical Laboratory Management					
				15	**0**	**14**	**25**

Semester: V							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML511	Blood Transfusion & Immune Hematology	Core	4	0	0	4
2	BML512	Parasitology	Core	4	0	0	4
3	BML514	Blood Transfusion & Immune Hematology Lab (Practical)	Skill Based	0	0	4	2
4	BML515	Parasitology Lab (Practical)	Skill Based	0	0	4	2
5	BML519	Research Methodology	AEC	2	0	0	2
6	BML599	XXXX	MOOC	0	0	0	3
7	BML520	Clinical Data Management	VAC	2	0	0	2
8	BML521	Minor Project	Project	0	0	4	2
Disciplinary Elective-VII (Any one of the following)							
9	BML517	First Aid	Disciplinary Elective-VII	3	0	0	3
10	BML518	Essentials of Medical Pharmacology					
			Total	**15**	**0**	**12**	**24**

Semester: VI							
Sr. No.	**Course Code**	**Course Name**	**Type of course**	**L**	**T**	**P**	**Credits**
1	BML601	Industrial Training/Internship (6 Months)	Skill Enhancement Course	0	0	0	20
			Total	**0**	**0**	**0**	**20**

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: General Anatomy

Course Code: BML101

L	T	P	Cr.
4	0	0	4

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate the Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas, help in employability.
2. Demonstrate the different properties of nerve fibers, anatomy of neuralgia, synapse, CNS, CSF, brain, cranial nerves.
3. Illustrate the anatomy of cell organelles, blood component, skeletal system, circulatory system, lymphatic system and its structure.
4. Classify the various muscles, organs, bones, joints, tendons, ligaments, blood vessels and cells.

Course Contents

UNIT-I **15 Hours**

Introduction to Anatomy, Definition and scope of anatomy, Anatomical terminology and directional terms, Anatomical planes and sections, Bones: Classification, structure, and functions, Bone development and growth Joints: Types and functions, Axial and appendicular skeleton, Muscular System: Muscle types: Skeletal, smooth, and cardiac function of skeletal muscles, Joints and their types.

UNIT-II **15 Hours**

Cardiovascular System, Heart anatomy, Blood vessels: Arteries, veins, and capillaries, Blood composition and functions, Circulation and cardiac cycle, Respiratory tract anatomy: Nasal cavity, pharynx, larynx, trachea, bronchi, and lungs, Gas exchange and respiration, Mechanics of breathing. Respiratory volumes.

Digestive System, Alimentary canal: Mouth, pharynx, oesophagus, stomach, small and large intestine, Accessory digestive organs: Liver, pancreas, and gallbladder

UNIT-III **15 Hours**

Urinary System: Kidney structure and function, Urinary tract: Ureters, urinary bladder, and urethra, Urine formation and excretion Fluid and electrolyte balance, Countercurrent Mechanism, Reproductive System: Male reproductive system: Testes, ducts, accessory glands, and penis, Female reproductive system: Ovaries, uterus, uterine tubes, and vagina, Menstrual cycle and hormonal regulation and Fertilization.

UNIT-IV **15 Hours**

Endocrine System: Endocrine glands and hormones, Regulation of hormone secretion, Major endocrine organs: Pituitary, thyroid, parathyroid, adrenal, pancreas, and gonads, Hormonal control and homeostasis, Pancreas,Insulin ,Glucagon ,Regulation of blood sugar in human body.

Transaction Modes

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

Suggested Readings

- *Chaurasia, B. D. (2010). BD Chaurasia's Human Anatomy. CBS Publishers & Distributors Pvt. Ltd.*
- *Mescher, A. L. (2013). Junqueira's basic histology: text and atlas (Vol. 12). 13th ed. New York: McGraw-Hill*
- *Halim, A. (2008). Human Anatomy: Volume I: Upper Limb And Thorax. IK International Pvt Ltd.*
- *Hallam, J. (2009). Grey's Anatomy: Scalpels, sex and stereotypes. Medical Humanities, 35(1), 60-61.*
- *"Gray's Anatomy for Students" by Richard Drake, A. Wayne Vogl, and Adam W. M. Mitchell.*
- *"Clinically Oriented Anatomy" by Keith L. Moore, Arthur F. Dalley, and Anne M. R. Agur.*

Course Title: General Physiology

Course Code: BML102

L	T	P	Cr.
4	0	0	4

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate the function of each structures related to human body.
2. Show the physiological activity of cell organelles, blood component, function, skeletal system, circulatory system, lymphatic system and its structure
3. Explain properties of nerve fibers, function of neuralgia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
4. Provide knowledge about functioning of Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas, help in employability

Course Contents

UNIT-I **15 Hours**

Introduction to physiology of the human body –Composition of body, Homeostasis, Organization of the human body at the tissue level – Function of Epithelial, Connective, Muscular & Nervous tissues, Blood –haemostasis, coagulation of blood, blood transfusion, Lymphatic system – Function of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus,Resistance & immunity – Innate immunity, acquired immunity, humoral & cell mediated immunity.

UNIT-II **15 Hours**

Respiratory system – Physiology of respiration, gas exchange in lungs, transport of gases between lungs & tissues, regulation of respiration, cardiovascular system - Heart & blood vessels: Systemic circulation, pulmonary circulation, cardiac output, blood pressure.

Digestive system – Process of digestion, function of oral cavity, pharynx, salivary glands, oesophagus, stomach, small intestine, large intestine, liver,

gallbladder, pancreas, Urinary system – Function of kidneys, glomerular apparatus, Ureter, urinary bladder and urethra.

UNIT-III **15 Hours**

Reproductive system– female: Physiology of female reproductive system, Reproductive system – male: Physiology of male reproductive system, Endocrine system - Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands and adrenal glands.

UNIT-IV **15 Hours**

Nervous system – Properties of nerve fibres, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, Skeletal system and bone physiology

Muscular system –Types of Muscles, Properties of skeletal muscle, cardiac muscle, smooth muscle, muscles of the body, Skeletal system – Functions of bones, axial skeleton, and appendicular skeleton, Special senses Skin – Function of skin, hair, sebaceous glands, sweat glands and nails

Transactional modes

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

Suggested Readings

- *Ashalatha, P. R., &Deepa, G. (2012). Textbook of Anatomy & Physiology for Nurses. JP Medical Ltd.*
- *Chatterjee, C. C. (2020). Human Physiology. (13 th edition). CBS Publisher and Distributor Pvt. Ltd.Colorimetry.*
- *Heilbrunn, L. V. (1952). General physiology. Saunders, Philadelphia.*
- *Hall, J. E. 1. (2016). Guyton and Hall textbook of* medical physiology *(13th edition.). Philadelphia, PA: Elsevier.*
- *"Principles of Physiology" by Robert M. Berne and Matthew N. Levy.*
- *"Textbook of Medical Physiology" by Arthur C. Guyton and John E. Hall.*

Course Title: Haematology – I

Course Code: BML109

L	T	P	Cr.
4	0	0	4

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand about the various abnormalities related to blood and blood Component
2. Prepare and analyze blood smears accurately, identifying and quantifying blood cell types and abnormalities..
3. Provide knowledge of Internal and external quality control including reference preparation
4. Handle Routine quality assurance protocol in hematology

Course Contents

UNIT-I **15 Hours**

Introduction to Haematology, Definition, Importance, Important equipment used, Laboratory organization and safety measures in Hematology Laboratory with reference to NABH and NABL. Introduction to blood, its composition, function and normal cellular components.

UNIT-II **15 Hours**

Anticoagulants Types, mode of action and preference of anticoagulants for different haematological studies, Collection and preservation of blood sample for various haematological investigations.

UNIT-III **15 Hours**

Formation of cellular components of blood (Haemopoesis) Erythropoiesis, Leucopoiesis, Thrombopoiesis, Haemoglobin: definition, types, structure, synthesis and degradation,Role of Haemoglobin. Factors affecting the affinity of Haemoglobin for oxygen. Morphology of normal blood cells, Normal Haemostasis & physiological properties of coagulation factors.

UNIT-IV **15 Hours**

Quality assurance in Hematology, Internal and external quality control

including reference, preparation, Routine quality assurance protocol, Statistical methods involved to maintain quality assurance.

Transactional modes

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

Suggested Readings

- *Bain, Imelda, B. and John V. D. (2001). Practical Haematology. London: Churchill Livingstone.*
- *Christopher, A. L. (1990) Clinical Haematology.*
- *John, B. H. (2001). Clinical Diagnosis & Management by Laboratory methods.*
- *McDonald, G.A. (1989). Atlas of haematology*
- *Godkar, P. B., &Godkar, D. P. (2003). Textbook of medical laboratory technology. Bhalani.*
- *Stephen, M. (2001). Clinical Hematology (Pathophysiological basis for clinical practice*.

Course Title: General Anatomy (Practical)

Course Code: BML104

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate the Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas, help in employability.
2. Demonstrate the different properties of nerve fibers, anatomy of neuralgia, synapse, CNS, CSF, brain, cranial nerves.
3. Illustrate the anatomy of cell organelles, blood component, skeletal system, circulatory system, lymphatic system and its structure.
4. Classify the various muscles, organs, bones, joints, tendons, ligaments, blood vessels and cells.

Course Content

List of Practical's / Experiments: **30 Hours**

1. Demonstration of anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, cavities of the body.
2. Demonstration of various tissues from permanent slides. (i) Epithelial tissue (ii) Connective tissue. (iii)Muscular tissue (iv) Nervous tissue
3. Demonstration of individual bone.
4. Demonstration of respiratory system from chart.
5. Demonstration of cardiovascular system form chart.
6. To study digestive system from charts and TS of liver, spleen and pancreas from permanent slides.
7. Study of Urinary system (charts)
8. Study of Genital system (male & female) from charts and TS of testis and ovary from permanent slides.
9. To study nervous system (From models / charts)

10. Demonstration of eye, nose, ear and tongue from model and charts.

Transactional modes

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

Suggested Readings

- *Chaurasia, B. D. (2010). BD Chaurasia's Human Anatomy. CBS Publishers & Distributors Pvt. Ltd.*
- *Mescher, A. L. (2013). Junqueira's basic histology: text and atlas (Vol. 12). 13th ed. New York: McGraw-Hill*
- *Halim, A. (2008). Human Anatomy: Volume I: Upper Limb And Thorax. IK International Pvt Ltd.*
- *Hallam, J. (2009). Grey's Anatomy: Scalpels, sex and stereotypes. Medical Humanities, 35(1), 60-61*

Course Title: General Physiology (Practical)

Course Code: BML105

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate the function of each structures related to human body.
2. Show the physiological activity of cell organelles, blood component, function, skeletal system, circulatory system, lymphatic system and its structure
3. Explain properties of nerve fibers, function of neuralgia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
4. Provide knowledge about functioning of Hormones, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas, help in employability

Course Content

30 Hours

1. Introduction to Basic physiological terminology,
2. Determination of heart rate and pulse rate.
3. Measurement of Blood pressure with sphygmomanometer.
4. To study different cell types.
5. Electro cardio gram (ECG)
6. To study circulatory system from charts and TS of artery and vein from permanent slides.
7. Demonstration of cell division i.e. mitosis and Meiosis from permanent mounted slides.
8. To study various body fluids.
9. Pear expiratory flow rate (PEFR)
10. Determination of blood group.

Transactional modes

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

Suggested Readings

- *Ashalatha, P. R., &Deepa, G. (2012). Textbook of Anatomy & Physiology for Nurses. JP Medical Ltd.*
- *Chatterjee, C. C. (2020). Human Physiology. (13 th edition). CBS Publisher and Distributor Pvt. Ltd.Colorimetry*
- *Heilbrunn, L. V. (1952). General physiology. Saunders, Philadelphia.*
- *Hall, J. E. 1. (2016). Guyton and Hall textbook of* medical physiology*, Philadelphia, PA: Elsevier.*

Course Title: English & Communication Skills

Course Code: BML105

L	T	P	Cr.
1	1		2

Total Hours 30

The objective of this course is to introduce students to the theory, fundamentals and tools of communication.

- To help the students become the independent users of English language.
- To develop in them vital communication skills which are integral to their personal, social and professional interactions.
- The syllabus shall address the issues relating to the Language of communication.
- Students will become proficient in professional communication such as interviews, group discussions, office environments, important reading skills as well as writing skills such as report writing, note taking etc.

Unit1- 1 (Introduction)
- Theory of Communication
- Types and modes of Communication

Unit- 2 (Language of Communication) •
Verbal and Non-verbal • (Spoken and Written)
Personal, Social and Business • Barriers and Strategies
Intra-personal, Inter-personal and Group communication

Unit-3 (Reading and Understanding)
Close Reading
Comprehension
Summary Paraphrasing
Analysis and Interpretation
Translation(from Hindi/Punjabi to English and vice-versa)
Literary/Knowledge Texts
Unit-4 (Writing Skills)
Documenting

Report Writing
Making notes
Letter writing

Suggested Readings:
1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.

Course Title: Haematology - I (Practical)

Course Code: BML110

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: On completion of this course, the learner will be able to

1. Analyze and interpret laboratory results, identify potential sources of error, troubleshoot technical issues, and propose appropriate solutions.
2. maintain and monitor the quality of laboratory reagents, equipment, and procedures to ensure accurate and reliable results.
3. determination of red blood cell count, hemoglobin concentration, hematocrit, white blood cell count, and platelet count.
4. Identify and describe normal and abnormal cell types, including differentiating between various types of white blood cells.

Course Content

List of Practical's / Experiments: **30 Hours**

1. To study Compound Microscope and its part.
2. Demonstration of Blood Cell counter.
3. Preparation of subject for phlebotomy
4. Collection of blood sample for various Lab Investigations.
5. Preparation of various anticoagulants: EDTA, Sodium Citrate, Oxalate with Fluoride
6. To perform Sahli's method for Haemoglobin (Hb) measurement.
7. To perform Cyanmethhemoglobin method for Hb estimation.
8. Preparation of Leishman stain and Wright's Stain.
9. Preparation of smear and staining with Giemsa and Leishman stain.
10. Identification of Normal blood cells.

Transactional modes

Video based teaching, Collaborative teaching, Case based teaching, Question

Answer

Suggested Readings

- *Bain, Imelda, B. and John V. D. (2001). Practical Haematology. London: Churchill Livingstone*
- *Christopher, A. L. (1990) Clinical Haematology.*
- *John, B. H. (2001). Clinical Diagnosis &Management by Laboratory methods.*
- *McDonald, G.A. (1989). Atlas of haematology*
- *Godkar, P. B., &Godkar, D. P. (2003). Textbook of medical laboratory technology. Bhalani.*
- *Stephen, M. (2001). Clinical Haematology (Pathophysiological basis for clinical practice(3rd edition)*.

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Course Title: Introduction To Quality And Patient Safety

Course Code: BML110

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Explore the historical development and evolution of quality improvement and patient safety initiatives in healthcare.
2. Emphasize the importance of ongoing monitoring and continuous improvement in healthcare quality and patient safety.
3. Consider ethical issues related to quality improvement and patient safety, including informed consent and disclosure of errors.
4. Develop the ability to work collaboratively with healthcare teams to promote a culture of safety and quality improvement.

Course Contents

UNIT-I **15 Hours**

Quality assurance and Management Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines. 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-II **10 Hours**

Basic emergency care First aid, choking, rescue breathing methods, ventilation including use of bag valve masters (BVMs) Biomedical Waste Management Definition, waste minimization.

UNIT-III **10 Hours**

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), Infection Prevention and Control, Sterilization, Disinfection, Effective hand hygiene, use of PPE,

UNIT-IV **10 Hours**

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

Transactional modes

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

Suggested Readings

- *Vincent, C. (2011). Patient safety. John Wiley & Sons.*
- *Hall, L. M. (Ed.). (2005). Quality work environments for nurse and patient safety. Jones & Bartlett Learning.*
- *Sandars, J., & Cook, G. (Eds.). (2009). ABC of patient safety (Vol. 72). John Wiley & Sons.*
- *Carayon, P. (2006). Handbook of human factors and ergonomics in health care and patient safety. CRC press.*

Course Title: Medical Ethics

Course Code: BML112

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: On completion of this course, the learner will be able to:

1 Interact with the patients and health care professionals in working area.

2 Handle Legal Responsibilities, Patient safety and quality.

3 Manage Biomedical waste generated from hospital.

4 Employs a body systems-oriented, word-analysis approach to learning medical terminology.

Course Contents

UNIT-I **10 Hours**

Introduction to Medical Ethics:

Definition and scope of medical ethics, Importance of ethical principles in healthcare, Historical development of medical ethics, Ethical Theories and Principles: Utilitarianism, Deontology, Virtue ethics, Autonomy, Beneficence, Non-maleficence, Justice.

UNIT-II **10 Hours**

Role of medical laboratory Technician, Definition and Interaction with the patients and health care professionals, Ethical, Moral, and Legal Responsibilities, Patient safety and quality, restrain policies and role of health professionals, Biomedical waste Management, medical records and reports.

UNIT-III **15 Hours**

Medical terminology- The course employs a body systems-oriented, word-analysis approach to learning medical terminology. Confidentiality and Privacy: Importance of patient confidentiality, Legal and ethical aspects of patient privacy, Ethical dilemmas related to confidentiality and privacy

UNIT-IV **10 Hours**

The goal of the class is to prepare students for the terminology they might encounter in their subsequent coursework, in their clinical rotations and ultimately in their roles as health care professionals.

Transactional modes

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

Suggested readings

- *Pozgar, G. D. (2012). Legal aspects of health care administration. Sudbury, Mass: Jones & Bartlett Learning*
- *Morrison, E. E., & Furlong, E. (2014). Health care ethics: Critical issues for the 21st century. Burlington, MA: Jones & Bartlett Learning.*
- *Kliegman, R., Stanton, B., St. Geme, J. W., Schor, N. F., & Behrman, R. E. (2016). Nelson textbook of pediatrics (Edition 20.). Phialdelphia, PA: Elsevier.*
- *"Principles of Biomedical Ethics" by Tom L. Beauchamp and James F. Childress.*
- *"Medical Ethics: Accounts of Ground-Breaking Cases" edited by Gregory E. Pence.*

Semester -2nd

Course Title: Immunology and Serology

Course Code: BML210

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: On completion of this course, the learner will be able to

1. Demonstrate the structure and functions of the immune system.
2. Explain the immune response mechanisms to different pathogens, including viruses.
3. Describe the principles of virology, including viral replication, pathogenesis, and diagnostic techniques.
4. Identify and classify different types of immune disorders and viral infections.

Course Contents

Unit I **15 Hours**

Introduction to Immunology

Overview of the immune system, Cells and tissues of the immune system, Innate immunity and adaptive immunity, Organs involved in immune system. Antigens, Major histocompatibility complex (MHC), Antibodies, Complement system and Hybridoma technology.

Unit II **15 Hours**

Immune Response, Humoral immune response, Cell-mediated immune response, Immunological memory, Hypersensitivity reactions

Autoimmunity and autoimmune disorders.

Unit III **15 Hours**

Introduction to Serology, Definition, scope, and importance of serology, Antigens and antibodies: structure, properties, and interactions, Immunological techniques used in serology, Serological Tests for Infectious Diseases, Principles and applications of serological tests, Serological diagnosis of viral, bacterial, and parasitic infections, Serological markers for specific diseases (e.g., HIV, hepatitis, syphilis)

UNIT-IV **15 Hours**

Immunological Disorders, Autoimmune diseases and serological markers, Allergic reactions and immunoglobulin measurements, Serological markers in

immunodeficiency disorders, Serological Techniques and Instrumentation: Enzyme-Linked Immunosorbent Assay (ELISA), Western blotting Immunofluorescence assays.

Transactional modes

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

Suggested Readings

- *Abbas, A. K., Lichtman, A. H., Pillai, S., & Baker, D. (2020). Cellular and Molecular Immunology. Elsevier.*
- *Dimmock, N. J., Easton, A. J., & Leppard, K. N. (2019). Introduction to Modern Virology. Wiley-Blackwell.*
- *"Janeway's Immunobiology" by Kenneth Murphy, Casey Weaver, and Allan Mowat.*
- *"Kuby Immunology" by Judy Owen, Jenni Punt, and Sharon Stranford.*
- *"Clinical Immunology and Serology: A Laboratory Perspective" by Christine Dorresteyn Stevens.*

Course Title: Biochemical Metabolism

Course Code: BML211

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to

1. Develop a comprehensive understanding of metabolism, including catabolic and anabolic pathways, and how they are interconnected.
2. Describe major biochemical pathways, such as glycolysis, the citric acid cycle, gluconeogenesis, fatty acid metabolism, and the urea cycle.
3. Comprehend the principles of enzyme kinetics, including enzyme-substrate interactions, enzyme catalysis, and factors influencing enzyme activity.
4. Analyze the metabolism of various macronutrients (carbohydrates, lipids, and proteins) and how they contribute to energy production and cellular function.

Course Contents

Unit I **15 Hours**

Introduction to Biochemical Metabolism, Definition and scope of biochemical metabolism, Overview of metabolic pathways and their regulation

Role of metabolism in maintaining homeostasis, Aerobic respiration, anaplerotic reactions. Metabolic reactions and enzymes, Energy metabolism and ATP production, Carbohydrate Metabolism

Unit II **15 Hours**

Structure and function of carbohydrates, Glycolysis, pyruvate oxidation and gluconeogenesis, Citric acid cycle (Krebs cycle), oxidative phosphorylation Glycogen metabolism and regulation, LipidMetabolism, Structure and function of lipids, Fatty acid metabolism and beta- oxidation, Biosynthesis of fatty acids and cholesterol,Steroid hormones and Bile acids.

Unit III **15 Hours**

Structure and function of amino acids, Protein digestion and amino acid absorption, Transamination and deamination, Urea cycle and ammonia detoxification, Biosynthesis and catabolism of amino acids, Structure and function of nucleotides, Molecules derived from amino acids.

Unit IV **15 Hours**

Nucleotide Metabolism and its Regulation, Vitamins and Minerals, Integration of Metabolic Pathways Hormonal regulation of metabolism, metabolic interconversions and integration, metabolic adaptations during fasting, feasting, and exercise Metabolic diseases and disorders, Metabolic Disorders of carbohydrates, proteins and lipids.

Transactional modes

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

Suggested Readings

- *Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox*
- *"Biochemistry" by Donald Voet, Judith G. Voet, and Charlotte W. Pratt*
- *"Metabolic Regulation: A Human Perspective" by Keith N. Frayn*
- *"Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology" by Gerhard Michal and Dietmar Schomburg.*

Course Title: Haematology-II

Course Code: BML212

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to.

1. Classify and differentiate between a broader range of hematological disorders, including rare and uncommon conditions, based on laboratory findings and clinical symptoms.
2. Explore advanced topics in hemostasis, including the molecular mechanisms of coagulation disorders, such as hemophilia and von Willebrand disease.
3. Demonstrate proficiency in the skills necessary to perform blood cell counts, and evaluation of blood elements within stated limits of accuracy.
4. Determine suitability of hematology specimens and dispose of them in the appropriate bio-hazard containers.

Course Contents

Unit I **15 Hours**

Introduction to Hematology: Overview of haematopoiesis, Components of blood and their functions, Haematological disorders and their classification, Laboratory Techniques in Hematology, Haemoglobin Types, functions and structure.

Unit II **15 Hours**

Blood collection methods, Hematological staining techniques, Automated cell counting and analysis, Examination of bone marrow samples, Hematological Parameters: Red blood cell parameters (RBC count, hemoglobin, hematocrit, etc.), White blood cell parameters (total count, differential count, etc.), Platelet parameters (count, indices, etc.)

Unit III **15 Hours**

Red Blood Cell Disorders: Anaemia: types, classification, and laboratory diagnosis, Hemoglobinopathies (e.g., thalassemia, sickle cell disease)

Polycythaemia and related disorders, White Blood Cell Disorders: Leukaemia: types, classification, and laboratory diagnosis, Lymphoma and myeloma, Myeloproliferative disorders (e.g., chronic myeloid leukaemia)

Unit IV **15 Hours**

Haemostasis and Coagulation Disorders: Blood coagulation pathways, Haemostasis and clotting factors, Bleeding disorders (e.g., haemophilia, von Willebrand disease), Thrombotic disorders (e.g., deep vein thrombosis, disseminated intravascular coagulation, Quality Control and Quality Assurance in Hematology: Quality control measures for haematological tests External quality assurance programs, Troubleshooting common issues in Hematology testing.

Transactional modes

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

Course Title: Immunology and Serology (Practical)

Course Code: BML213

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Promote effective communication and teamwork skills through laboratory activities.
2. Introduce students to the basic principles and concepts of immunology and virology.
3. Develop practical skills in the laboratory techniques used in immunology and virology.
4. Analyze the role of immunology and virology in the diagnosis, prevention, and treatment of infectious diseases.

Course Content

List of Practical's / Experiments **30 Hours**

1. Determination of ABO and Rh blood group of a blood sample.
2. Demonstration of electrophoresis.
3. Measurement of CRP levels as an indicator of Inflammation.
4. Demonstration of ELISA for detection and quantification of specific antigens and antibodies.
5. Demonstration of Hemagglutination inhibition assay.
6. Diagnostic Virology: Laboratory diagnosis of viral infections
7. Serological tests for viral antibodies,
8. Demonstration of PCR for viral detection.

Transactional modes

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

Suggested Readings

- *Abbas, A. K., Lichtman, A. H., Pillai, S., & Baker, D. (2020). Cellular and Molecular Immunology. Elsevier.*

- *Dimmock, N. J., Easton, A. J., & Leppard, K. N. (2019). Introduction to Modern Virology. Wiley-Blackwell.*

Course Title: Biochemical Metabolism (Practical)

Course Code: BML214

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. The primary objective is to gain a comprehensive understanding of the fundamental concepts and principles of biochemical metabolism.
2. To understanding of metabolic disorders and their underlying biochemical abnormalities.
3. Students will acquire practical skills related to biochemical metabolism.
4. Students should be able to interpret and analyze biochemical test results related to metabolism, identify abnormalities, and correlate them with specific diseases or conditions.

List of Practical's / Experiments: 30 Hours

Demonstration of-

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

Transactional modes

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

Suggested readings

- *Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins.*
- *Ferrier, D. R. (2014). Biochemistry. Lippincott Williams & Wilkins.*
- *Varley, H. (1954). Practical clinical biochemistry. Practical clinical biochemistry.*
- *Lucock, M. (2000). Folic acid: nutritional biochemistry, molecular biology, and role in disease processes. Molecular genetics and metabolism, 71(1- 2), 121-138.*
- *Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008). Lehninger principles of biochemistry. Macmillan.*
- *Vasudevan, D. M., Sreekumari, S., &Vaidyanathan, K. (2013). Textbook of biochemistry for medical students. JP Medical Ltd.*

Course Title: Haematology-II (Practical)

Course Code: BML215

L	T	P	Cr.
0	0	4	2

Total Hours 30

Course Learning Outcomes: After completion of this course, the learner will be able to:

1. Develop a comprehensive understanding of metabolism, including catabolic and anabolic pathways, and how they are interconnected.
2. Describe major biochemical pathways, such as glycolysis, the citric acid cycle, gluconeogenesis, fatty acid metabolism, and the urea cycle.
3. Comprehend the principles of enzyme kinetics, including enzyme-substrate interactions, enzyme catalysis, and factors influencing enzyme activity.
4. Analyze the metabolism of various macronutrients (carbohydrates, lipids, and proteins) and how they contribute to energy production and cellular function.

Course Content

List of Practical's / Experiments: **30 Hours**

1. Preparation of Staining reagents (Wright's stain, Romanowsky stain)
2. Demonstration of Laboratory Equipment and necessary safety measures of Laboratory.
3. Determine complete blood count parameters, including red blood cell count, white blood cell count

4. Examine the stained blood smear under the microscope at different magnifications and identify and differentiate various types of white blood cells.
5. Demonstration of Complete Blood Count (CBC) with Differential Count.
6. Determination of percentage of Reticulocytes in the blood.
7. Determination of ESR .

Transactional modes

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

Suggested Readings

- *Hoffbrand's Essential Haematology by A.Victor Hoffbrand and Paul A. H. Moss*
- *Hematology: Basic Principles and Practice by Ronald Hoffman, Edward J. Benz Jr., Leslie E. Silberstein.*
- *"Rodak's Hematology: Clinical Principles and Applications" by Elaine Keohane, Larry Smith, and Jeanine Walenga.*
- *"Hoffbrand's Essential Haematology" by A. Victor Hoffbrand and Paul A. H. Moss*
- *"Clinical Hematology Atlas" by Bernadette F. Rodak and Jacqueline H. Carr.*

Course Title: Museum Techniques

Course Code: BML216

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify the role of museums in society and their significance in preserving cultural heritage.
2. Demonstrate knowledge of collections management practices, including acquisition, cataloging, and documentation.
3. Apply basic conservation techniques for artifact preservation.
4. Design and plan museum exhibitions considering principles of display, lighting, and visitor flow.

Course Contents

UNIT-I **10 Hours**

Introduction to Museum Techniques**,** Overview of museum types and their functions**,** History of medical and scientific museums**,** Roles and responsibilities of museum professionals, Digital Technologies in Museums

UNIT-II **10 Hours**

Museum Management, Collection policies and acquisition procedures, Museum ethics and legal considerations, Funding and financial management of museums, Artefact Handling and Conservation, Principles of artefact handling and safety precautions.

UNIT-III **10 Hours**

Introduction to conservation techniques and materials, Preventive conservation and environmental control, Collections Management, cataloguing systems and documentation standards, Inventory management and database software, Loans, acquisitions, and deaccessioning procedures.

UNIT-IV **15 Hours**

Curatorial Practices, Curatorial roles and responsibilities, Object interpretation and research methods, Exhibition planning and design principles, Exhibition Design, Space planning and layout, Graphics and labelling techniques, Lighting and display case considerations.

Transactional modes

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

Suggested Readings

- *Greenwald, Michael T. "Techniques for collecting large vertebrate fossils." Paleontological Society Special Publications 4 (1989): 264–74*
- *Valtysson, Bjarki, Sanne Lynge Nilsson, and Christine Eva Pedersen. "Reaching Out to be in Reach. Museum Communication in the Current Museum Zeitgeist." Nordisk Museologi 31, no. 1 (May 31, 2021): 8.*
- *Valtysson, Bjarki, Sanne Lynge Nilsson, and Christine Eva Pedersen. "Reaching Out to be in Reach. Museum Communication in the Current Museum Zeitgeist." Nordisk Museologi 31, no. 1 (May 31, 2021): 8.*
- *The Manual of Museum Exhibitions" by Barry Lord and Gail Dexter Lord.*
- *"Museum Registration Methods" by Rebecca Buck and Jean Allman Gilmore*

Course Title: Health Education and Health Communication

Course Code: BML217

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe the importance of health education and health communication in promoting individual and community health.
2. Identify key theories and models related to health behavior change.
3. Explore different communication strategies and techniques used in health education.
4. Develop skills in designing and implementing health education programs.

Course Contents

UNIT-I **10 Hours**

Introduction to Health Education and Health Communication, Importance and goals of health education, Role of health communication in behaviour change, Historical perspectives on health education and communication

UNIT-II **10 Hours**

Theories and Models of Health Behaviour Change Social cognitive theory, Trans theoretical model, Health belief model, Ecological model, Effective Communication Strategies, Principles of effective communication

UNIT-III **10 Hours**

Designing Health Education Programs, assessing needs and setting objectives, developing educational materials, Planning and implementing health education programs, Evaluating program effectiveness, Verbal and non-verbal communication, Health literacy and plain language, Cultural competence in communication

UNIT-IV **15 Hours**

Ethical and Cultural Considerations in Health Education, Ethical guidelines andprinciples, Informed consent and confidentiality, Health communication with vulnerable populations, Evaluation of Health Education and Communication Interventions.

Transactional modes

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

Suggested Readings

- *Bandura, A. (2004).Health promotion by social cognitive means. Health Education & Behavior, 31(2), 143-164.*
- *Brashers, D. E., Haas, S. M., & Neidig, J. L. (2014). Health communication and the social networks of older adults: Implications for health and aging. In R. N. Bostrom & B. H. Westley (Eds.), Communication and aging (pp. 193-222). Routledge.*
- *Freimuth, V. S., Quinn, S. C., Thomas, S. B., Cole, G., Zook, E., & Duncan, T. (2001). African Americans' views on research and the Tuskegee Syphilis Study. Social Science & Medicine, 52(5), 797-808.*

Kreps, G. L., & Sparks, L. (2008). Meeting the health literacy needs of immigrant populations. Patient Education and Counseling, 71(3), 328-332

Course Title: Molecular Cell Biology

Course Code: BML218

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe the organization and structure of cellular components at the molecular level.
2. Analyze cellular signaling pathways and their role in cellular communication.
3. Explore the principles of cell cycle regulation and cell division.
4. Examine the molecular basis of genetic inheritance and mutation.

Course Contents

UNIT-I **10 Hours**

Cell structure and organelles, Transport of molecules across plasma membrane. Structure and function of nucleic acids, Structure and function of proteins, Structure and function of lipids and carbohydrates

UNIT-II **10 Hours**

DNA Replication and Repair, DNA replication, DNA repair mechanisms, Transcription and Translation, Gene expression and regulation, Transcription and RNA processing, Translation and protein synthesis, Cellular Signalling- GPCR and G protein, ion channel, linked enzymes and enzyme linked receptors.

UNIT-III **15 Hours**

Cell Cycle and Cell Division, Cell cycle regulation, Mitosis and meiosis, Molecular Genetics and Inheritance, Mendelian genetics, Chromosomal abnormalities and genetic disorders and Cell fusion experiments.

UNIT-IV **10 Hours**

Molecular Basis of Cancer, Oncogenes and tumour suppressor genes, Mechanisms of cancer development and progression, Techniques in Molecular Biology, DNA extraction and purification, Polymerase chain reaction (PCR), Gel electrophoresis, DNA sequencing

Transactional modes

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

Suggested Readings

- *Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2014). Molecular biology of the cell (6th ed.). Garland Science*
- *Lodish, H., Berk, A., Zipursky, S. L., Matsudaira, P., Baltimore, D., & Darnell, J. (2000). Molecular cell biology (4th ed.). W. H. Freeman*
- *Nelson, D. L., Cox, M. M., & Lehninger, A. L. (2017). Lehninger principles of biochemistry (7th ed.). W. H. Freeman.*
- *Lodish, H., Berk, A., Zipursky, S. L., Matsudaira, P., Baltimore, D., & Darnell, J. (2019). Molecular cell biology (8th ed.). W. H. Freeman.*
- *Lewin, B. (2007). Genes IX. Jones & Bartlett Learning.*
- *Cooper, G. M., & Hausman, R. E. (2013). The cell: A molecular approach (6th ed.). Sinauer Associates*

Course Title: Medical Laboratory Management

Course Code: BML219

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Explain the organizational structure and functions of a medical laboratory.
2. Apply quality management principles and tools to ensure accurate and reliable laboratory results.
3. Demonstrate knowledge of financial management techniques specific to medical laboratories.
4. Comply with relevant regulations, accreditation standards, and ethical considerations in laboratory management

Course Contents

UNIT-I **10 Hours**

Introduction to Medical Laboratory Management Definition and scope of medical laboratory management, Roles and responsibilities of a laboratory manager, Trends and challenges in laboratory management, Laboratory Organization and Workflow

UNIT-II **15 Hours**

Organizational structures in medical laboratories, Laboratory workflow and process optimization, Equipment and inventory management

Quality Management Systems, Introduction to quality management in laboratories, Quality control and assurance, Accreditation and regulatory requirements, Risk management and error prevention, Financial Management in Medical Laboratories

UNIT-III **10 Hours**

Budgeting and financial planning, Cost analysis and pricing of laboratory services, Reimbursement systems and insurance considerations, Revenue cycle management, Human Resource Management, Recruitment, training, and

development of laboratory staff, Performance evaluation and staff motivation, Teamwork and effective communication

UNIT-IV **10 Hours**

Compliance with relevant laws and regulations (e.g., HIPAA), Ethical considerations in laboratory management, Data privacy and security

Strategic Planning and Continuous Improvement, developing a strategic planfor a medical laboratory, Monitoring and improving laboratory performance

Implementing change and innovation

Transactional modes

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

Suggested Readings

- *Harr, R. B. (2016). Medical Laboratory Management and Supervision: Operations, Review, and Study Guide (2nd ed.). American Society for Clinical Pathology Press.*
- *O'Connor, M. L., & Williams, A. (2019). Clinical Laboratory Management (2nd ed.). Elsevier.*
- *Garza, D., & Becan-McBride, K. (2015). The Laboratory Manager's Handbook (4th ed.). ASQ Quality Press.*
- *Vallero, D. A. (2017). Clinical Laboratory Management: A Guide for Clinical Laboratory Scientists. CRC Press.*
- *Mayo Clinic (Eds.). (2016). Mayo Clinic Medical Laboratory Science and Pathology Board Review (3rd ed.). Oxford University Press.*

Semester -3rd

Course Title: Histopathological Techniques
Course Code: BML312

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Develop proficiency in microtomy, including the use of microtomes to cut thin tissue sections of consistent thickness.
2. Recognize decalcification agent, technique of decalcification.
3. Classify dyes, principles of Dye Chemistry sand their uses.
4. Demonstrate the applications of various types of microscopes i.e. dark field, polarizing, phase contrast, interference and fluorescent microscope

Course Contents

UNIT-I **15 Hours**

Introduction to Histotechnology, Compound microscope: Optical system, magnification, and, maintenance, Safety measures in histopathology laboratory Basic concepts about routine methods of examination of tissues, Collection and Transportation of specimens for histological examination,

UNIT-II **15 Hours**

Basic concepts of fixation, various types of fixatives used in a routine, histopathology laboratory Simple Fixatives Compound, fixatives Special fixatives for demonstration of various tissue elements, Decalcification Criteria of a good decalcification agent, Technique of decalcification followed with selection of tissue, fixation and decalcification, neutralization of acid and thorough washing.

UNIT-III **15 Hours**

Various types of decalcifying fluids: Organic & Inorganic Acid, chelating agents, Use of Ion-exchange resigns and Electrophoretic decalcification and treatment of hard tissues which are not calcified. Processing of various tissues for

histological examination Procedure followed by Dehydration, Clearing, and Infiltration and routine timing schedule for, manual, or automatic tissue processing, its care and Maintenance Embedding: Definition, Various types of embedding media, Museum Technology its steps.

UNIT-IV **15 Hours**

Sharpening of Microtome Knives, Honing, Stropping, various types of microtome and their applications, Freezing Microtome, Faults in paraffin section cutting with reason and remedy, mounting cover slip Protocol, Impregnation and Mountants , Classifications of Dyes, Principles of Dye, Mounting of Cover Slips, Labelling and Cataloguing the Slides Routine Staining Procedures, Haematoxylin and Eosin Staining, various types of Haematoxylins Mallory's Phosphotungstic Acid Haematoxylin(PTAH), Autopsy: External Examination and Internal Examination, Mortuary.

Transactional modes

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

Suggested Readings

- *M.Imran (2023).Basics and Techniques of Histopathology Cape Comorin Publisher Kanyakumari, TamilNadu*
- *Bancroft, J. D., & Gamble, M. (Eds.).(2008). Theory and practice of histological techniques.Elsevier health sciences.*
- *Culling, C. F. A., Allison, R. T., & Barr, W. T. (2014). Cellular pathology technique.Elsevier.*
- *Mohan, H. (2015). Textbook of pathology.Jaypee Brothers Medical Publishers.*

Course Title: Clinical Bacteriology

Course Code: BML313

L	T	P	Cr.
4	0	0	4

Total Hours 60

- **Learning Outcomes:** After completion of this course, the learner will be able to:
- To learn the diagnosis of bacteria from infective regions of the body
- Study of their sensitivity

- Examination of bacteria from common samples.
- Study of control measures for nosocomial infection.
- Student can safeguard himself & society and can work diagnostics and hospitals.

Unit I

Historical development in Bacteriology, Classification of Pathogenic bacteria, General methods of isolation and identification of pathogenic bacteria. Hospital infections Quality control in microbiology Laboratory control of antimicrobial therapy Collection of specimens for bacteriological investigations

Unit II

Infections associated with following Gram-positive bacteria – Bacillus anthracis. Clostridium, Pneumococcus, Corynebacterium, Streptococcal infections, Staphylococcal infections.

Unit III

Bacteriological investigation in: PUO, Tuberculosis, Leprosy, Meningitis, Eye infections Causative agents and investigations in cases of: Food poising, gastroenteritis, diarrhea, Respiratory tract infections, Sexually transmitted diseases, Dental infections. Infections associated with following Gram-negative bacteria – Enterobacteriaceae – Salmonella, Shigella, Klebsiella, Proteus, Yersinia and Escheichia. Vibrio, Pseudomonas, Neisseria, Haemophilus, Campylobacter, Bordetella, Brucella.

Unit IV

Infections associated with Mycoplasma, Mycobacterium tuberculosis and Mycobacterium leprae. Spirochetes – Treponema, Borrelia and Leptospira. Actinomycetes. Rickettsiae and Chlamydiae.

Unit V Nosocomial infections and Zoonotic diseases, Sterilization, disinfection and antimicrobial agents, culturing Techniques and sensitivity Testing; MPN count for water Quality.

Transactional modes

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

Suggested Readings

- Text book of Microbiology by Ananthanereyan
- Medical Microbiology by Paniker & SatishGupte
- Medical Microbiology-by Fritz H. Kayser et al
- Bailey and Scott's Diagnostic Microbiology(12th) Ed
- Medical laboratory Technology vol.I, II, III by Mukherjee
- Medical Laboratory manual for tropical countries Vol II Microbiology by MoniaCheesbrough

Course Title: Transfusion Medicine

Course Code: BML

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe the basic concepts of blood banking and transfusion medicine.
2. Perform and interpret routine blood bank tests and procedures.
3. Identify blood groups, antibodies, and antigens involved in blood transfusion.
4. Demonstrate knowledge of blood component preparation and storage.

Course Contents

UNIT-I **15 Hours**

Introduction to Blood Banking, History and evolution of blood banking, Role and responsibilities of a blood bank technologist, Regulatory and ethical considerations in blood banking, Quality assurance and quality control in blood banking, Standard operating procedures (SOPs) and documentation, Blood bank safety measures and infection control.

UNIT-II **15 Hours**

Blood Collection and Processing, Blood collection techniques and anticoagulants, Blood component separation and processing methods, Donor screening and blood donor selection criteria, Transfusion guidelines and protocols, Documentation and record-keeping in blood transfusion

UNIT-III **15 Hours**

Blood Group Systems, ABO and Rh blood group systems, Other significant blood group systems (Kell, Duffy, etc.) Inheritance patterns and clinical significance of blood groups, Immunological and non-immunological adverse reactions, Blood bank organization and staffing.

UNIT-IV **15 Hours**

Blood Components and Storage, Preparation and storage of packed red blood cells (PRBCs), Platelet concentrates and cryoprecipitate preparation, Fresh frozen plasma (FFP) and other blood components, Haemolytic disease of thefoetus and new-born (HDFN), Transfusion support in patients with autoimmune disorders

Transactional modes

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

Suggested Readings

Course Title: Clinical Bacteriology (Practical)

Course Code: BML314

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate theoretical and practical knowledge of bacterial infectious diseases;
2. Demonstrate knowledge and understanding of bacteriological investigations required for the diagnosis and treatment of the infected individual;
3. Perform various clinical laboratory procedures including specimen processing, isolation, identification and susceptibility testing of bacterial pathogens.

Course Content

List of Practical's / Experiments — 30 Hours

1. Sterilization techniques.
2. Staining Techniques-Gram stain, Acid fast stain, Albert stain.
3. Study of motility of bacteria, Hanging drop preparation.
4. Preparation of different culture media and Biochemical media.
5. Culture techniques
6. Isolation of bacteria on Nutrient agar, Blood Agar, Maconky agar
7. Biochemical reactions-Sugar fermentation test, Oxidation-Fermentation test, Urease test, Citrate test, TSI, M.R., V.P.
8. Antibiotic sensitivity test-MIC, MBC, Agar dilution, Broth dilution, Disc diffusion etc
9. Anaerobic culture methods.

Transactional modes

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

Suggested Readings

- Practical Medical Microbiology by Mackie & MacCartney Volume 1 and 2

- Moselio Schaechter, Cary Engleberg, N.Barry I. Eisenstein, Gerald medoff.
- Mechanisms of microbial disease, 3rd ed, Lippincott Williams & Wilkins, 1999.
- Ananthanarayan and Jayaram Paniker. Textbook of Microbiology, 4th ed. Orient Longman, 2000.
- Mandel, G.L. Bennet, J.E. and Dolin, R. 1995.
- Principles and practice of infectious disease. 4th edi. Churchil Living stone. New York.

Course Title: Histopathological Techniques (Practical)

Course Code: BML315

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Cut frozen section and stain for Hematoxylin and Eosin.
2. Prepare Schiff 's reagent in the lab and do Periodic Acid Schiff 's (PAS) stain on a paraffin section.
3. Stain Decalcified paraffin embedded section for the presence of calcium salts.
4. Demonstrate the presence of bacteria and fungi in paraffin embedded sections using the following staining procedures.

Course Content

List of Practical's / Experiments: 30 Hours

1. Introduction to Compound Microscope, Tissue processing
2. Preparation and fixation of tissue section in Formalin.
3. To cut frozen section and stain for Haematoxylin and Eosin, Metachromatic stain Toluidine blue, Oil Red O staining for the demonstration of fat
4. To prepare Schiff 's reagent in the lab and do Periodic Acid Schiff 's (PAS)

stain on a paraffin section

5. To prepare ammonical silver bath in the laboratory and stain paraffin embedded section for the demonstration of reticulin fibres.
6. To stain a paraffin section for the demonstration of smooth muscle by Van Gieson‘s Stain
7. To perform Masson ‘s trichrome stain on a paraffin section for the demonstration of collagen fibre, muscle fibre and other cell elements.
8. To stain for nucleic acid (DNA and RNA) To stain the paraffin section for the demonstration of the elastic fibres (EVG).
9. To stain a paraffin section for the demonstration of iron (Perl ‘s stain) staining procedures:
10. AFB staining (Ziehl Neilson ‘s staining) for M. tuberculosis and leprae

Transactional modes

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

Suggested Readings

- *M.Imran (2023).Basics and Techniques of Histopathology Cape Comorin Publisher Kanyakumari, TamilNadu*
- *Bancroft, J. D., & Gamble, M. (Eds.).(2008). Theory and practice of histological techniques.Elsevier health sciences.*
- *Culling, C. F. A., Allison, R. T., & Barr, W. T. (2014). Cellular pathology technique.Elsevier.*
- *Mohan, H. (2015). Textbook of pathology.Jaypee Brothers Medical Publishers.*

Keeping

L	T	P	Cr.
4	0	0	4

Course Code:

Total Hours:

60 Learning Outcomes: After completion of this course, the learner will be ablet o:

1. Students will demonstrate the ability to maintain accurate, detailed, and up-to-date patient records, ensuring compliance with legal and regulatory standards.
2. Students will be able to apply legal and ethical guidelines in their record-keeping practices, ensuring patient privacy and data security..
3. Students will be able to effectively document patient information, including medical histories, diagnoses, treatment plans, and follow-up care, facilitating seamless communication and continuity of care among healthcare providers.

Course Contents

UNIT I **15 Hours**

Derivation of medical terms, Define word roots, prefixes, and suffixes, Conventions for combined morphemes and the formation of plurals, Basic medical terms, Form medical terms utilizing roots, suffixes, prefixes, and combining roots.

UNIT II **15 Hours**

Interpret basic medical abbreviations/symbols, Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.

UNIT III **15 Hours**

Medical Record Keeping Basics, Introduction to medical record keeping, Components of a medical record, Documentation standards and best practices, Legal and Ethical Aspects of Medical Record Keeping, HIPAA regulations and patient confidentiality, Legal requirements for medical record documentation, Ethical considerations in record keeping

UNIT IV **15 Hours**

- EMR (Electronic medical records).
- HIS (Hospital information system).
- RIS (radiology information system).
- Case studies in medical record documentation

Transactional modes

Video based teaching, Collaborative teaching, Case based teaching, QuestionAnswer

Suggested Readings

- *"Medical Terminology: A Short Course" by Davi-Ellen Chabner*
- *"The Language of Medicine" by Davi-Ellen Chabner*
- *"Medical Terminology for Health Professions" by Ann Ehrlich and Carol L. Schroeder*

"Medical Records and the Law" by William H. Roach Jr. and James E. Carbone.

Course Title: BIOMEDICAL TECHNIQUES

Course Code: BML317

L	T	P	Cr.
3	0	0	3

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Understand the importance of biomedical instruments and Techniques used

in Laboratory.

2. Explore various technologies and techniques used for biomedical assessment.
3. Explore various performance and management methods, including detection determination and sample processing.
4. Comprehend the safe storage practices for biomedical devices, including HPLC, Electrophoresis etc.

Course Contents

UNIT I **15 Hours**

Methods of qualitative analysis of biomolecules: Principles, experimental procedures and application of chromatography – paper, thin-layer, ion exchange, affinity, gel filtration, gasliquid and HPLC. Principles, procedures and application of Electrophoresis- paper, polyacrylamide gel, agarose gel, capillary and cellulose acetate.

UNIT II **15 Hours**

Centrifugation Techniques – Principle and technique of preparative and analytical centrifugation, differential centrifugation, density gradient centrifugation, ultracentrifuge and its application.

UNIT III **15 Hours**

Quantitative methods: Principles and applications of Photometry, Spectrophotometry, flame photometry, flow cytometry ELISA, RIA Western Blotting, FACS, Immuno electrophoresis.

Transactional modes

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

Suggested Readings:

- Molecular Cloning: A Laboratory Manual by Michael R. Green and Joseph Sambrook.
- Principles of Fluorescence Spectroscopy by Joseph R. Lakowicz.
- Biophysical Chemistry: Principles and Techniques by Upadhyay RK

Course Title: Introduction to Blood Banking

Course Code: BML318

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

- able to describe the various components of blood, including red blood cells, white blood cells, platelets, and plasma, and understand their functions.
- Students should understand the procedures for processing blood donations into various blood components and the principles of blood storage and transportation.
- be familiar with the process of blood donation, including donor screening, phlebotomy techniques, and donor care.
- understand the importance of quality assurance in blood banking operations and be aware of regulatory requirements and standards governing blood banking practices.

Course Contents

UNIT I — 15 Hours

Introduction to Blood Banking. History and discovery of various blood group systems. Blood Donation: Donor Motivation, Motivational Techniques, Social Marketing, Preparation of IEC Materials. Donor recruitment & Retention: Types of blood donors, Donor selection, medical interview and medical examination, screening for hemoglobin estimation, Managing rejected blood donors.

UNIT II — 15 Hours

Pre donation counseling, Bleeding of the donor, post donation care, post donation counseling. Screening of blood units for man datory tests, discarding infected units. Blood Donation drive: Awareness programs prior to Donation drive, Camp site, staff requirement, management of camp, transportation of blood units from camp site to blood bank. Preservation of donated blood, blood preservation solutions, Additive solutions

UNIT III — 15 Hours

Apheresis procedures, Apheresis products, preparation of multiple products on cell separators, Maintenance of cell separator equipment. Autologous blood donation, techniques of donor blood collection.

UNIT IV — 15 Hours

Selection of blood bags for component preparation, preparation of red cell concentrate, Fresh Frozen plasma, platelet concentrate, cryoprecipitate, washed red cells, Frozen red cells. Plasma Fractionation: Principles, manufacturing of different plasma derivatives. Component Testing, Labeling. Quality control in blood bank

Transactional modes

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

Suggested Readings

- "Technical Manual" by AABB: Published by the American Association of Blood Banks (AABB)

- "Modern Blood Banking & Transfusion Practices" by Denise M. Harmening
- AABB Technical Manual of Blood Bank and Transfusion Practices" by Anne M. Steiner and Katherin E. McLaughlin

Course Title: Principle of Lab Management and Medical Ethics

Course Code: BML

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Efficiently manage laboratory resources, including personnel, equipment, supplies, and budget, to optimize productivity and provide timely and cost-effective services.
2. Develop and implement efficient processes and workflows to maximize productivity, minimize errors, and reduce turnaround time for laboratory tests.
3. Adhere to professional standards of behavior, including maintaining patient confidentiality, respecting patient autonomy and dignity, and practicing non-discrimination.
4. Understand the importance of maintaining patient confidentiality and privacy, including handling and protecting sensitive patient information in accordance with legal and ethical guidelines

Course Contents

UNIT-I **15 Hours**

Introduction to Management: Definition, nature, and scope of management, Evolution of management theories, Functions of management: planning, organizing, staffing, directing, and controlling. Planning: Importance and types of planning, Setting goals and objectives, Decision-making process, Strategies, policies, and procedures

UNIT-II **10 Hours**

Organizing: Organizational structure and design, Departmentalization and delegation, Authority, responsibility, and accountability, Span of control and coordination, Staffing: Human resource planning, Recruitment and selection process.

UNIT-III **10 Hours**

Leadership styles and theories, Motivation and employee engagement, Communication and effective teamwork, Conflict management and negotiation, Controlling: Importance of control, Types of control mechanisms, Performance measurement and evaluation, Corrective action and feedback.

UNIT-IV **10 Hours**

Managerial Ethics and Corporate Social Responsibility: Ethical decision-making, corporate social responsibility and sustainability, Ethical issues in management, Contemporary Issues in Management: Globalization and international management, Innovation and change management, Diversity and inclusion in the workplace, Technology and digital transformation.

Transactional modes

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

Suggested Readings

- *Brennan, M. (2015). Laboratory Management: Principles and Processes (3rd ed.). Academic Press.*
- *Cohen, R., & Erickson, A. (2019). Medical Ethics: A Very Short Introduction. Oxford University Press.*
- *Galloway, M. (2017). Principles of Laboratory Management: A Review. Medical Laboratory Observer, 49(8), 22-25.*
- *Johnston, C. (2016). Medical Ethics: A Case-Based Approach. John Wiley & Sons.*
- *Pettit, J., & Weaver, K. (2018). Laboratory Management: Principles and Processes (2nd ed.). Routledge.*

Course Title: Biomedical waste Management

Course Code: OEC004

L	T	P	Cr.
2	0	0	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

5. Demonstrate the importance of biomedical waste management in protecting public health and the environment.
6. Explore various treatment technologies used for biomedical waste, such as autoclaving, incineration, chemical treatment, and alternative methods.
7. Explore various waste management methods, including segregation, storage, transportation, treatment, and disposal.
8. Comprehend the safe storage practices for biomedical waste, including container requirements, location, and duration.

Course Contents

UNIT-I **05 Hours**

Introduction to Biomedical Waste Management Definition and classification of biomedical waste Historical overview and importance of biomedical waste management Legal and regulatory framework Types and Sources of Biomedical Waste Classification of biomedical waste based on infectious, hazardous, and general waste.

UNIT-II **05 Hours**

Health Hazards and Risks Potential and hazards associated with improper biomedical waste management, Infection control and prevention measures Waste Segregation and Collection Segregation guidelines and colour coding Collection methods and container types

UNIT-III **10 Hours**

Waste Disposal and Environmental Impact Landfilling, landfill requirements, and considerations Environmental consequences of improper waste disposal Waste-to-energy and recycling options Storage and Transportation Storage requirements and guidelines Transportation regulations and safety measures Treatment Technologies Overview of treatment methods: autoclaving,

incineration, chemical disinfection, etc. Emerging technologies and advancements in waste treatment

UNIT-IV **10 Hours**

Waste Management Planning and Implementation Developing wastemanagement plans for healthcare facilities Staff training and awareness programs monitoring and auditing waste management practices, Biomedical Waste Management Rules 2016.

Transactional modes

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

Suggested Readings

- *Bhattacharya, S., Biswas, S., Das, D., & Nair, P. (2019). Biomedical waste management in India: Critical appraisal. Journal of International Environmental Application & Science, 14(2), 91-97.*
- *Prüss-Üstün, A., & Rapiti, E. (2008). Safe management of wastes from health-care activities. World Health Organization.*
- *Srivastava, A., & Kaushal, R. K. (2020). Biomedical waste management during COVID-19 pandemic: A review. Environmental Sustainability and Resource Management, 2(1), 53-61.*
- *Rao, P. V., & Patnaik, S. K. (2016). Biomedical waste management: An exploratory study. International Journal of Environmental Science and Technology, 13(7), 1607-1616.*

Course Title: Health care and Nutrition

Course Code: OEC016

L	T	P	Cr.
2	0	0	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Explore special diets, including therapeutic diets for conditions like celiac disease, food allergies, and renal disease, as well as cultural and religious dietary restrictions.
2. Explore the principles of nutritional support for patients who are unable to meet their dietary needs through regular oral intake due to illness, surgery, or other factors.
3. Develop skills in providing nutrition counseling and education to patients, emphasizing behavior change and adherence to dietary recommendations.
4. Explore current research in the field of nutrition and apply evidence-based practices in healthcare settings.

Course Contents

UNIT-I **05 Hours**

Introduction to Health Care: Definition and scope of health care, Roles and responsibilities of medical laboratory technologists, Ethical considerations in health care, Overview of human anatomy and physiology, Organ systems and their functions, understanding body systems related to laboratory diagnostics, Health promotion and disease prevention strategies

UNIT-II **05 Hours**

Laboratory information systems and management principles, Introduction to biochemistry and its significance in health care, Carbohydrates, lipids, proteins, and nucleic acids, Enzymes and their role in metabolic processes

UNIT-III **10 Hours**

Hematology: Blood components, blood disorders, and laboratory tests, Clinical microbiology: Basics of microbiology, identification of microorganisms, and antimicrobial susceptibility testing, Quality control and quality assurance in the laboratory, Laboratory safety and regulations

UNIT-IV **10 Hours**

Overview of the immune system, Antibodies, antigens, and their interactions, Immunological techniques and diagnostic tests, Principles of nutrition and its

importance in health care, Essential nutrients and their functions, Dietary guidelines and nutritional assessment, Dietetics and Therapeutic Nutrition: Therapeutic diets for various diseases and conditions, Public Health and Epidemiology:

Transactional modes

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

Suggested Readings

- *Smith, J. (2021). The Future of Healthcare: Innovations and Challenges. Publisher.*
- *Johnson, M., & Davis, L. (2019). Healthcare Management: Principles and Practices. Publisher.*
- *Brown, A., Johnson, M., Davis, L., & Thompson, R. (2018). The Economics of Healthcare: Trends and Issues. Publisher.*
- *Jones, R. (Ed.). (2020). Perspectives on Mental Health: Innovations and Interventions. Publisher.*

Semester-4th

Course Title: Basic Histopathological Diseases

Course Code: BML410

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Identify the diseases of Blood vessels- Atheroma, Arteriosclerosis, heart block.
2. Carry out basics procedures used in diagnose in Diseases of GIT.
3. Explain Glomerulonephritis, Nephrotic syndrome, renal failure, UTI.
4. Find out the abnormalities in endocrine system.

Course Contents

UNIT-I **15 Hours**

Alimentary System: Diseases of mouth, Diseases of Oesophagus- Oesophageal varices. Digestive System: Gastritis, Peptic ulceration, Appendicitis microbial diseases, food poisoning, hernia, Intestinal obstructions & mal absorption. Accessory Digestive glands: Salivary glands- mumps Liver – hepatitis, liver failure, cirrhosis. Pancreas- pancreatitis. Gall Bladder- Gall stones, jaundice and cardiovascular diseases.

UNIT-II **15 Hours**

Circulatory System: Diseases of Blood vessels- Atheroma, Arteriosclerosis, heart block. Disorders of Blood Pressure Hyper & Hypotension. Respiratory System: Upper respiratory tract infection, Bronchi, Asthma, Pneumonia, Lung abscess, Tuberculosis, Lung Collapse.

UNIT-III **15 Hours**

Urinary System: Glomerulonephritis, Nephrotic syndrome, renal failure, renal calculi, Urinary obstruction, Urinary tract infection. Reproductive system: Sexually transmitted diseases, Pelvic inflammatory disease, disorder of cervix (CIN), Disease of ovaries, ectopic pregnancy, prostatitis, Infertility

UNIT-IV **15 Hours**

Diseases of Blood vessels- Atheroma, Arteriosclerosis, heart block. Glomerulonephritis, Nephrotic syndrome, renal failure, UTI. Nervous System: Neuronal damage, Cerebral Infarction, head injury, Alzheimer ‘s disease, dementia. Endocrine System: Pituitary: Hyper & Hypo secretions Thyroid: Goitre Adrenal: Cushing Syndrome, Addison Disease.

Transactional modes

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

Suggested Readings

- *M.Imran (2023).Basics and Techniques of Histopathology Cape Comorin Publisher Kanyakumari, TamilNadu*
- *Clark R.K. (2010).Anatomy and Physiology: Understanding the Human Body.*
- *Pearce, E. C. (1968). Anatomy and Physiology for Nurses*
- *Sears, Gordon, W., Winwood, R. S. and Smith J. L. (1985). Anatomy and Physiology for Nurses*

Course Title: Mycology and Virology

Course Code: BML411

L	T	P	Cr.
4	0	0	4

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

2. Demonstrate different types of immunological tests, State the principle of immunological tests
3. Examine the major aspects of human fungal infections and how to identify the pathogens.
4. Describe the basic structure and classification of pathogenic fungi;
5. Demonstrate knowledge and understanding of the pathogenesis of the various mycoses, their clinical manifestations, diagnosis and management.

Course Contents

UNIT-I **15 Hours**

Introduction to Mycology, Definition, scope, and importance of mycology Classification and nomenclature of fungi, Structure and morphology of fungi

Reproduction and life cycles of fungi, Classification of Medically Important Fungi, Systematic classification of pathogenic fungi, Identification and characterization of common pathogenic fungi, Clinical manifestations and diseases caused by pathogenic fungi.

UNIT-II **15 Hours**

Laboratory Techniques in Mycology, Collection, transportation, and processing of clinical specimens, Preparation and staining of fungal smears, Culture media and methods for fungal isolation, Identification of fungi using microscopic and macroscopic techniques, Antifungal susceptibility testing Fungal Infections, Superficial, cutaneous, and subcutaneous fungal infections, Systemic fungal infections, Opportunistic fungal infections, Diagnosis, treatment, and prevention of fungal infections.

Unit III **15 Hours**

Introduction to Virology, Viral structure and classification, Viral replication strategies, Viral pathogenesis, Host-virus interactions, Antiviral drugs and therapies

Unit IV **15 Hours**

Viral Infections, DNA viruses, RNA viruses, Respiratory viruses, gastrointestinal viruses, Hepatitis viruses, sexually transmitted viruses, Retroviruses and HIV/AIDS, Laboratory Diagnosis of Viral Infections, Serological tests for viral infections, Molecular diagnostic techniques (PCR, RT-PCR), Virus isolation and identification, Viral antigen detection methods

Transactional modes

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

Suggested Readings

- *Alexopoulos, C. J., Mims, C. W., & Blackwell, M. (1996). Introductory mycology. John Wiley & Sons.*
- *Kirk, P. M., Cannon, P. F., Minter, D. W., & Stalpers, J. A. (2008). Dictionary of the fungi (10th ed.). CABI.*
- *Deacon, J. W. (2013). Fungal biology (4th ed.). Wiley-Blackwell.*
- *Coligan, J. E., Kruisbeek, A. M., Margulies, D. H., Shevach, E. M., & Strober, W. (Eds.). (2014). Current protocols in immunology. John Wiley &Sons.*
- *Rose, N. R., Hamilton, R. G., & Detrick, B. (Eds.). (2018). Manual of clinical laboratory immunology (8th ed.). ASM Press.*

Total Hours 60

Course Title: Basic Cytopathology

Course Code: BML412

L	T	P	Cr.
4	0	0	4

Learning Outcomes: After completion of this course, the learner will be able to:

1. Follow Principles and preparation, Cytocentrifuge, molecular cytology, Cell Block and Immune- cytochemistry.
2. Gain the ability to interpret cellular specimens, recognizing cellular abnormalities, inflammation, and signs of malignancy.
3. Diagnose the fluid cytology urine, CSF , body fluids (pleural, pericardial, ascetic).
4. Narrate indications & utility of the technique with special emphasis on role in FNAC.

Course Contents

UNIT- I **15 Hours**

Cryostat sectioning, its applications in diagnostic Cytopathology, Enzyme Cytochemistry, Diagnostic applications Demonstration of Phosphates, Dehydrogenises, Oxidase & Peroxides

UNIT- II **15 Hours**

Vital staining for Sex Chromatin, Aspiration cytology: Principle Indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics

UNIT-III **15 Hours**

Exfoliative cytology (Papanicolaoue technique for the staining of cervical smears), Cervical cytology

Fluid Cytology, Urine, CSF, Body Fluids (Pleural, Pericardial, Ascetic)

UNIT-IV **15 Hours**

Automation in cytology, Liquid based cytology: Principles and preparation, Cytocentrifuge, molecular cytology, Cell Block and Immune-cytochemistry.

Transactional modes

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

Suggested Readings

- *Kumar, V., Abbas, A. K., & Aster, J. C. (2017). Robbins basic pathology e-book.Elsevier Health Sciences.*
- *Bancroft, J. D., & Gamble, M. (Eds.).(2008). Theory and practice of histological techniques.Elsevier health sciences.*
- *Culling, C. F. A., Allison, R. T., & Barr, W. T. (2014). Cellular pathology technique.Elsevier.*
- *Mohan, H. (2015). Textbook of pathology.Jaypee Brothers Medical Publishers.*
- *Mohan, H. (2012). Pathology practical book. JP Medical Ltd.*
- *Culling, C. F. A. (2013). Handbook of histopathological and histochemical techniques: including museum techniques. Butterworth-Heinemann.*

Total Hours 30

Course Title: Environmental Science

Course Code: BML413

L	T	P	Cr.
2	0	0	2

Learning Outcomes: After completion of this course, the learner will be able to:

1. Analyze the sources, types, and effects of pollution, including air pollution, water pollution, soil contamination, and noise pollution.
2. Classify the causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution
3. Examine waste generation, disposal methods, recycling, and waste reduction strategies to minimize environmental impacts.
4. Explore the science of climate change, its causes, consequences, and mitigation strategies.

Course Contents

UNIT-I **05 Hours**

Introduction: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness. Natural Resources - Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

UNIT-II **05 Hours**

Ecosystems: Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hotspots of biodiversity

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards

UNIT-III **10 Hours**

Solid waste management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution

case studies, Disaster management: Floods, earthquake, cyclone and landslides. Case studies, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, Environment Protection Act, Air (Prevention and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act.

UNIT-IV **10 Hours**

Human Population and the Environment, Population growth, variation among nations. Population explosion–Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare, Role of Information Technology in Environment and human health. Case studies. Understanding the Hospital Environment Understanding the environment in the following clinical laboratories: Microbiology, Biochemistry, Histopathology, Hematology Clinical laboratory hazards to the environment from the following and means to prevent: Infectious material, Toxic Chemicals, Radioactive Material, Other miscellaneous wastes

Transactional modes

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

Suggested Readings

- *Vincent, C. (2011). Patient safety. John Wiley & Sons.*
- *Hall, L. M. (Ed.). (2005). Quality work environments for nurse and patient safety. Jones & Bartlett Learning.*
- *Sandars, J., & Cook, G. (Eds.). (2009). ABC of patient safety (Vol. 72). John Wiley & Sons.*
- *Carayon, P. (2006). Handbook of human factors and ergonomics in health care and patient safety. CRC press.*

Course Title: Mycology and Virology (Practical)

Course Code: BML415

L	T	P	Cr.
0	0	4	3

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Perform different types of immunological tests, State the principle of immunological tests.
2. Examine the major aspects of human fungal infections and how to identify the pathogens.
3. Describe the basic structure and classification of pathogenic fungi.
4. Demonstrate knowledge and understanding of the pathogenesis of the various mycoses, their clinical manifestations, diagnosis and management.

Course Content

List of Practical's / Experiments: **30 Hours**

1. Fungal morphology and structure
2. Serological Test for Dengue.
3. **LPCB** & KOH mount Procedure.
4. Lab Diagnosis of Fungal infections
5. To perform India Ink Staining.
6. Agglutination tests (e.g., Widal, VDRL, RPR))
7. Enzyme-linked immunosorbent assays (ELISAs)
8. **Preparation of Culture media for Fungi.**
9. Fluorescent antibody techniques
10. **Triple viral markers: HIV,HCV,HbsAg.**

Transactional modes

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

Suggested Readings

- *Alexopoulos, C. J., Mims, C. W., & Blackwell, M. (1996). Introductory mycology. John Wiley & Sons.*
- *Kirk, P. M., Cannon, P. F., Minter, D. W., & Stalpers, J. A. (2008). Dictionary of the fungi (10th ed.). CABI.*
- *Deacon, J. W. (2013). Fungal biology (4th ed.). Wiley-Blackwell.*
- *Coligan, J. E., Kruisbeek, A. M., Margulies, D. H., Shevach, E. M., & Strober, W. (Eds.). (2014). Current protocols in immunology. John Wiley & Sons.*
- *Rose, N. R., Hamilton, R. G., & Detrick, B. (Eds.). (2018). Manual of clinical laboratory immunology (8th ed.). ASM Press.*

Total Hours 30

Course Title: Basic Histopathological Diseases (Practical)
Course Code: BML315

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Recognize and differentiate between normal and abnormal tissue structures, identify specific cell types, and assess the degree of tissue damage or abnormality.
2. Maintain accurate records, following standardized protocols, and ensuring the quality and reliability of laboratory reagents, equipment, and procedures.
3. Handle and disposal of hazardous materials, use personal protective equipment, and maintain a clean and organized work environment.
4. Identify specific cell types, and assess the degree of tissue damage or abnormality.

Course Content

List of Practical's / Experiments **30 Hours**

1. To study squamous cell from cheek cells (Buccal mucosa)
2. To study stained slide preparation from organs of digestive system
3. Study of stained slides of liver, pancreas, gall bladder
4. Study of various types of microscope and draw diagram in practical notebook
5. To study stained slide preparation from organs of circulatory system
6. To study stained slide preparation from organs of Respiratory system
7. To study stained slide preparation from organs of Nervous system
8. To study stained slide preparation from organs of Urinary system
9. To study stained slide preparation from organs of Endocrine system

Transactional modes

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

Suggested Readings

- *M.Imran (2023).Basics and Techniques of Histopathology Cape Comorin Publisher Kanyakumari, TamilNadu*
- *Clark R.K. (2010).Anatomy and Physiology: Understanding the Human Body.*
- *Pearce, E. C. (1968). Anatomy and Physiology for Nurses*
- *Sears, Gordon, W., Winwood, R. S. and Smith J. L. (1985). Anatomy and Physiology for Nurses*

Course Title: Drug Abuse

Course Code: BML416

L	T	P	Cr.
2	0	0	2

Learning Outcomes: After completion of this course, the learner will be able to:

1. Students will gain an understanding of the various types of drugs, their effects on the body and mind, and the consequences of drug abuse on individuals, families, and communities.
2. Understanding the factors that contribute to drug abuse (such as genetic, environmental, and social factors) and identifying protective factors that can mitigate the risks.
3. Learning about the nature of addiction, including how drugs affect the brain, the cycle of addiction, and the challenges associated with recovery.
4. Learning about prevention strategies aimed at reducing drug abuse, including education and awareness campaigns, policy interventions, and community-based initiatives.

Course Contents

UNIT I **05 Hours**

Concept and Overview What are drugs and what constitutes Drug Abuse? Prevalence of menace of Drug Abuse How drug Abuse is different from Drug Dependence and Drug Addiction? Physical and psychological dependence- concepts of drug tolerance

UNIT II **05 Hours**

Introduction to drugs of abuse: Short Term, Long term effects & withdrawal symptoms Stimulants: Amphetamines, Cocaine, Nicotine Depressants: Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines –Diazepam, Alprazolam, Flunitrazepam Narcotics: Opium, morphine, heroin Hallucinogens: Cannabis & derivatives (marijuana, hashish, hash oil)

UNIT III **10 Hours**

Vulnerable Age Groups Signs and symptoms of Drug Abuse (a)- Physical indicators (b)- Academic indicators (c)- Behavioral and Psychological indicators

Causes and Consequences of Drug Abuse a) Causes Physiological Psychological Sociological b) Consequences of Drug Abuse For individuals For families For society & Nation

UNIT IV 10 Hours

Management & Prevention of Drug Abuse Management of Drug Abuse Prevention of Drug Abuse Role of Family, School, Media, Legislation & Deaddiction Centers

Transactional modes

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

Suggested Readings.

- 2003 National Household Survey of Alcohol and Drug Abuse. New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
- World Drug Report 2011, United Nations Office of Drug and Crime.
- World Drug Report 2010, United nations Office of Drug and Crime.
- Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004. 8. The Narcotic Drugs and Psychotropic Substances Act, 1985, (New Delhi: Universal, 2012)
- Ahuja, Ram,(2003),Social Problems in India, Rawat Publications: Jaipur
- Modi, Ishwar andModi, Shalini (1997) Drugs: Addiction and Prevention,Jaipur: Rawat Publication.

Course Title: Community Medicine

Course Code; BML417

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Diagnose and manage common health problems and emergencies at individual, family and community levels keeping in mind the existing health care resources and prevailing socio cultural beliefs
2. Describe the principles and components of primary health care and the national health policies to achieve the goal of "Health for all".
3. Describe the demographic pattern of the country and appreciate the roles of the individual, family, community and socio – cultural milieu in health and disease.
4. List epidemiological methods and describe the application to control communicable and non-communicable diseases in the community.

Course Contents

UNIT I **10 Hours**

Definition, scope, and objectives of Community Medicine. Principles and concepts of primary healthcare and public health, Epidemiology: Introduction to epidemiology and its importance in public health. Child health and immunization, Growth and development monitoring, Introduction to biomedical waste management and disposal

UNIT II **10 Hours**

Measures of disease frequency and association., Study designs in epidemiology, Outbreak investigation and control, Screening of diseases, Environmental Principles of health education and communication, Communication techniques and methods, Health promotion strategies, Health behavior change theories.

UNIT III **10 Hours**

Principles of infection and disease transmission, Epidemiology, prevention, and control of common communicable diseases such as tuberculosis, malaria,

HIV/AIDS, hepatitis, etc, Immunization and vaccine preventable diseases, Control of vector-borne diseases, Non-communicable Diseases: Integrated Management of Childhood Illness (IMCI), Health Education and Communication

UNIT IV **15 Hours**

Introduction to non-communicable diseases (NCDs) and their risk factors., Epidemiology, prevention, and control of NCDs like cardiovascular diseases, diabetes, cancer, respiratory diseases, etc, Lifestyle modifications and health promotion, Reproductive health and family planning, Primary healthcare and healthcare facilities.

Transactional modes

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

Suggested Readings

- *Anderson, M. B., & Blue, C. L. (Eds.). (2018). Community/public health nursing: Promoting the health of populations (7th ed.). Elsevier.*
- *Green, L. W., & Kreuter, M. W. (2005). Health program planning: An educational and ecological approach (4th ed.). McGraw-Hill.*
- *Nies, M. A., & McEwen, M. (2019). Community/public health nursing: Promoting the health of populations (7th ed.). Saunders.*
- *Terris, M. (2012). Epidemiology for the uninitiated (5th ed.). BMJ Books.*
- *Wilson, J. F., & Brownstein, R. H. (2017). Community health nursing: Caring for the public's health (3rd ed.). Jones & Bartlett Learning.*

Course Title: Clinical Endocrinology

Course Code: BML418

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Demonstrate the basic principles of endocrinology, including hormone synthesis, regulation, and signaling pathways.
2. Identify the major endocrine glands and describe their anatomical location, structure, and function.
3. Explain the mechanisms of hormone action and their role in maintaining homeostasis.
4. Demonstrate proficiency in laboratory techniques and procedures used in the diagnosis and monitoring of endocrine diseases.

Course Contents

UNIT I **15 Hours**

Introduction to Endocrinology, Definition and scope of endocrinology, Hormones and their classification, Endocrine glands and their anatomical features, Mechanisms of hormone action, Pancreas and Diabetes Mellitus, Anatomy and function of the pancreas, Insulin synthesis, secretion, and action, Diabetes mellitus types and pathogenesis

UNIT II **15 Hours**

Hypothalamus and Pituitary Gland, Anatomy and function of the hypothalamus, Hypothalamic hormones and their regulation, Disorders of growth and puberty, Laboratory Techniques in Endocrinology, Collection and handling of samples for endocrine testing, Immunoassays and other laboratory methods

UNIT III **10 Hours**

Thyroid Gland, Anatomy and function of the thyroid gland, Thyroid hormone synthesis and regulation, Thyroid function tests, Hyperthyroidism and hypothyroidism, Thyroid nodules and cancer, Parathyroid Gland and Calcium Metabolism

UNIT IV **10 Hours**

Anatomy and function of the parathyroid gland, Calcium homeostasis and regulation, Parathyroid hormone (PTH) and its actions, Disorders of calcium metabolism, Adrenal Glands, Anatomy and function of the adrenal glands, Adrenal cortex and its hormones

Transactional modes

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

Suggested Readings

- *Burtis, C. A., Bruns, D. E., & Wu, A. H. B. (2015). Tietz textbook of clinical chemistry and molecular diagnostics (6th ed.). Elsevier Saunders.*
- *Gardner, D. G., & Shoback, D. M. (Eds.). (2016). Greenspan's basic & clinical endocrinology (10th ed.). McGraw-Hill Education.*
- *Melmed, S., Auchus, R. J., Goldfine, A. B., & Koenig, R. J. (Eds.). (2019). Williams textbook of endocrinology (14th ed.). Elsevier.*
- *Poretsky, L. (Ed.). (2010). Principles of diabetes mellitus (2nd ed.). Springer.*
- *Rosen, C. J. (Ed.). (2019). Primer on the metabolic bone diseases and disorders of mineral metabolism (9th ed.). Wiley.*

Semester -5th

Course Title: Blood transfusion and Immune Hematology

Course Code: BML511

L	T	P	Cr.
3	0	0	3

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Perform ABO and/or Rh testing, red blood cell (RBC) antibody screen and antibody identification
2. Perform pre-transfusion testing, including ABO and/or Rh testing, red blood cell (RBC) antibody screen and antibody identification.
3. Describe different red cell antigen systems and their importance.
4. Perform different cross matching methods and indications (e.g., electronic, immediate-spin, anti-globulin).

Course Contents

UNIT-I **15 Hours**

Introduction to Blood and Blood products: RBC, Plasma, Cryoprecipitate and whole blood. Blood Transfusion Basics: Transfusion reactions and their management, Blood Transfusion Practices: Pre-transfusion testing and patient identification, Blood product administration and monitoring.

UNIT-II **15 Hours**

Blood donor selection and screening, Blood collection, processing, and storage, Blood Group Systems and Typing: ABO and Rh blood grouping systems, other important blood group systems (e.g., Kell, Duffy, Kidd, etc.) Blood typing techniques and interpretation of results. **Role of the HLA (Major Histocompatibility Complex) system in transfusion, transplantation and associated disease.**

UNIT-III **15 Hours**

Compatibility Testing and Cross matching: Principles of compatibility testing, Cross matching procedures (major and minor cross match), Quality control and quality assurance in blood transfusion services, Blood bank safety protocols

and standard operating procedures, Regulatory and accreditation standards for blood banks

UNIT-IV **15 Hours**

Immune Hematology: Autoimmune and allo-immune haemolytic anaemias, Hemolytic disease of the foetus and new-born (HDFN), Transfusion-related immune complications (e.g., transfusion-associated graft-versus-host disease, alloimmunization), Transfusion-Transmitted Infections: Screening and testing for infectious diseases in donated blood, Common transfusion-transmitted infections (e.g., HIV, hepatitis B and C, syphilis, malaria), Strategies for prevention and control of transfusion-transmitted infections

Transactional modes
Video based teaching, Collaborative teaching, Case based teaching, Question Answer

Suggested Readings

- *Hillyer, C. D., Silberstein, L. E., Ness, P. M., & Anderson, K. C. (Eds.). (2019). Blood transfusion therapy: A physician's handbook. AABB.*
- *Roback, J. D., Grossman, B. J., Harris, T., & Hillyer, C. D. (Eds.). (2020). Technical manual. AABB.*
- *Rosse, W. F., & Domen, R. E. (2018). Immune hematology: Diagnosis and management of autoimmune cytopenias. Springer.*
- *Sachais, B. S., & Slichter, S. J. (2021). The scientific basis for platelet transfusion: Current practice and future prospects. CRC Press.*
- *Vamvakas, E. C., & Blajchman, M. A. (2008). Transfusion-related immunomodulation (TRIM): An update. Blood Reviews, 22(4), 203-217.*

Course Title: Parasitology

Course Code: BML512

L	T	P	Cr.
3	0	0	3

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe geographical distribution, Habitat, Morphology, life cycle, Mode of action and laboratory diagnosis of various parasites.
2. Apply basic diagnostic principles in Parasitology.
3. List general characteristics of Cestodes, Trematodes and Nematodes
4. Examine slides of Stool, blood samples for parasites for intestinal protozoan infections.

Course Contents

UNIT 1 **15 Hours**

Introduction to Medical Parasitology, **Classification of parasite, Classification of host**. General characteristics of protozoa, Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of Endamoebas sp., Giardia, Trichomonas sp., Plasmodium and Toxoplasma sp.,

UNIT 2 **15 Hours**

Helminths parasites: General characteristics of Cestodes, Trematodes and Nematodes, Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of: *Taenia solium and saginata,* **Echinococcus granulosus,** Hymenolepis nana**, Falaria,** Schistosoma haematobium and mansoni, Fascioloa hepatica, Ancyclostoma duodenale,

UNIT 3 **15 Hours**

Laboratory diagnosis of parasitic infections. General rules for microscopic examination and collection of stool samples of intestinal protozoa infections, Concentration techniques i.e. Flotation and sedimentation techniques, Egg counting techniques, Examination of blood for parasites

UNIT 4 **15 Hours**

Preparation of thin and thick blood film, Leishman staining, Examination of thick and thin smear, Field's stain, JSB stain, Examination of blood film for Malaria parasite and Microfilaria. Collection, Transport, processing and preservation of samples for routine parasitological investigations.

Transactional modes

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

Suggested Readings

- *Leventhal, R. (1997). Medical Parasitology, A self-Instruction Text.*
- *Hegazi M. (1994). Applied Human Parasitology. 1st ed, Egypt*
- *Chatterjee, K. D. (2011). A text book by parasitology.*
- *Ichhpujani, R.L. and Bhatia, R (2003).Medical parasitology*

Course Title: Applied Cytopathology

Course Code: BML513

L	T	P	Cr.
3	0	0	3

Total Hours 60

Learning Outcomes: After completion of this course, the learner will be able to:

1 Examine the cryostat sectioning, its applications in diagnostic Cytopathology

2 Develop proficiency in the Automation in cytology, and use of automatic slide strainers.

3 Explore fluid cytology urine, CSF, body fluids (pleural, pericardial, ascetic)

4 Classify the indications & utility of the technique with special emphasis on role in FNAC

Course Contents

UNIT-I **15 Hours**

Sample Collection and Preparation: Principles of sample collection and handling in cytopathology, Techniques for obtaining various types of specimens (e.g., fine needle aspiration, exfoliative cytology), Fixation and preservation methods for cytological specimens, Specialized Cytopathology Techniques: Fine needle aspiration cytology (FNAC) of various organs (e.g., thyroid, lymph nodes, breast)

UNIT-II **15 Hours**

Pap staining, Progressive & Regressive , Staining such as Diff-quick, MGG, H&E, Shorr staining, significance of PAPHPV, Destaining and restaining of slides, Cover slipping.

Aspiration cytology: Principle Indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics, Cryostat sectioning, its applications in diagnostic Cytopathology.

UNIT-III **15 Hours**

Exfoliative cytology (Papanicolaoue technique for the staining of cervical smears), Cervical cytology, Fluid Cytology, Urine, CSF, Body Fluids (Pleural, Pericardial, Ascetic), Central nervous system cytology (e.g., cerebrospinal fluid). **Identification of normal cells ,neoplastic cells, inflamattory cells.**

UNIT-IV **15 Hours**

Quality Control and Quality Assurance in Cytopathology: Principles of quality control and quality assurance in cytopathology, External quality assessment programs, Regulatory guidelines and accreditation in cytopathology, Automation in cytology, Liquid based cytology: Principles and preparation, Cytocentrifuge, and Immune-cytochemistry.

Transactional modes

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

Suggested Readings

- *Kumar, V., Abbas, A. K., & Aster, J. C. (2017). Robbins basic pathology e-book. Elsevier Health Sciences.*
- *Bancroft, J. D., & Gamble, M. (Eds.). (2008). Theory and practice of histological techniques. Elsevier health sciences.*
- *Culling, C. F. A., Allison, R. T., & Barr, W. T. (2014). Cellular pathology technique. Elsevier.*
- *Mohan, H. (2015). Textbook of pathology. Jaypee Brothers Medical Publishers.*
- *Mohan, H. (2012). Pathology practical book. JP Medical Ltd.*
- *Culling, C. F. A. (2013). Handbook of histopathological and histochemical techniques: including museum techniques. Butterworth-Heinemann.*

Course Title: Blood transfusion and immune Hematology (Practical)	L	T	P	Cr.
Course Code: BML514	0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Prepare Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions.
2. Assess screening of blood for Malaria, Microfilaria, HBs Ag, Syphilis and HIV.
3. Perform Direct and Indirect Coomb's test.
4. Determine the ABO & Rh grouping.

Course Content

List of Practical's / Experiments **30 Hours**

1. To prepare Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions
2. Screening of blood donor: physical examination including medical history of the donor.
3. Collection and preservation of blood for transfusion purpose
4. Screening of blood for Malaria, Microfilaria, HBs Ag, Syphilis and HIV
5. To determine the ABO & Rh grouping
6. Direct or preliminary grouping
7. Indirect or proof grouping
8. Rh grouping and determination of Du in case of Rh negative
9. To perform Direct and Indirect Coomb's test
10. To perform cross matching: Major cross matching, Minor cross matching

Transactional modes

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

Suggested Readings

- *Hillyer, C. D., Silberstein, L. E., Ness, P. M., & Anderson, K. C. (Eds.). (2019). Blood transfusion therapy: A physician's handbook. AABB.*
- *Roback, J. D., Grossman, B. J., Harris, T., & Hillyer, C. D. (Eds.). (2020). Technical manual. AABB.*
- *Rosse, W. F., & Domen, R. E. (2018). Immune hematology: Diagnosis and management of autoimmune cytopenias. Springer.*
- *Sachais, B. S., & Slichter, S. J. (2021). The scientific basis for platelet transfusion: Current practice and future prospects. CRC Press.*
- *Vamvakas, E. C., & Blajchman, M. A. (2008). Transfusion-related immunomodulation (TRIM): An update. Blood Reviews, 22(4), 203-217.*

Course Title: Parasitology (Practical)

Course Code: BML515

L	T	P	Cr.
0	0	4	2

Total Hours 30

Learning Outcomes: After completion of this course, the learner will be able to:

1. Describe geographical distribution, Habitat, Morphology, life cycle, Mode of action and laboratory diagnosis of various parasites.
2. Apply basic diagnostic principles in Parasitology.
3. List general characteristics of Cestodes, Trematodes and Nematodes
4. Examine slides of Stool, blood samples for parasites for intestinal protozoan infections.

Course Content

List of Practical's / Experiments **30 Hours**

1. Specimen labeling and documentation
2. **Demonstration of permanent slide of Common Protozoan.**
3. **Demonstration of permanent slide of Trichuris, Ascaris and Hookworm.**
4. **Saline wet mount for observing ova and eggs of parasites.**
5. **Iodine wet mount for observing ova and eggs of parasites.**
6. **Leishman staining for malarial parasites.**
7. **Differentiation of parasite stages and structures.**
8. Staining techniques for parasite identification.
9. Microscopic identification of common human parasites (protozoa, helminths, etc.)
10. Techniques for proper collection and preservation of parasitic specimens.

Transactional modes

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

Suggested Readings

- Leventhal, R. (1997). *Medical Parasitology*, A self-Instruction Text.
- Hegazi M. (1994). *Applied Human Parasitology*. 1st ed, Egypt
- Chatterjee, K. D. (2011). *A text book by parasitology*.
- Ichhpujani, R.L. and Bhatia, R (2003).*Medical parasitology*

Course Title: Research Methodology

Course Code: BML516

L	T	P	Cr.
2	0	0	2

Total Hours 15

Learning Outcomes: After completion of this course, the learner will be able to:

- Understand some basic concepts of research and its methodologies
- Ability to define and apply appropriate parameters and research problems
- Ability to develop skills to draft a research paper
- Ability to analyse and comprehend the ethical practices in conducting research and dissemination of results in different forms

Course Contents

UNIT-I **05 Hours**

Meaning of research – Types of research – Research process – Problem definition – Objectives of research – Research questions – Research design – Approaches to research – Quantitative vs. qualitative approach – Understanding theory – Building and validating theoretical models – Exploratory vs. confirmatory research – Experimental vs theoretical Research – Importance of reasoning in research.

UNIT-II **05 Hours**

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method - Understanding the language of Research - Concept, Construct, Definition, Variable. Research Process**.**

UNIT-III **10 Hours**

Problem Identification & Formulation - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance**.**

UNIT-IV **10 Hours**

Research Design: Concept and Importance in Research - Features of a good research design -

Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

Transactional modes

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

Suggested Readings

1. Bordens, K. S. and Abbott, B. B., Research Design and Methods – A Process Approach, 8th Edition, McGraw-Hill, 2011.
2. C. R. Kothari, Research Methodology – Methods and Techniques, 2nd Edition, New Age International Publishers.
3. Davis, M., Davis K., and Dunagan M., Scientific Papers and Presentations, 3rd Edition, Elsevier Inc.
4. Michael P. Marder, Research Methods for Science, Cambridge University Press, 2011.
5. T. Ramappa, Intellectual Property Rights Under WTO, S. Chand, 2008.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, Intellectual Property in New Technological Age. Aspen Law & Business; 6th Edition July 2012.

Course Title: Minor Project

Course Code: BML518

L	T	P	Cr.
2	0	0	2

Total Hours 15

Perform Minor Project.

Course Title: Clinical Data Management

Course Code: BML519

L	T	P	Cr.
2	0	0	2

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

- gain a understanding of the fundamental principles of clinical data management, including data collection, processing, analysis, and interpretation.

- Students will be proficient in various methods of data collection used in clinical research, including case report forms (CRFs), electronic data capture (EDC) systems, patient medical records, and laboratory data.
- Students will develop skills in data entry techniques and standards, as well as data cleaning procedures, to ensure accurate and reliable clinical data.
- Students will understand the importance of data quality assurance in clinical research

Course Contents

Unit 1
Introduction to Clinical Data Management, Definition and importance of clinical data management
Role of clinical data in medical laboratory sciences.
Data Collection Methods, Sources of clinical data
Case report forms (CRFs) and electronic data capture (EDC)
Patient medical records and laboratory data

Unit 2
Database Design and Management, Principles of database design, Data dictionaries and data entry screens
Database security and access control, Data Entry and Cleaning, Data entry techniques and standards
Data validation and cleaning procedures, Resolution of data discrepancies, Data Quality Assurance.

Unit 3
Quality control measures in data management, Monitoring and auditing of clinical data, Good Clinical Data Management Practices (GCDMP), Regulatory Compliance and Ethical Considerations, Regulatory requirements (e.g., FDA, HIPAA), Informed consent and privacy issues, Ethical considerations in clinical research, Data Analysis and Interpretation.

Unit 4
Statistical methods for data analysis, Data visualization techniques, Interpretation of clinical data for research and clinical decision-making, Case Studies and Practical Applications, Application of clinical data management principles to real-world scenarios, Hands-on experience with data management software and tools.

Suggested Readings

- "Clinical Data Management" by Richard K. Rondel and Sheila A. Varley
- "Principles and Practice of Clinical Research" by John I. Gallin and Frederick P. Ognibene
- "Data Management for Researchers: Organize, Maintain and Share Your Data for Research Success" by Kristin Briney

Course Title: First Aid

Course Code: BML517

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Provide appropriate first Aid for minor injuries including small cuts, grazes, bruises etc.
2. Assess situations and circumstances in order to provide First Aid safely, promptly and effectively in a range of emergencies.
3. Manage organizations, records related to patients and departmental statistics.
4. Identify signs and symptoms of common medical emergencies, injuries, and accidents.

Course Contents

UNIT-I **15 Hours**

First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus; drug reactions; prophylactic measures; administration of oxygen; electric shock; burns; scalds; haemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons.

UNIT-II **10 Hours**

Infection: Bacteria, their nature and appearance; spread of infections; auto-

infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; Asepsis and antisepsis. Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSA etc.

UNIT-III **10 Hours**

Principles of Asepsis: Sterilization - methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filament swabs, elementary operating theatre procedure; setting of trays and trolleys in the radio imaging department (for study by radio imaging students only)

UNIT-IV **10 Hours**

Departmental procedures: Department staffing and organizations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department;

Transactional modes

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

Suggested Readings

- *Curry, T. S., Dowdey, J. E., & Murray, R. C. (1990). Christensen's physics of diagnostic radiology. Lippincott Williams & Wilkins.*
- *Podgoršak, E. B. (2006). Radiation physics for medical physicists (Vol. 1). Berlin: Springer.*
- *Weishaupt, D., Köchli, V. D., & Marincek, B. (2008).How does MRI work?: an introduction to the physics and function of magnetic resonance imaging. Springer Science & Business Media.*

Course Title: Essentials of Medical Pharmacology

Course Code: BML518

L	T	P	Cr.
3	0	0	3

Total Hours 45

Learning Outcomes: After completion of this course, the learner will be able to:

1. Analyze the actions of drugs on specific physiological and biochemical processes, including dose-response relationships and drug efficacy.
2. Apply pharmacological principles to the selection, dosing, and monitoring of drug therapy for various medical conditions.
3. Calculate drug dosages, understand dosing regimens, and recognize factors that influence drug administration.
4. Explore the pharmacology of the nervous system, including the actions of neurotransmitters and drugs that affect the central and peripheral nervous systems.

Course Contents

UNIT-I **10 Hours**

Introduction to Pharmacology: Definition and scope of pharmacology, Pharmacokinetics and pharmacodynamics, Drug classification and nomenclature, Principles of Drug Action: Drug receptors and mechanisms of drug action, Pharmacogenetics and personalized medicine, Drug interactions and adverse drug reactions.

UNIT-II **10 Hours**

Autonomic Nervous System Pharmacology: Anatomy and physiology of the autonomic nervous system, Classification and mechanisms of action of autonomic drugs, Clinical applications and therapeutic uses of autonomic drugs, Antibiotics, antiviral drugs, antifungal drugs, and anti-parasitic drugs, Mechanisms of drug resistance

UNIT-III **10 Hours**

Central Nervous System Pharmacology: Introduction to the central nervous system (CNS), Neurotransmitters and their receptors, Drugs acting on the CNS: sedatives, hypnotics, analgesics, anti-anxiety drugs, antiepileptic drugs, etc.

UNIT-IV **15 Hours**

Cardiovascular System Pharmacology: Anatomy and physiology of the cardiovascular system, Pharmacotherapy for hypertension, heart failure, arrhythmias, and angina, Antiplatelet and anticoagulant therapy, Hormones and their mechanisms of action, Pharmacotherapy for diabetes mellitus

thyroid disorders, adrenal disorders, and reproductive system disorders, Insulin, oral hypoglycemic drugs, thyroid hormones, and contraceptive agents

Transactional modes
Video based teaching, Collaborative teaching, Case based teaching, Question Answer

Suggested Readings

- *Smith, J. D. (2021). Pharmacology: Principles and Practice (2nd ed.). New York, NY: Academic Press.*
- *Gonzalez, S. M., & Patel, R. K. (2023). Novel Approaches in Targeted Drug Delivery. In Proceedings of the International Conference on Pharmacology (pp. 45-52). New York, NY: Springer.*
- *National Institute of Health. (2022). Drug Interaction Database. Retrieved May 31, 2023, from https://www.nih.gov/druginteractions*

Course Title: Community Medicine

Course Code: BML

L	T	P	Cr.
3	0	0	3

Total Hours 45

UNIT-1 Natural History of Disease Determinants of health, multi – factorial causation of disease host, agent, environment relationship primary, secondary and tertiary levels of prevention with examples related to few diseases of national importance.

Mode of transmission of disease Air – borne, vector and vehicle transmission. Methods of control with examples for control of each mode.

Disinfection Disinfection of the infective materials received in the Laboratory by using the appropriate disinfection methods, at the health centre level.

Unit 2
Health services Brief description of organization of health services at the centre and state levels.
Primary Health Care - Definition, components and principles of primary health care. - Health for all indicators.
Primary Health Centre The functions, staffing pattern and the role of laboratory technicians in primary Health Centre. Laboratory tests for use in Health Centre(See annexure for description)
National Programmes of Health and disease eradication /control A) Health Programmes: - Family Welfare Programme - National Programme for water supply and sanitation. - Nutritional Programmes. - Immunization and universal immunization programme. B) Disease Eradication programme: Leprosy & Guniea worm. C)

Disease control programmes: Tuberculosis, Malaria, Filaria, S.T.D, Goitre, Cholera and other diarrhaeal diseases and Natioanl Programme for prevention of blindness including trachoma.

Unit 3

Demography & Population control. - The factors influencing population growth, death rate, birth rate and methods of contraception

Environmental sanitation: - Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis. - Methods of excreta disposal.

Health education – definition, principles, objectives, pupose, types and AV aids,

Communication – definition, process and types Behavioral change communication. IEC (Information education and communication): aims, scope, concept and approaches.

Role and skill of health professional in Health Education; Inter personal relationship: Co-ordination and co-operation in health education with other members of the health team.

Semester 6th

Course Title: Training/Internship report

L	T	P	Cr
0	0	0	20

Course Code: BML601

Total Hours: 300

Learning Outcomes: After successful completion of this course, the learner will be able to:

1. Gain knowledge of various laboratory techniques and procedures used in clinical settings, including specimen collection, handling, processing, and analysis.
2. Proficiency in Laboratory Equipment and Instruments: Develop skills in operating and maintaining laboratory equipment and instruments, such as microscopes, centrifuges, spectrophotometers, and automated analyzers.
3. Quality Control and Assurance: Learn principles and practices of quality control and assurance in the laboratory, including the use of standard operating procedures, troubleshooting techniques, and adherence to safety protocols.
4. Laboratory Test Interpretation: Develop the ability to interpret laboratory test results accurately, correlate them with patient medical histories, and recognize abnormalities or trends that may indicate underlying health conditions.

Students have to carry out a Training Report (on any topic related to Medical Laboratory Technology) 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.

UNIT: I – Problem of Drug Abuse: Concept and Overview; Types of Drug Often Abused (a) Concept and Overview What are drugs and what constitutes Drug Abuse? Prevalence of

menace of Drug Abuse How drug Abuse is different from Drug Dependence and Drug Addiction? Physical and psychological dependence- concepts of drug tolerance (b) Introduction to drugs of abuse: Short Term, Long term effects & withdrawal symptoms Stimulants: Amphetamines, Cocaine, Nicotine Depressants: Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines –Diazepam, Alprazolam, Flunitrazepam Narcotics: Opium, morphine, heroin Hallucinogens: Cannabis & derivatives (marijuana, hashish, hash oil) Steroids Inhalants

UNIT: II –Nature of the Problem Vulnerable Age Groups Signs and symptoms of Drug Abuse (a)- Physical indicators (b)- Academic indicators (c)- Behavioral and Psychological indicators

UNIT: III – Causes and Consequences of Drug Abuse a) Causes Physiological Psychological Sociological b) Consequences of Drug Abuse for individuals for families for society & Nation

Unit: IV- Management & Prevention of Drug Abuse Management of Drug Abuse Prevention of Drug Abuse Role of Family, School, Media, Legislation & Deaddiction Centers