

**B.Voc. (MLT)
SCHEME**

Semester-I

Category	Subject	Subject Code	Credit			Marks							Hours		
						Theory			Practical			Total			
			T	P	To	I	E	To	I	E	To		T	P	To
General Education Component	Communication Skills	ENG501	3	1	4	35	15	50	15	35	50	100	45	30	75
		ENG501L													
	Fundamentals of Medical Laboratory, Basic Techniques & BMW	MLT506	3	1	4	35	15	50	15	35	50	100	45	30	75
		MLT506L													
GEC Total			6	2	8	70	30	100	30	70	100	200	90	60	150
Skill Education Component	Fundamentals of Microbiology-I	MLT503	2	2	4	35	15	50	15	35	50	100	30	60	90
		MLT503L													
	Medical Biochemistry	LSH506	2	2	4	35	15	50	15	35	50	100	30	60	90
		LSH506L													
	Fundamental of Medical Sciences	LSH507	2	2	4	35	15	50	15	35	50	100	30	60	90
		LSH507L													
	General Pathology	LSH503	2	2	4	35	15	50	15	35	50	100	30	60	90
		LSH503L													
	Basics of Clinical Hematology-I	MLT501	2	2	4	35	15	50	15	35	50	100	30	60	90
MLT501L															
Project Work-I	MLTPW501L	0	4	4	0	0	0	30	70	100	100	0	120	120	
SEC Total			10	14	24	175	75	250	105	245	350	600	150	420	570
Grand Total			16	16	32	245	105	350	135	315	450	800	240	580	720

Semester-II

Category	Subject	Subject Code	Credit			Marks							Hours		
						Theory			Practical			Total			
			T	P	To	I	E	To	I	E	To		T	P	To
General Education Component	MOOC-I	MOOC501	2	0	2	30	70	100	0	0	0	100	30	0	30
	Entrepreneurship	OMS501	2	0	2	30	70	100	0	0	0	100	30	0	30
	GEC Total			4	0	4	60	140	200	0	0	0	200	60	0
Skill Education Component	On-the-Job Training	OJT501	0	24	24	0	0	0	245	105	350	350	0	720	720
	SEC Total			0	24	24	0	0	0	245	105	350	350	0	720
Grand Total			4	24	28	60	140	200	245	105	350	550	60	720	780

Semester-III

Category	Subject	Subject Code	Marks										Hours		
			Credit			Theory			Practical			Total	Hours		
			T	P	To	I	E	To	I	E	To		T	P	To
General Education Component	Immunohematology and Blood Transfusion	MLT610	3	1	4	15	35	50	35	15	50	100	45	30	75
		MLT610L													
	Endocrinology Tumor & Cancer Marker	MLT609	3	1	4	15	35	50	35	15	50	100	45	30	75
		MLT609L													
GEC Total			6	2	8	30	70	100	70	30	100	200	90	60	150
Skill Education Component	Diagnostic Biochemistry-I	MLT603	2	2	4	15	35	50	35	15	50	100	30	60	90
		MLT603L													
	Diagnostic Cytology	MLT604	2	2	4	15	35	50	35	15	50	100	30	60	90
		MLT604L													
	Fundamentals of Microbiology-II	MLT605	2	2	4	15	35	50	35	15	50	100	30	60	90
		MLT605L													
	Histopathology & Histotechnique-I	MLT606	2	2	4	15	35	50	35	15	50	100	30	60	90
		MLT606L													
	Immunology and Serology-I	MLT608	2	2	4	15	35	50	35	15	50	100	30	60	90
MLT608L															
Project Work-II	MLTPW601L	0	4	4	0	0	0	70	30	100	100	0	120	120	
SEC Total			10	14	24	75	175	250	245	105	350	600	150	420	570
Grand Total			16	16	32	105	245	350	315	135	450	800	240	580	720

Semester-IV

Category	Subject	Subject Code	Credit			Marks							Hours		
						Theory			Practical			Total	Hours		
			T	P	To	I	E	To	I	E	To		T	P	To
General Education Component	MOOC-II	MOOC601	2	0	2	30	70	100	0	0	0	100	30	0	30
	Human Values and Professional ethics	OAE101	2	0	2	30	70	100	0	0	0	100	30	0	30
	GEC Total			4	0	4	60	140	200	0	0	0	200	60	0
Skill Education Component	On-the-Job Training	OJT601	0	24	24	0	0	0	245	105	350	350	0	720	720
	SEC Total			0	24	24	0	0	0	245	105	350	350	0	720
Grand Total			4	24	28	60	140	200	245	105	350	550	60	720	780

SYLLABUS

SUBJECT: Communication Skills

SUBJECT CODE: ENG501

CREDIT: 03

Objectives

- To inculcate in students professional and ethical attitude, effective communication skills, teamwork, skills, multidisciplinary approach and an ability to understand engineer's social responsibilities.
- To inculcate in students written communication skills.

Learning Outcomes

The syllabus introduces students to have basic skill set of channelizing information, self-development, decision making and interpersonal skills.

Unit	Topic	Key Learning
I	Communication	<ul style="list-style-type: none">• Meaning of Communication, Importance of Communication, Types of communication. Process of communication• Communication network in an organization• Barriers to communication, Essentials of good communication
II	Remedial English Grammar Understanding and applying Vocabulary	<ul style="list-style-type: none">• Articles, agreement between verb and subject, uses of tenses, Modal and their uses, Prepositions.• One word substitutes, Synonyms and Antonyms Word formation:-Prefixes, Bases and Suffixes.
III	Listening Skills	<ul style="list-style-type: none">• The process of listening, Types of listening, Benefits of effective listening• Barriers to listening, listening to announcements at work place.
IV	Reading Skills	<ul style="list-style-type: none">• Process and methodologies of reading, Skimming and scanning, Levels of reading, Proofreading, Summarizing, Precise writing• Unseen comprehension passage, Note taking and reviewing• convert the given information into charts and graphs.
V	Writing Skills	<ul style="list-style-type: none">• Main Forms of Written Communication: Notices, Drafting an E-mail• Correspondence: Personal and Official, Notices,• Technical Report Writing, Preparing agenda and minutes of meeting

Suggested Readings:

- Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
- Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
- Prasad, P. Communication Skills, S.K. Kataria & Sons.
- Bansal, R.K. and J.B. Harrison. Spoken English, Orient Language.
- Roach Peter. English Phonetics and Phonology.
- A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.
- Prasad, P. The Functional Aspects of Communication Skills, Delhi.
- McCarthy, Michael. English Vocabulary in Use, Cambridge University Press.
- Rajinder Pal and PremLata. English Grammar and Composition, Sultan Chand Publication.
- Idioms & Phrases (English-Hindi), Arihant Publication (India) Pvt. Ltd.
- One Word Substitution, Dr. Ashok Kumar Singh, Arihant Publications (India) Pvt, Ltd

SUBJECT: Communication Skills Lab
SUBJECT CODE: ENG501L
CREDIT: 01

List of Experiments

1. Greeting and starting of conversation.
2. Nonverbal communication techniques during conversation.
3. Verbal communication techniques during conversation.
4. Group discussion.
5. Extempore public speaking.
6. Reading activity
7. Situational dialogues /Role play.
8. PPT presentation technique

SUBJECT: Fundamentals of Medical Laboratory, Basic Techniques & BMW

SUBJECT CODE: MLT506

CREDIT: 03

Objectives:

The purpose of the course is to provide fundamental knowledge and exposure to the concepts, theories and practices in the field of Laboratory Technology

Learning Outcomes

By the end of this course:

- The student demonstrates an understanding of the processes of Laboratory Technology.
- Identify the basic functions, and management challenges in the Laboratories.

Unit	Topic	Key Learning
I	Introduction to Laboratory, Role of a laboratory Technician	Basic laboratory principles, Organization of clinical laboratory and role of medical laboratory technician
II	Code	Code of conduct of medical laboratory personnel
III	Clinical Laboratory	Organization of clinical laboratory and role of medical laboratory technician
IV	Safety measures and biomedical waste management rules	Various safety measures used in Medical Laboratory, Healthcare waste definitions, types of biomedical waste management and segregation of waste in laboratory.
V	Professional Ethics	Medical laboratory professional - professionalism in laboratory workers, code of conduct, communication between physician and lab technician

SUBJECT: Fundamentals of Medical Laboratory, Basic Techniques & BMW –Lab

SUBJECT CODE: MLT506L

CREDIT: 01

List of Practical

1. Common glassware in clinical laboratory.
2. Cleaning, care and maintenance of glassware.
3. Calibration of pipettes and other volumetric apparatus.
4. Laboratory instruments: Microscopes-Principles, parts, use, care and maintenance of Light microscope,
5. Electron microscope, Fluorescent microscope, Dark ground microscope, Phase contrast microscope etc
 - a. Centrifuge
 - b. Water bath
 - c. Refrigerators
 - d. Autoclave
6. Hot air oven
 - i. Mixer
 - ii. Water distillation apparatus.
7. General approach to specimen collection, transport and disposal.
8. Anticoagulants- E.D.T.A, Dipotassium salts of EDTA Double oxalate, single oxalate, sodium citrate. Sodium Fluoride.
9. Preparation of solution: Normal solution, Buffer solution, Percent solution, normal saline, Molar solution.
10. Preparation of Normal saline
11. Methods of measuring liquids, weighting solids.
12. Clinical Laboratory records.
13. Demonstration of Biomedical Waste Management.
14. Modern Laboratory set up.
15. Quality control in clinical laboratories, basic outline

Books Recommended

- K1 Mukherjee: Medical Lab Technology (Tata Mc Graw Hill)
- P.D. Godkar: Textbook of Medical Lab Technology (Balani Publishing House)

SUBJECT: Fundamentals of Microbiology-I**SUBJECT CODE: MLT503****CREDIT: 02****Objective**

To introduce basic principles and application relevance of clinical disease for students who are in preparation for Laboratory Technicians. The content of this course includes etiological agents responsible for global infectious diseases

Learning Outcome

- The student demonstrates an understanding of the basic concepts of Microbiology.
- Identify the basic organisms and structures included in the course.

Unit	Topic	Key Learning
I	Microbiology lab	Lab organization, Laboratory Safety measures in Microbiology, Occurrence of lab infections, route of infections in laboratory, Universal precautions Prokaryotic and eukaryotic cells, Introduction, basic features and importance of bacteria, viruses, fungi, protozoa
II	Bacteria	General characters and classification of Bacteria, Morphology based on size, shape, arrangement, motility, flagella, spores, capsules, cell wall, plasma membrane, pili, ribosomes. Cell size, shape and arrangement, cell-wall, composition and detailed structure of Gram-positive and Gram-negative cell walls, Staining Methods: Simple, Grams staining, Ziehl-Neelsen staining or AFB staining, capsule staining, Negative Impregnation
III	Microbes	Growth and Maintenance of Microbes: Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, viable count, bacterial nutrition, oxygen requirement, CO ₂ requirement, temperature, pH, light
IV	Sterilization and Disinfection	Sterilization and Disinfection: Physical agents- Sunlight, Temperature less than 1000C, Temperature at 1000C, steam at atmospheric pressure and steam under pressure, irradiation, filtration. Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.
V	Culture Media	Culture Media: Definition, uses, basic requirements, classification, Agar, Peptone, Transport Media, Sugar Media, Anaerobic Media, Containers of Media, Forms of Media, Aseptic techniques in microbiology

Text Books

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
- Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013)
- Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
- Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition.
- Elsevier Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education

SUBJECT: Fundamentals of Microbiology-I-Lab
SUBJECT CODE: MLT503L
CREDIT: 02

List of Practicals

- Unit 1: Preparation of swabs/sterile tubes & bottles.
- Unit 2: Preparation of smear.
- Unit 3: Staining: Gram & Ziehl-Neelsen staining.
- Unit 4: Identification of Culture media.
- Unit 5: Identification of common microbes

SUBJECT: Medical Biochemistry-I**SUBJECT CODE: LSH506****CREDIT: 02****Objective**

Review of Chemistry as applicable to human biochemical systems: knowledge about chemical properties and standardization of various materials used in biochemical analysis. Chemistry of molecules, enzymes, laboratory safety

Learning Outcome

By the end of this course:

- The student demonstrates an understanding of the processes of Medical Biochemistry
- Identify the basic functions, and challenges in the Laboratories.

Unit	Topic	Key Learning
I	Chemistry of Lipids	Introduction, definition, classification, biomedical importance, essential fatty acids, importance and function of simple, compound and derived lipids Brief outline of metabolism: Beta oxidation of fatty acids, fatty liver, Ketosis, Cholesterol & its clinical significance, Lipoproteins, its type & their functions, lipid profile test, Atherosclerosis.
II	Introduction of Enzymes	Introduction, definition, properties, classification, coenzymes, cofactors, isoenzymes, metalloenzymes, measuring units of enzyme activity factors affecting enzyme action, factors responsible for abnormal enzyme level, Nucleic acids: Structure, Function and types of DNA and RNA, Nucleotides, Nucleosides, Nitrogen bases
III	Chemistry of Carbohydrates	Carbohydrates and their related metabolism - Introduction, definition, classification, biomedical importance & properties. Brief outline of metabolism: Glycogenesis & glycogenolysis (in brief), Glycolysis, citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), regulation of blood glucose level.
IV	Chemistry of Proteins	Chemistry of Proteins & their related metabolism - Introduction, definition, classification, biomedical importance. Metabolism: Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle, metabolic disorders in urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria
V	Urea	Urea cycle, metabolic disorders in urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria

Text Books

- Sharma and Parashar. Dictionary of Biochemistry; CBS Publications
- Harold And Varley. Practical Clinical Biochemistry
- Laxmi Ahuja; Quick Review In Biochemistry; Asia Printograph

Reference Books

- A.C. Deb; Fundamentals Of Biochemistry; New Central Book Agency
- Varun Kumar Malhotra; Handbook Of Practical Biochemistry; Jaypee Brothers

SUBJECT: Medical Biochemistry Lab

SUBJECT CODE: LSH506L

CREDIT: 02

Learning (Practical)

Unit 1: To study general properties of the enzyme (Urease) & Achromatic time of salivary amylase.

Unit 2: Urine analysis – normal & abnormal constituents of urine; Glucose tolerance test & Glycosylated hemoglobin Unit 3: CSF Analysis - Gross & Microscopic.

Unit 4: Centrifugation: Principle, types & applications, Chromatography: Definition, types, RF value, description of paper chromatography & applications.

Unit 5: Uses, Care and Maintenance of various instruments of the laboratory

Reference Books

- Sharma and Parashar. Dictionary of Biochemistry; CBS Publications
- Harold And Varley. Practical Clinical Biochemistry
- Laxmi Ahuja; Quick Review In Biochemistry; Asia Printograph
- A.C. Deb; Fundamentals of Biochemistry; New Central Book Agency
- Varun Kumar Malhotra; Handbook of Practical Biochemistry; Jaypee Brothers

Web Links:

- <http://www.colby.edu/chemistry/BC176/CH1.pdf>
- <https://doctorlib.info/medical/biochemistry/3.html>
- [https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/Medical Bio_chemistry.pdf](https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/Medical_Bio_chemistry.pdf)

SUBJECT – Fundamental of Medical Sciences

SUBJECT CODE: LSH507

CREDIT: 02

Objectives:

1. To enable the students to review the areas of anatomy relevant to the practice of applied life sciences.
2. Review of Chemistry as applicable to human biochemical systems:
3. The students in basic understanding of the composition of blood, waste management, instrumentation, techniques and methods of estimating different parameters
4. The student will be able to devise likely diagnoses from clinical scenarios by recognizing key manifestations of congenital, hemodynamic, inflammatory, infectious, metabolic, environmental, and neoplastic diseases.

Learning Outcomes:

1. Identify the basic functions, location, anatomical position and motion of various body parts.
2. Collect, process and preserve the blood samples can efficiently perform routine investigations in clinical haematology laboratory
3. The student demonstrates an understanding of the processes of Medical Biochemistry
4. Explain the basic nature of disease processes from the standpoint of causation, epidemiology, natural history, and the structural and functional abnormalities.

Unit	Topic	Key Learning
I	Structure of Human Body and its functions	Explain organization of body cells, tissues, organs, organ systems, membranes and glands in human body Understanding basic unit of body – Cell, understanding different types of tissues, Understanding different types of organ systems.
II	Basics of vital system	Understanding of Endocrine system, cardiovascular system and blood vessels musculo-skeletal system , Digestive system , Respiratory system, Urinary System, Nervous System and Lymphatic system in human body
III	Basic Sensitization to Hematology and Clinical Pathology	Understand blood and collection of blood sample in detail, Understand Hemoglobin (Hb)in detail. Understand reticulocytes, red blood cells, WBCs, Hemostasis & Coagulation Mechanism and testing in brief, Understand Detailed Examination of Sputum, Semen, CSF and Other Body Fluids Like Pleural Fluid, Pericardial Fluid, Peritoneal Fluid, Synovial Fluid, Ascitic Fluid.
IV	Basic Sensitization to Biochemistry and Clinical Biochemistry	Understand process of blood analysis, urine analysis and stool Analysis
V	Basic Sensitization to Bacteriology, Histopathology, Cytology, Immunology, Serology and Blood Banking	Explain basics of histopathology, cytology, microbiology immunology and Serology and Immuno- hematology

SUBJECT – Fundamental of Medical Sciences-Lab
SUBJECT CODE: LSH507L
CREDIT: 02

Learning (Practical)

1. Identification and description of all anatomical body structures.
2. The learning and demonstration of anatomy through dissected parts, slides, models and charts etc.
3. Demonstration of vital system.
4. Collection of blood sample
5. Determination of blood type
6. Determination of Hemoglobin.
7. Hemocytometer.
8. Reticulocyte Count.
9. Morphology of Cells
10. Urine routine examination
11. Stool routine examination

SUBJECT: General Pathology

SUBJECT CODE: LSH503

CREDIT: 02

Objective

The student will be able to devise likely diagnoses from clinical scenarios by recognizing key manifestations of congenital, hemodynamic, inflammatory, infectious, metabolic, environmental, and neoplastic diseases

Learning Outcome

By the end of this course, the student will be able to

- explain the basic nature of disease processes from the standpoint of causation, epidemiology, natural history, and the structural and functional abnormalities.

Unit	Topic	Key Learning
I	Introduction to pathology	Introduction to pathology, subdivisions of pathology, common terminology used in pathology Cell Injury and Cellular Adaptations: a) Normal Cell b) Cell Injury- types of cell injury, etiology of cell injury, morphology of cell injury, cellular swelling; c) Cell death : types- autolysis, necrosis, apoptosis & gangrene; d) Cellular adaptations- atrophy, hypertrophy, hyperplasia & dysplasia, metaplasia, necrosis and apoptosis
II	Inflammation	a) Acute inflammation - vascular event, cellular event, inflammatory cells; b) Chronic Inflammation - general features, granulomatous inflammation, tuberculoma. Phagocytosis, Acute phase proteins
III	Haemodynamic Disorders	Introduction to Oedema, hyperemia, congestion, haemorrhage, circulatory disturbances, thrombosis, ischaemia & infarction
IV	Tumour	Introduction to Neoplasia, tumor, characteristics of tumor, spread of tumors, difference between benign tumor and malignant tumor Introduction and significance of tumor markers.
V	Healing	Healing: Definition, different phases of healing, factors influencing wound healing.

Reference Book

- Text Book of Pathology, Harshmohan, 7th Edition
- Text book of Pathology, Robbins, 4th edition,

Web Links

- <http://gonuke.org/wp-content/acad/IntroductiontoMedicalLaboratoryTechnology.pdf>
- <https://scholarworks.bgsu.edu/cgi/viewcontent.cgi?article=1282&context=honorsprojects>

SUBJECT: General Pathology Lab
SUBJECT CODE: LSH503L
CREDIT: 02

LIST OF PRACTICALS

- Unit 1: Components & setting of the Compound microscope.
- Unit 2: Focusing of object, use of low & high power objectives of microscope
- Unit 3: Use of oil immersion lens, care and Maintenance of the microscope.
- Unit 4: Different types microscopy: Dark field microscopy, Fluorescence Microscopy
- Unit 5: Electronic Microscopy in brief

SUBJECT: Basics of Clinical Haematology-I**SUBJECT CODE: MLT501****CREDIT: 02****Objective**

The curriculum of hematology aims to prepare the students in basic understanding of the composition of blood, waste management, instrumentation, techniques and methods of estimating different parameters.

Learning Outcome

By the end of this course, the students will be able to

- Collect, process and preserve the blood samples
- Can efficiently perform routine investigations in clinical hematology laboratory

Unit	Topic	Key Learning
I	Introduction	Introduction to Haematology, Organization of laboratory and safety measures, Laboratory Safety guidelines, Important equipment used in haematology lab
II	Haematopoiesis	Erythropoiesis, Leucopoiesis, Thrombopoiesis, sites of hemopoiesis, Mechanism of hemopoiesis, stages of cell development, , Blood and its composition, Anticoagulants, mechanism of action, types and uses, merits and demerits, effect of storage on blood cells
III	Sample Collection	Requirement, methods of collection, transport, preservation, and processing of various clinical Specimens, Blood collection for hematological investigations, Venipuncture, Capillary blood, Arterial blood, Precautions during collection, Vacutainer tubes, its type and uses, sample acceptance and rejection criteria.
IV	Hemoglobin	structure, function and types, Hemoglobinometry, Hemoglobin estimation by various methods, advantages and disadvantages, physiological and pathological variations on blood parameters, Hemocytometry, visual and electronic method, neubauer counting chamber, RBC count, WBC count, Platelets count, absolute eosinophil count, principle, procedure, calculation , significance, precautions involved during counting, absolute count of various WBCs. Physiological and pathological changes in values
V	Smear preparation	Preparation of thin and thick smears, staining of smears, Romanowsky dyes, preparation and staining procedures of blood smears, Morphology of normal blood cells and their identifications, differential leucocytes count by manual and automated method, physiological and pathological variations in value.

Text Books:

- Godkar.B. Praful,(2016) Textbook of MLT,3rd edition,Bhalani Publications
- Singh Tejinder,(2014),Atlas & Textbook of Haematology,3rd edition,Avichal Publications
- Ochei J & Kolhatkar A(2000),Medical Laboratory Science: Theory & Practice, 3rd edition,Mcgraw Hill Education

Reference Books:

- Mukherjee .L.K(2017), Medical Laboratory Technology,Vol.1-3,3rd edition, Tata Mcgraw Hill Sood Ramnik,(2015),
- Text book of Medical Laboratory Technology,2nd edition, Jaypee Publications

Web Links:

- <http://www.colby.edu/chemistry/BC176/CH1.pdf>
- <https://doctorlib.info/medical/biochemistry/3.html>
- [https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/Medical Bio chemistry.pdf](https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/Medical_Bio_chemistry.pdf)

SUBJECT: Basics of Clinical Haematology-I-Lab

SUBJECT CODE: MLT501L

CREDIT: 02

LIST OF PRACTICALS

1. To learn general laboratory safety rules
2. To demonstrate glass wares, apparatus and plastic wares used in laboratory
3. To prepare EDTA, Sod. Citrate & Sod. Fluoride anticoagulants and bulbs/vials used in laboratory
4. Demonstration of Vacutainer
5. To demonstrate method of blood collection
6. To separate serum and plasma
7. Demonstration of microscope.
8. Determination of Hemoglobin by various methods
9. Determination of TLC
10. Preparation of thick and thin smear
11. Determination of DLC
12. Determination of Total RBC
13. Determination of total platelet count
14. Determination of absolute leucocyte count

Text Books

- Sharma and Parashar. Dictionary of Biochemistry; CBS Publications
- Harold And Varley. Practical Clinical Biochemistry
- Laxmi Ahuja; Quick Review In Biochemistry; Asia Printograph

Reference Books

- A.C. Deb; Fundamentals of Biochemistry; New Central Book Agency
- Varun Kumar Malhotra; Handbook of Practical Biochemistry; Jaypee Brothers

SUBJECT: Project Work-I
SUBJECT CODE: MLTPW501L
CREDIT: 04

Project Work: (Field Work and Case Studies).

The project is meant for students to understand, perform of test and diagnosis of disease in laboratory.

SUBJECT: MOOC
SUBJECT CODE: MOOC501
CREDIT: 02

SUBJECT: Entrepreneurship
SUBJECT CODE: OMS501
CREDIT: 02

Objective

The objective of this course is to develop personal creativity, entrepreneurial initiative, understanding the stages of the entrepreneurial process and the resources needed for the successful development of entrepreneurial ventures.

Learning Outcome

By the end of this course, the students will be able to

- Understand entrepreneurship concept as a whole.
- Sell both themselves and their idea or product
- Create as solid business plan.

Units	Topics	Key Learning
Unit-1	Introduction to Entrepreneurship	Introduction to Entrepreneurship, , Entrepreneurial Mindset, Characteristic of an Entrepreneur, Advantages and disadvantages of Entrepreneurship
	Recognise Opportunity	Purpose of all businesses, Types of Entrepreneurial organizations, Types of Enterprises
	Creativity & Innovation	Marketing, 4Ps of Marketing, Process of Marketing, Marketing Mix, 7Ps of Marketing
	Conception & Ideation	Business Plan and its elements, Application of Business Plan
	Are you a risk taker?	Entrepreneurs, types of Entrepreneurs, Roles and Responsibilities of Entrepreneurs, Qualities of an Entrepreneur
	Identify Your Customer	Customer segmentation, Criteria for selling customer value proposition, Customer Lifecycle
Unit-2	Self Confidence and Resilience	4 Ps of Entrepreneurship, Qualities of successful entrepreneur, Self-confidence, Positive attitude, Overcoming the fears, Recover from Failure
	Success and Failure Stories of Famous Entrepreneurs – 1	Steve Jobs Success Story, Mumbai Dabbawala delivery success Story
	Never Give Up	Importance of Focusing energy on Business, Importance of Business Networking and its advantages
	Competition Analysis	Competition Analysis, Factors affecting competition strategies, Prerequisites of successful enterprise
	Risks – Identification and Mitigation	Business Risk, Types of Business Risks, Risk Identification, Risk Mitigation,
	Getting Money for Business	Concept Of Funding, Basics terms of Accounting, Types of Funding,
Unit-3	Dream and Achieve	Vision, Mission and Goals, Business Ethics, SMART goals, entrepreneurial work ethics
	Leadership and Team Spirit	Lead by example, Importance of Embracing diversity, Role of Emotional Intelligence to be a leader.
	Success and Failure Stories of Famous Entrepreneurs – 2	
	Serving the Society	Roles of Entrepreneurs in society, Selfless Entrepreneurship,
	Taking Ownership	Taking complete ownership, taking control over the business
	Adapt to Change	Porters competition strategies, Factors affecting business,

	Discover Yourself	Qualities of the successful entrepreneur
Unit-4	Problem Solving: Introduction to Critical Thinking	Critical Thinking, Applying critical thinking, REASON Model of Critical Thinking
	Problem Solving: Introduction to Creative Thinking	Creative thinking, Importance and benefits of Creative thinking, Creative thinking in problem solving
	Problem Solving: Introduction to Decision Making	Decision making, Effective decision making process
Unit-5	4Ps of Marketing – PDF	4Ps- Product, Place, Price, Promotion, Apply 4Ps to marketing Strategy into action
	Costs in Entrepreneurship - PDF	Cost, types of Costs, Introduction to Accounting Basics, main methods of Accounting, Financial Documents, P&L statements, Working capital
	Applicable Sources of funding and Regulatory and Statutory rules – PDF	Regulatory and statutory rules for an Entrepreneur, Business Loans for startups and MSMEs by Indian Government
	Analysis of success and failure stories – PDF	Analysis of success and failure stories, Key skills involved in the successes of entrepreneurs
	Identification of one's entrepreneurial skills and knowledge - PDF	Identify various skills and characteristics to be an entrepreneur, Effective Ways to Build Entrepreneurial Skills, Develop or Improve your Entrepreneurial Skills ,
	Legal Issues	Intellectual Property Rights, patents, trademarks, copyrights, trade secrets, licensing, franchising

Text Books:

1. Dollinger, MJ, Entrepreneurship- Strategies and Resources, Pearson Education.
2. Desai, Vasant, Entrepreneurship Development, Himalaya Publishing House.
3. Gupta, C.B. and Srinivasan, P., Entrepreneurship Development, Sultan Chand & Sons.

Reference Books:

1. Charanthimath, P.M., Entrepreneurship Development and Small Business Enterprise, Pearson Education.
2. Havinal, Veerbhadrappa, Management and Entrepreneurship, 1st Edition, NewAge International Publishers, 2008.

SUBJECT: Diagnostic Biochemistry-I
CODE: MLT603
CATEGORY: Skill Education Component

Objectives

This paper gives brief understanding about various types of organ function test, acidosis and alkalosis.

Learning Outcomes

- Able to memorize and enlist various organ function tests.
- Able to perform and demonstrate various tests.
- Able to compare and evaluate the test results.

Unit	Topic	Key Learning
I	Diabetic Profile and Liver Function Test	Introduction, bile pigment metabolism, jaundice and its types, Estimation of Bilirubin, Bile salt, Bile pigments, Urobilinogen, SGPT/ALT, SGOT/AST, ALP, GGT, Viral Hepatitis
II	Renal and Pancreatic Function Test	Renal Function Test: Introduction, Glomerular filtration rate, renal threshold, Urea, Creatinine, Uric Acid, Sodium, Potassium, Creatinine Clearance test, Urea clearance test, Examination of renal calculi Estimation and significance of amylase and lipase
III	Cardiac Function Test	Introduction, myocardial infarction, CHD, Biochemical markers of Heart diseases and their estimation, Role of laboratory in monitoring heart diseases, Lipid Profile Test
IV	Gastric Function Test	Introduction, gastric secretions, total and free acid, stimulation test, physical & chemical examination of gastric secretions.
V	Acid Base Balance	Acid base balance, action of buffer system, Hb buffers, respiratory and metabolic acidosis, respiratory and metabolic alkalosis, Arterial blood gas analysis, Blood gas analyzer.

Text Books

- Text book of Medical lab Technology, Praful B Godkar, IIIrd edition
- Text book of Biochemistry, D M Vasudevan, Jaypee Publishers
- Text book of Biochemistry, M N Chatterjea, RanaShinde
- Practical Biochemistry, Singh & Sahni

Reference Books

- Clinical Chemistry, Teitz

Web Links

- <http://www.grsmu.by/files/file/university/cafedry/klinicheskaya-immynologiya/files/fiu/4.pdf>

SUBJECT: Diagnostic Biochemistry-I (LAB)

CODE: MLT603L

Objectives

Course is designed to impart knowledge and skills required to learn various aspects and concepts about Diagnostic Biochemistry, the related disorders and diseases.

Learning Outcomes

1. Provides an understanding of which techniques are used to diagnosis the disease in the Diagnostic Biochemistry
2. Explains the basic principles of Diagnostic biochemistry and their application in the clinical diagnosis of diseases

Learning (Practical)

1. Estimation of Bilirubin
2. Estimation of SGPT
3. Principle, clinical significance and estimation of Urea and Creatinine
4. Principle, clinical significance and estimation of Lipid Profile Total Cholesterol, Triglyceride
5. Physical & chemical examination of body fluid
6. Preparation of Buffer

Text Books

- Text book of Medical lab Technology, Praful B Godkar, IIIrd edition
- Text book of Biochemistry, D M Vasudevan, Jaypee Publishers
- Text book of Biochemistry, M N Chatterjea, RanaShinde
- Practical Biochemistry, Singh & Sahni

Reference Books

- Clinical Chemistry, Teitz

Web Links

- <http://www.grsmu.by/files/file/university/cafedry/klinicheskaya-immynologiya/files/fiu/4.pdf>

SUBJECT: Diagnostic Cytology

CODE: MLT604

Objectives

This course has been formulated to impart basic aspects of cells and its stains for diagnosis of disease in cytology.

Learning Outcomes

- Students would be able to perform collection, processing, staining and quality control in cytological diagnosis.

Unit	Topic	Key Learning
I	Cell Structure of Tumor	Cell: basic structure and function, cell organelles, cell cycle, Benign and Malignant tumors, Instruments used in cytology, preparation of buffers, stains,
II	Instruments and equipment used in cytology	Instruments and equipments used in cytology Fixation and Fixatives used in cytology, Adhesive and mounting media, Cell block and cytospin technique, Staining such as PAP, Diff-quick, MGG, H&E, Shorr staining, significance of PAP-HPV, Destaining and restaining of slides, Cover slipping
III	Aspiration and exfoliative cytology	Aspiration and exfoliative cytology, Patient preparation, Sample collection, Fixation, Processing and Staining FNAC: procedure, processing of sample and staining, on site quick staining procedure
IV	Pap staining	Pap staining, Progressive & Regressive, Collection, preservation, transportation and processing of cytological specimens such as sputum, BAL, CSF, Pleural, peritoneal and pericardial fluid, Gynaecologic sample
V	Immunocytochemistry	Sex chromatin demonstration, Introduction of Immunocytochemistry, different markers and its applications, Automation in cytology, Liquid based preparation & automated screening device

Text Books

- Clinical Diagnosis & Management, Henry
- Histopathology & Histotechniques, Bancroft,
- Text Book of Histopathology & Histotechniques, C FA Culling
- Diagnostic Cytology, Koss& Koss
- Cytopathology, Bibbo

SUBJECT: Diagnostic Cytology (LAB)

CODE: MLT604L

Objectives

This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Learning Outcomes

- Students would be able to perform collection, processing, staining and quality control in cytological diagnosis.

Learning (Practical)

1. PAP staining and interpretation of results
2. To perform Papnicolaou's stain on cervical smear
3. To process samples using cytopspin
4. To perform Guard's staining for demonstration sex chromatin (Barr bodies on a buccal smear)
5. Liquid based Cytology : Principle and Preparation

Text Books

- Clinical Diagnosis & Management, Henry
- Histopathology & Histotechniques, Bancroft,
- Text Book of Histopathology & Histotechniques, C FA Culling
- Diagnostic Cytology, Koss& Koss
- Cytopathology, Bibbo

SUBJECT: Fundamentals of Microbiology-II

CODE: MLT605

Objectives

This subject gives a general insight into the basics of microbiology, culture media preparation and various biochemical test used in microbiology, methods for recovery, culture techniques, procedures and antibiotic testing.

Learning Outcomes

- Able to recognize various culture media and its preparation method.
- Understanding of concepts of culturing methods.
- Able to perform and interpret various biochemical tests.
- Able to differentiate various microorganisms.

Unit	Topic	Key Learning
I	Cultural Media	Classification, Liquid and solid Media, Synthetic media, Selective media, differential media, transport media containers for media, distribution of medias in tubes, bottles and Petri dishes, Composition and preparation of cultural media, role of ingredients of culture media, Precautions during media Preparation
II	Culturing of Microorganism	Inoculation of culture media, culturing of aerobes and anaerobes Growth and Nutrition of Bacteria: various phases of growth, typical growth curve, Nutrition of microbes and physical condition required for growth. Effect of Carbon, Nitrogen, Growth factors, Vitamins, Temperature, pH, Osmotic Pressure, Oxygen and Carbon Di Oxide on microbial growth.
III	Methods of Culture Preservation	Pure culture isolation and preservation: Streaking, serial dilution and plating methods, cultivation, maintenance and preservation/stocking of pure cultures, cultivation of aerobic and anaerobic bacteria.
IV	Biochemical Test	Culturing of microorganisms and identification, Biochemical test such as Catalase, Citrate utilization test, Coagulase test, Indole test, Oxidase test, Urease test, MR-VP test, TSI slants and others biochemical test
V	Antimicrobial Sensitivity Test	Antimicrobial sensitivity test, Culture medium used for Antibiotic susceptibility testing, Preparation and standardization of inoculums, Control bacterial strains, Choice of antibiotics MIC and MBC: Concepts and methods for determination various methods of Antibiotic susceptibility testing with special reference to Stokes and Kirby- Bauer method

Text Books

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
- Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013)
- Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication

Reference Books

- Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
- Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education

Web Links: <http://www.grsmu.by/files/file/university/cafedry/klinicheskaya-immynologiya/files/fiu/4.pdf>

SUBJECT: Fundamentals of Microbiology-II (LAB)

CODE: MLT605L

Objectives

Course is designed to impart knowledge and skills required to learn various aspects and concepts about Microbiology, the related disorders and diseases.

Learning Outcomes

- Able to recognize various culture media, its preparation method and uses.
- Understanding of concepts of culturing methods.
- Able to understand principle, perform and interpret various biochemical tests.
- Able to differentiate various microorganisms.

Learning (Practical)

1. Preparation and Identification of Liquid, selective, differential, transport culture media & its uses
2. Preparation of swabs/sterile tubes & bottles
3. Preparation of culture plates.
4. Inoculation of organisms in aerobic culture media.
5. Inoculation of organisms in anaerobic culture media.
6. Streaking, preparation of serial dilution and plating methods.
7. Culturing and identification of organisms in various biochemical test such as Catalase, Citrate utilization test, Coagulase test, Indole test, Oxidase test.
8. Antimicrobial sensitivity testing with different methods Stokes and Kirby- Bauer method.
9. Interpretation of MIC & MBC.

Text Books

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
- Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013)
- Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication

Reference Books

- Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
- Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education

Web Links: <http://www.grsmu.by/files/file/university/cafedrv/klinicheskaya-immynologiya/files/fiu/4.pdf>

SUBJECT: Histopathology & Histotechniques-I**CODE: MLT606****Objectives**

Students will learn about various basic of histopathology & Histotechnique, handling and processing of tissue specimens, staining procedures and application of Histotechnique.

Learning Outcomes

- Understanding of histopathology laboratory, equipments and fixation procedure.
- Identification of samples and selection of proper tissue processing techniques.
- Able to employ and demonstrate various microtomy procedures and staining method.
- Comparing and interpreting various staining procedures.
- Developing and designing of histopathology laboratory.

Unit	Topic	Key Learning
I	Introduction of histopathology	Introduction of histopathology & histotechniques, laboratory organization, care & maintenance of equipments used in histotechnology lab ,Safety measures in histotechnology lab Reception, Recording, Labeling and transportation of tissue specimens, Basic concepts of fixation and various types of fixative used in histopathology and Cytopathology
II	Tissue and its processing	Tissue and its types, Location and function, Grossing of tissues, whole mount, sections, smears, tissue processing and its steps, manual and automated method, components & principle of automatic tissue processor Decalcification, decalcification methods, types of decalcifying fluid, Processing of bones and teeth, Embedding media, its type and properties
III	Microtomy	Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Section cutting, fault and remedies, Section adhesive Cryostat, frozen sections of fresh, fixed and unfixed tissue, freeze drying, rapid frozen sections and staining for emergency diagnosis
IV	Principles of staining	Dye chemistry, Stains and dyes, natural dye, acidic dye, basic dye, neutral dyes, fluorescence dye, mordant, accelerators, accentuators, metachromasia, metachromatic dyes Progressive, regressive, vital, supravital staining, types of hematoxylin, Haematoxylin and eosin staining, use of control sections in tissue staining, mounting and mounting media, advantages & disadvantages
V	Application of Histotechniques	Staining of carbohydrates, Connective tissue, Demonstration and identification of lipids, Demonstration of microorganism on tissue specimens Demonstration of sex chromatin, Museum techniques Immunohistochemistry: principle, types, applications, antigen retrieval, APAAP, PAP Staining

Text Books

- Text Book of Histopathology & Histotechniques, C FA Culling
- Diagnostic Cytology, Koss & Koss
- Cytopathology, Bibbo
- Diagnostic Cytology, Naib

Reference Books

- Histopathology & Histotechniques, Bancroft,

Web Links

<https://webpath.med.utah.edu/HISTHTML/HISTOTCH/HISTOTCH.html>

SUBJECT: Histopathology & Histotechniques-I (LAB)

CODE: MLT606L

Objectives

Students will learn about various basic of histopathology & Histotechnique, handling and processing of tissue specimens, staining procedures and application of Histotechnique.

Learning Outcomes

- Understanding of histopathology laboratory, equipments and fixation procedure.
- Identification of samples and selection of proper tissue processing techniques.
- Able to demonstrate and perform various microtomy procedures and staining method.
- Able to perform and interpreting various staining procedures.

Learning (Practical)

1. Recording, Labeling and transportation of tissue specimens,
2. Procedure of tissue fixation
3. Procedure of tissue grossing
4. Procedure of dehydration
5. Embedding procedure
6. Procedure of Microtomy
7. Staining H & E ,
8. Staining PAP

Text Books

- Text Book of Histopathology & Histotechniques, C FA Culling
- Diagnostic Cytology, Koss & Koss
- Cytopathology, Bibbo
- Diagnostic Cytology, Naib

Reference Books

- Histopathology & Histotechniques, Bancroft,

Web Links

<https://webpath.med.utah.edu/HISTHTML/HISTOTCH/HISTOTCH.html>

SUBJECT: Immunology & Serology-I**CODE: MLT608****Objectives**

This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Learning Outcomes

- The students will learn scientific approaches/techniques that are used to investigate various diseases.

Unit	Topic	Key Learning
I	Immune System	History and Introduction of the immune system, innate and adaptive immunity; active and passive immunity, primary and secondary immune response. Cell and organs of immune system, Phagocytosis
II	Antigens and haptens	Antigens and haptens: Properties, foreignness, molecular size, heterogeneity, B and T cell Epitopes, T dependent and T independent antigens. Antibodies: structure, function and properties of the antibodies, different classes, subclasses and biological activities of antibodies Introduction of hybridoma technology, monoclonal antibodies, polyclonal Antibody
III	Major Histocompatibility Complex	Mechanism of humoral and cell mediated immune response. Introduction of Major Histocompatibility Complex, Antigen presenting cells Complement system and complement fixation test. Introduction of Hypersensitivity and its types
IV	Rheumatological diseases	Introduction to Rheumatological diseases, etiology and pathogenesis and lab investigations, Introduction to autoimmunity, autoimmune disorders and autoimmune markers such as parietal cell antibody, anti sperm antibody, lupus anticoagulants, anti mitochondrial antibody, ANA, ds DNA, HLA-B27, ASMA, anti CCP
V	Laboratory tests for demonstration of antigen	Laboratory tests for demonstration of antigen – antibody reaction such as agglutination, precipitation, precipitation in gels, ELISA, RIA, Immunofluorescence assay, WIDAL, ASO, CRP, RA, RPR, TPHA, Introduction and classification of vaccines

Text Books

- Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
- Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
- Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

Reference Books

- Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
- Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
- Richard C and Geffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.

SUBJECT: Immunology & Serology-I (LAB)

CODE: MLT608L

Objectives

Course is designed to impart knowledge and skills required to learn various aspects and concepts about immunology and serology, the related disorders and diseases.

Learning Outcomes

1. Provides an understanding of which techniques are used to diagnosis the disease in immunology and serology
2. Explains the basic principles of immunology and serology, their application in the diagnosis of diseases

Learning (Practical)

1. Demonstration of Total IgE ELISA Method
2. To perform and interpretation of Widal slide and tube method
3. To perform, interpretation and clinical significance of CRP
4. To perform, interpretation and clinical significance of RA Factor
5. To perform, interpretation and clinical significance of ASO

Text Books

- Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
- Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley- Blackwell Scientific Publication, Oxford.
- Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

Reference Books

- Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
- Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
- Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.

SUBJECT: Endocrinology Tumor & Cancer Marker**CODE: MLT609****Objectives**

This paper is framed to provide basic knowledge of hormones & toxic substances with their determination techniques as well as related disorders.

Learning Outcomes

- Students would be able to perform collection, processing and quality control in immunodiagnosis.

Unit	Topic	Key Learning
I	Hormones	Introduction to endocrinology, Hormones & its classification , organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of Action
II	Thyroid Function	Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T3, T4, TSH, FT3, FT4, TBG, Disorder associated with thyroid dysfunction. Hormones of Parathyroid gland and their estimation,
III	Infertility	Infertility, types of infertility, test for female and male infertility Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone, DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test, Quadruple Test
IV	Growth Hormones	Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion
V	Tumor Markers	Tumor markers, their types, significance and estimation, Advantages and disadvantages of tumor markers

Text Books

- Text book of Biochemistry, D M Vasudevan, Jaypee Publishers
- Text book of Biochemistry, M N Chatterjea, Rana Shinde
- Clinical Chemistry, Teitz
- Clinical Chemistry, Bishop
- Text book of Medical Lab Technology, Praful B Godkar, IIIrd edition

SUBJECT: Endocrinology Tumor & Cancer Marker (LAB)

CODE: MLT609L

Objectives

This paper is framed to provide basic knowledge of hormones & toxic substances with their determination techniques as well as related disorders.

Learning Outcomes

Students would be able to processing, analyzing and interpretation of Hormones, Tumor & Cancer marker report.

Learning (Practical)

1. Estimation of T3
2. Estimation of T4
3. Estimation of TSH
4. Estimation of FSH
5. Estimation of LH
6. Estimation of hCG
7. Estimation of Cortisol
8. Estimation of Progesterone
9. Estimation of Testosterone

Text Books

- Text book of Biochemistry, D M Vasudevan, Jaypee Publishers
- Text book of Biochemistry, M N Chatterjea, Rana Shinde
- Clinical Chemistry, Teitz
- Clinical Chemistry, Bishop
- Text book of Medical Lab Technology, Praful B Godkar, IIIrd edition

SUBJECT: Immunohematology and Blood transfusion**CODE: MLT610****Objectives**

This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Learning Outcomes

- The students will learn scientific approaches/techniques that are used to investigate various diseases.

Unit	Topic	Key Learning
I	Blood Group system	Introduction of blood bank and its components, ABO & Rh blood group system, Various methods of blood group determination, Other blood group system, Hemolytic disease in Newborn (HDN), Antigen, Antibody, Naturally occurring antibody.
II	Blood Bank Techniques	Transfusion transmissible infectious disease screen, Coomb'test, Cross matching, Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination and Gel card, Apheresis, indications of hemapheresis, plasmapheresis, platelets pheresis
III	Principle of blood transfusion	Principal & Practice of blood Transfusion. Donor selection criteria and screening, Blood collection and processing, Blood transfusion reaction and its type, Blood transfusion and its Hazards, Quality control and quality assurance in blood transfusion.
IV	Preparation of blood Components and Storage	Blood components and its preparation, preservation, storage and transportation, Indications for different blood component transfusion, Anticoagulants and preservative used in blood bank.
V	Accreditation, licensing and regulation	Basic Principles of Blood Banking Quality control of reagents, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society, DGHS, FDA and blood transfusion services. Maintain blood bank records.

Text Books

- Compendium of Trasfusion Medicine, Dr R N Makroo
- Text book of Medical lab Technology, Praful B Godkar, IIIrd edition
- Text book of Medical Lab Technology, Ramnik Sood, Jaypee Publishers
- Text Book of Pathology, Harshmohan, 6th Edition
- Practical Haematology, Dacie & Lewis, 11th edition

SUBJECT: Immunohematology and Blood transfusion (LAB)

CODE: MLT610L

Objectives

This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Learning Outcomes

The students will learn scientific approaches/techniques that are used to investigate various diseases.

Learning (Practical)

- 1.ABO Blood Grouping and cross matching
- 2.To perform RH incompatibility testing
- 3.To demonstrate Coomb's Test
- 4.Separation of blood components
5. Screening test (HIV, HbSAg & HCV)

Text Books

- Compendium of Trasfusion Medicine, Dr R N Makroo
- Text book of Medical lab Technology, Praful B Godkar, IIIrd edition
- Text book of Medical Lab Technology, Ramnik Sood, Jaypee Publishers
- Text Book of Pathology,Harshmohan, 6th Edition
- Practical Haematology,Dacie & Lewis, 11th edition

SUBJECT: Human Values and Professional Ethics

CODE: OAE101

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Objectives:

At the end of course students will attain

- Understanding of Human values for self (NiYama), and for interaction with outer world (Yama).
- Ability to exhibit Professional Ethics in performing a professional task with excellence – योग: कर्मसु कौशलम् .
- Understanding of Professional Ethics that demands to see the unseen with emphasis on Sustainable development / eco-friendly implementation of the task.
- Ability to work in team with human values and professional ethics

UNIT I: Human Values-1:

Morals, **Values** (Niyam): -Understanding values, Types of values, Role of tracking values for individual & social wellbeing. And Ethics (Yama) :

Integrity:- Understanding integrity and role of integrity in social harmony –Trustworthiness

Work **Ethics** – Service-Learning – Civic Virtue – Respect for others – Living Peacefully –Caring – Sharing.

Honesty: -Understanding honesty and its role in personal and social –Courage – **Value** Time.Co-operation:-Understanding cooperation and significance of cooperation its family, work team and social cohesiveness, wellbeing and development – Commitment.

Tutorial Module :Rational Behavior versus Ethical Behavior:Case Studies (from Yoga-Sutra, Bhagwat Geeta, Panchatantra, Autobiography of Mahatma Gandhi) or any other literatures.

UNIT II: Human Values-2

Empathy: Basic Concept on Empathy– Self-confidence – Spirituality- Character.

Truthfulness: - Understanding truthfulness, need for truthfulness and role of truthfulness in relationship, social interaction, integrity, faiths & dependence – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties – Aspirations and Harmony (I, We & Nature) – Gender Bias – Emotional Intelligence– Emotional Competencies – Conscientiousness.

Being, body, brain & mind: - Effective & efficient use of body, brain and mind is personal and social well being

Value Judgments, Facts & Values, how values are justified, Aesthetics, Selection of Values, Universal Values, Human Values, Value Education

Tutorial Module :Empathy and its types:Case Studies from Yoga-Sutra, Bhagwat Geeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature.

UNIT III: Professional Ethics aiming at excellence and Harmony

Value Based Life and Profession, Professional Ethics and Right Understanding, Competence in Professional Ethics, Issues in Professional Ethics – The Current scenario.

Positive and constructive dynamism of power, politics and leadership.

Tutorial Module: Ethical decision making:Case Studies (from Yoga-Sutra, Bhagwat Geeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)

UNIT.IV Professional Ethics: Global Prospective.

Globalization and MNCs –Cross Culture Issues – Business Ethics – Media Ethics – Environmental Ethics – Endangering Lives – Bio Ethics – Computer Ethics – War Ethics

Tutorial Module: Ethics and Social Networks:Case Studies (from Yoga-Sutra, Bhagwat Geeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)

UNIT V: Duties and Rights in Profession

Concept of Duty – Professional Duties – Collegiality – Techniques for Achieving Collegiality – Senses of Loyalty – Consensus and Controversy – Professional and Individual Rights – Confidential and Proprietary Information – Conflict of Interest-Ethical egoism – Collective Bargaining – Confidentiality – Gifts and Bribes, Plagiarism

Tutorial Module :Ethics in Corporate: Case Studies (from Yoga-Sutra, Bhagwat Geeta, Panchatantra, Autobiography of Mahatma Gandhi or any other literature)

REFERENCES:

1. **New Approaches in Ethics for the Caring Professions: Taking Account of Change for Caring Professions 2005 Edition**, by Richard Hugman
Publisher: Red Globe Press; 2005 edition (9 July 2018)
2. **Rethinking Values and Ethics in Social Work 1st ed. 2017 Edition, Kindle Edition** by Richard Hugman (Author), Jan Carter (Author)
Publisher: Red Globe Press; 1st ed. 2017 edition (16 September 2017)
3. **Professional Ethics and Human Values** Paperback – 2015
by A. Alavudeen (Author), R. Kalil Rahman (Author), M. Jayakumaran (Author)
Publisher: Laxmi Publications; First edition (2015)
4. **A Foundation Course in Human Values and Professional Ethics** Paperback – 30 Apr 2010
by R.R. Gaur (Author), R. Sangal (Author), G.P. Bagaria (Author)
Publisher: Excel Books (30 April 2010)
5. **Living Issues in Philosophy (9th Edition) (1995)**
By : Titus, Smith and Nolan
Publisher: Oxford University Press, New York
6. **Foundation of Ethics and Management**
By : B P Banerjee
Publisher: Excel Books, 2005

Assessment Methodology

- Self Assessment
- Peer Learning
- Assessment Rubrics for Behavioral Skills
- Pedagogy:
- Case study based & Group Discussion.

Suggested reading:

1. Case Study: <https://whitneyhess.com/blog/2012/08/21/on-empathy-and-apathy-two-case-studies/>Book: De Gruyter - Speaking of Emotions: Conceptualisation and Expression (edited by Angeliki Athanasiadou, Elzbieta Tabakowska)
2. Book: To Kill a Mockingbird - Lee Harper
3. Book: Take A Walk In Someone Else's Shoes by Bethany Morlan
4. A paper on 'University Students' Value Priorities and Emotional Empathy':
file:///C:/Users/Dell/Desktop/University_Students_Value_Priorities_and_Emotiona.pdf
5. Research paper on 'Empathy as Added Value in Predicting Donation Behavior':
file:///C:/Users/Dell/Desktop/wp_10_692.pdf
6. Decety J and Jackson PL. 2004. The functional architecture of human empathy. Behavioral and cognitive neuroscience reviews 3(2):71-100.
7. Klimecki OM1, Leiberg S2, Ricard M2, Singer T3. Differential pattern of functional brain plasticity after compassion and empathy training. Soc Cogn Affect Neurosci. 2014 Jun; 9 (6): 873-9.
8. A paper on 'The Science of Empathy' - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5513638/>
9. A paper on 'The Psychology of Emotional and Cognitive Empathy' - <https://lesley.edu/article/the-psychology-of-emotional-and-cognitive-empathy>
10. Links on the latest research and reviews on articles related to empathy - <https://www.nature.com/subjects/empathy>

Suggested videos/movies (English/Hindi)

1. The Boy in the Striped Pyjamas (an English movie based on the novel by the same name by John Boyne)
2. Chhapaak (an Indian movie about how a young woman tries to rebuild her life after a man throws acid in her face on a public street in New Delhi in 2005)
3. George Lucas Educational Foundation – Edutopia – 3 videos on the importance of empathy - <https://www.edutopia.org/blog/3-videos-importance-empathy>
4. The actor, Mark Ruffalo, and Murray (from Sesame Street) talk about the word "Empathy" - https://www.youtube.com/watch?v=9_1Rt1R4xbM
5. <http://theconversation.com/understanding-others-feelings-what-is-empathy-and-why-do-we-need-it-68494>
6. <https://www.verywellmind.com/what-is-empathy-2795562>
7. "The Present" is a thesis short from the Institute of Animation, Visual Effects and Digital Postproduction at the Filmakademie Baden-Wuerttemberg in Ludwigsburg, Germany. - <https://www.youtube.com/watch?v=96kI8Mp1uOU>