GALGOTIAS UNIVERSITY

Syllabus of

B.Sc. Medical Laboratory Technology

Name of School: School of Medical and Allied Sciences

Department: Medical laboratory Technology

Year: 2017-2018

B.Sc.Medical Lab Technology

2017-18--Programme Structure					
Sem I					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML101	General Anatomy-I	3	0	0	3
BML102	General Physiology -I	3	0	0	3
BML103	Biochemistry-I	3	0	0	3
EVS102	Energy & Environmental Sciences	3	0	0	3
ENG133	Communicative English-I	3	0	0	3
BML151	General Anatomy-I (P)	0	0	2	1
BML152	General Physiology-I (P)	0	0	2	1
BML153	Biochemistry-I (P)	0	0	2	1
ENG183	Communicative English-I(P)	0	0	2	1
	TOTAL				**19**
Sem II					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML201	General Microbiology	3	0	0	3
BML202	Biochemical metabolism	3	0	0	3
BML203	General Anatomy and Physiology	3	0	0	3
ENG233	Communicative English-II	3	0	0	3
BML251	General Microbiology(P)	0	0	2	1
BML252	Biochemical metabolism(P)	0	0	2	1
ENG283	Communicative English-II (P)	0	0	2	1
	Total				**15**
Sem III					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML301	Analytical biochemistry	3	0	0	3
BML 302	Pathology	3	0	0	3
BML303	Systemic bacteriology	3	0	0	3
BML304	Computer Fundamentals	3	0	0	3
BML351	Analytical biochemistry (P)	0	0	2	1
BML352	Pathology (P)	0	0	2	1
BML353	Systemic bacteriology (p)	0	0	2	1
BML354	Computer Fundamentals(P)	0	0	2	1
	Total				**16**
Sem IV					
Course Code	**Subject**	**L**	**T**	**P**	**C**

BML401	Hematology & hematological diseases	3	0	0	3
BML402	Immunology and bacterial serology	3	0	0	3
BML403	Clinical Biochemistry	3	0	0	3
BML451	Hematology & hematological diseases (P)	0	0	2	1
BML452	Immunology and bacterial serology(P)	0	0	2	1
BML453	Clinical Biochemistry (P)	0	0	2	1
	Total				**12**
Sem V					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML501	Mycology & virology	3	0	0	3
BML502	Immunopathology	3	0	0	3
BML503	Transfusion Medicine	3	0	0	3
MLT504	Medical Laboratory Technician-I	12	0	0	12
LLL101	Universal human values and ethics	3	0	0	3
BML551	Mycology & virology(P)	0	0	2	1
BML552	Immunopathology (P)	0	0	2	1
BML553	Transfusion Medicine(P)	0	0	2	1
MLT554	Medical Laboratory Technician-I(P)	0	0	12	6
	TOTAL				**33**
Sem VI					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML601	Cytopathology	3	0	0	3
BML602	Parasitology	3	0	0	3
BML603	Clinical Laboratory Practice(CLP)	3	0	0	3
BML604	Research Methodology & Biostatistics	3	0	0	3
MLT605	Medical Laboratory Technician-II	12	0	0	12
BML651	Cytopathology (p)	0	0	2	1
BML652	Parasitology (p)	0	0	2	1
MLT653	Medical Laboratory Technician-II(P)	0	0	6	3
BML653(or)	Microbiology (Project)	0	0	0	1
BML654(or)	Biochemistry (Project)				

BML655(or)	Hematology (Project)				
BML656	Transfusion Medicine(Project)				
	TOTAL				**30**
Sem VII					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML 701	Professional Training (6MONTHS)	0	0	40	20
	TOTAL				**20**
Sem VIII					
Course Code	**Subject**	**L**	**T**	**P**	**C**
BML 801	Professional Training (6MONTHS)	0	0	40	20
	TOTAL				**20**
	TOTAL				165

BML101	**General Anatomy-I**	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Human anatomy

Course Outcomes

On completion of this course, the students will be able to understand anatomy of different body systems and functions exhibited by these systems in our body.

Catalog Description

This subject involves study of human body, locomotion and support, histological features of various body systems – cardiovascular, GIT, respiratory, endocrine etc.

Text Books

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill
2. Chaursia's, *A Text Book of Anatomy*
3. Ranganathan, T.S., *A Text Book of Human Anatomy*

Reference Books

1. Fattana, *Human Anatomy,* (Description and Applied), Saunder's & C P Prism Publishers, Bangalore
2. Ester. M. Grishcimer, *Physiology & Anatomy with Practical Considerations*, J.P. Lippin Cott. Philadelphia.

Course Content

Module I

Introduction: Human body as a whole

Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Epithelium-definition, classification, describe with examples, function, Glands classification,describe serous & mucous glands with examples, Basic tissues – classification with examples.

Module II

Locomotion and Support

Cartilage – types with example & histology, Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc, fontanelles of fetal skull, Joints – Classification of joints with examples, synovial joint (in detail for radiology), Muscular system- Classification of muscular tissue & histology, Names of muscles of the body.

Module III

Cardiovascular System

Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein.

Module IV

Gastro-intestinal System

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen.

Module V

Respiratory System

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand anatomy of different body systems and functions exhibited by these systems in our body.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 101	**General Anatomy-I**	3				1	2					2	1

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML102	General Physiology-I	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar with human physiology.

Course Outcomes

On completion of this course, the students will be able to understand-scope and importance of cell, physiological laws, blood groups, blood transfusion and fundamentals of different organ systems.

Catalog Description

This is an important subject of Medical Laboratory Technology. It deals with importance of cell and organelles, cell division, physio-chemical laws applied to physiology, blood cells and blood grouping. This subject also deals with blood groupings, blood transfusion, blood indices, transfusion anticoagulant and various blood counts.

Text Books

1. A.K Jain, Human Physiology
2. Chatterjee, C C, Human Physiology, Medical Allied Agency

Reference Books

1. Guyton, Arthur, Text Book of Physiology, Prism Publishers
2. Chatterjee, C C, Human Physiology, Medical Allied Agency

Course Content

Module 1:Cell

Definition, Structure and function of Cytoplasmic Organelles, Reproduction-Meosis, Mitosis.

Module 2: The important physico-chemical laws applied to physiology

Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption, Colloid.

Module 3: Introduction- composition and function of blood

Red blood cells- Erythropoiesis, stages of differentiation function, counts physiological Variation. Haemoglobin -Structure, function, concentration physiological variation. Methods of Estimation of Hb, White blood cell- Production, function, life span, count, differential count. Platelets- Origin, normal count, morphology functions. Plasma Proteins- Production, concentration, types, albumin, globulin, fibrinogen, Prothrombin functions. Haemostasis & Blood coagulation. Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting disorders of clotting factors. Blood Bank, Blood groups-A, B, O system, Rh system,

Module 4

Circulation: General principles Heart: myocardium – innervation – transmission of cardiac impulse Events during cardiac cycle – cardiac output. Peripheral circulation: peripheral

resistances – arterial blood pressure – measurements – factors regulation variations – capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous.

Module 5: Respiration: Mechanics of respiration – pulmonary function tests – transport of respiratory gases- neural and chemical regulation of respiration – hypoxia, cyanosis, dyspnoea – asphyxia.
Excretion: Body fluids – distribution, measurement & exchange, Kidney – structure of nephron – mechanism of urine formation – composition of the urine and abnormal constituents – urinary bladder & micturition

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand-scope and importance of cell, physiological laws, blood groups, blood transfusion and fundamentals of different organ systems.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 102	**General Physiology-I**	3				1	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML103	Biochemistry- I	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the Basic biochemistry

Course Outcomes

On completion of this course, the students will be able to understand Acid Base balance, Structure, function and interrelationship of bio molecules- carbohydrates, Proteins, Lipids, Vitamins, Minerals, and consequences of deviation from normal.

Catalog Description

This course Biochemistry I deals with the acid base balance, biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

Text Books

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2 Das, Debajyothi, *Biochemistry*, Academic, Publishers, Calcutta.
3 A Text book of Medical Biochemistry by. Chatterjee,
4 A Text book of Biochemistry by Satyanarayan,U.

Reference Books

1. Varley, *Clinical Chemistry*
2. Teitz, *Clinical Chemistry*
3. Kaplan, *Clinical Chemistry*

Course Content

MODULE I

Introduction to Apparatus, chemical balance & centrifuge, principle and practice, basic concept of Acids, bases, salts & acid base balance. Structure of cell & introduction to bio-molecules .

MODULE II

Carbohydrates: Introduction, Sources, Classification into mono, di and polysaccharides. Classification of monosaccharides based on no. of carbon atoms & aldoses and ketoses, fischer projections, hawroth structures , anomers, epimers, sterioisomerism and optical isomerism of sugars. Chemical reactions of sugars, important derivatives of monosaccharides, Structure and functions of sugars- disaccharides & polysaccharides.

MODULE III

Amino Acids and Proteins: Introduction, Classification Optical isomerism, chemical properties, Acid-base properties- polyionic nature, zwitter ions, pKa's, pI, Peptide bond formation, Levels of protein structure (brief mention of primary, secondary, tertiary & quaternary structures), denaturation of Proteins.

MODULE IV

Lipids: Introduction, sources, nomenclature, classification, structure ,properties & functions of fatty acids, tri acylglycerols, steroids, biological significance of fats ,cholesterol and phospholipids

MODULE V

Classification, functions, dietary sources, chemistry, RDA, deficiency disorders of
Vitamins: Fat soluble (A, D, E, K); Water Soluble (C, B2, B9, B12)
Minerals: Na, K, Fe, P, Ca, Se.

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand Acid Base balance, Structure, function and interrelationship of bio molecules- carbohydrates, Proteins, Lipids, Vitamins, Minerals, and consequences of deviation from normal.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 103	**Biochemistry-I**	3				2	1					2	1

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML151	General Anatomy-I (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic human anatomy and its functions.

Course Outcomes

On completion of this course, the students will be able to understand anatomy of different body systems and functions exhibited by these systems in our body.

Catalog Description

This subject involves study of human body, locomotion and support, histological features of various body systems – cardiovascular, respiratory, endocrine, respiratory, urinary system, reproductive organs, skeletal.

Text Books

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill.
2. Chaurasia's, *Practical of Human Anatomy.*

Reference Books

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill.
2. Chaurasia's, *Practical of Human Anatomy.*

Course Content

1. Learning of surface landmarks with special emphasis on bones, joints, muscles, and Nerves

2. Demonstration through dissected parts, slides, models, charts, etc.

3. Demonstration of dissected parts (upper extremity, lower extremity, thoracic & Abdominal viscera, face and brain)

4. Demonstration of skeleton articulated and disarticulated.

5. Histology of types of epithelium, Histology of serous, mucous & mixed salivary gland.

6.Histology of the types of cartilage, Demo of all bones showing parts, radiographs of normal bones & joints, Histology of compact bone (TS & LS), Demonstration of all muscles of the body, Histology of skeletal (TS & LS), smooth & cardiac muscle.

7.Demonstration of heart and vessels in the body, Histology of large artery, medium sized artery & vein, large vein, Microscopic appearance of large artery, medium sized artery & vein, large vein, pericardium, Histology of lymph node, spleen, tonsil & thymus, Normal chest radiograph showing heart shadows, Normal angiograms.

Mode of Evaluation: The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand anatomy of different body systems and functions exhibited by these systems in our body.	1,5,6,11

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 151	**General Anatomy-I (Practical)**	2				2	2					2	

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML152	General Physiology (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic human physiology practicals.

Course Outcomes

On completion of this course, the students will be able to understand physiological parameters as White Blood Cell Count, Red Blood Count, Determination of Blood Groups, Leishman's staining and Differential WBC count, Determination of packed cell Volume.

Catalog Description

This subject involves study of human body, Haemoglobinometry, Erythrocyte sedimentation rate [ESR], Calculation of blood indices, Determination of Clotting Time, Bleeding Time, Blood pressure Recording, Auscultation for Heart Sounds, Artificial Respiration, Determination of vital capacity.

Text Books

1. A.K Jain, *Practical Handbook of Human Physiology*.
2. Nageshwari, *Practical Workbook of Human Physiology*.
3. Gupta, *Medical Physiology Made Easy*.

Reference Books

1. A.K Jain, *Practical Handbook of Human Physiology*.
2. Nageshwari, *Practical Workbook of Human Physiology*.
3. Gupta, *Medical Physiology Made Easy*.

Course Content

1. Haemoglobinometry.
2. White Blood Cell Count.
3. Red Blood Cell Count.
4. Determination of Blood Groups.
5. Leishman's staining and Differential WBC count.
6. Determination of packed cell Volume.
7. Erythrocyte sedimentation rate [ESR].
8. Calculation of blood indices.
9. Determination of Clotting Time, Bleeding Time.
10. Blood pressure Recording.
11. Auscultation for Heart Sounds.
12. Artificial Respiration.
13. Determination of vital capacity.
14. Normal ECG

Mode of Evaluation: The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**20**	**80**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand physiological parameters as White Blood Cell Count, Red Blood Count, Determination of Blood Groups, Leishman's staining and Differential WBC count, Determination of packed cell Volume.	1,5,6,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML152	**General Physiology (Practical)**	3				2	2						2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML153	Biochemistry-I (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar with Medical Biochemistry practicals.

Course Outcomes

On completion of this course, the students will undergo Analysis of Normal Urine, Liver Function tests, Lipid Profile test.

Catalog Description

This is an important subject of Medical Lab Technology. It deals with importance of Renal Function test, Blood gas and Electrolytes, Demonstration of Glucometer with strips, Analysis of Normal Urine, Liver Function tests, Lipid Profile test.

Text Books

1. Varley, *Clinical Chemistry*.
2. Kaplan, *Clinical Chemistry*.
3. Das, Debajyothi, *Biochemistry*, Academic, Publishers, Calcutta.
4. Chatterjee, A *Text book of Medical Biochemistry*.
5. Satyanarayan,U., *Medical Biochemistry.*

Reference Books

1. Varley, *Clinical Chemistry*.
2. Kaplan, *Clinical Chemistry*.
3. Das, Debajyothi, *Biochemistry*, Academic, Publishers, Calcutta.
4. Chatterjee, A *Text book of Medical Biochemistry*.
5. Satyanarayan,U., *Medical Biochemistry.*

Course Content

1. Qualitative Analysis of abnormal constituents of Urine
(Glucose,proteins,ketonebodies,bilesalts,bilepigments,occultblood)
2. Demonstration of Blood gas and Electrolytes.
3. Demonstration of Glucometer .
4. Qualitative analysis of unknown carbohydrates

    a)Monosaccharides (Glucose,Fructose,Galactose&Maltose)

    b) Disaccharides (Lactose&Sucrose)

    c)Polysacharides (Starch)

5. Demonstration of Osazone Reaction – Glucosazone and Fructosazone

6. Estimation: Photometry

Standard graphs for estimation of Serum/Blood Glucose & Proteins

Mode of Evaluation: The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	The students will understand Analysis of Normal Urine, Liver Function tests, Lipid Profile test.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 153	**Biochemistry-I (Practical)**	3				2	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of courses

ENG 133	Communicative English -I	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

1. To help the students understand and communicate in English as used in day to day activities.
2. To help the students enhance their competence in the English language.

Course Outcomes

The students will get the required training in LSRW through the prescribed texts and would be:

Able to write simple and meaningful sentences with proper punctuation.
Able to understand words, in isolation and in context
Able to understand instructions, requests and class lectures.
Able to pronounce words correctly in everyday use

Catalog Description

Though, we take students of undergraduate courses to be proficient in English language, we have been proved wrong time and again. The course presented here, is a skill based programme, where we would try to improve all the four skills of the students i.e. LSRW (Listening, Speaking, Reading and Writing). The quest is to improve their understanding and expression so that they are able to do much better in their studies and life as a resultant.

Text Books

Murphy Raymond, Essential English Grammar, Cambridge Uni. Press.
Intermediate English Grammar. Raymond Murphy ISBN NO 978-81-7596-676-5
Essential English Grammar. Raymond Murphy ISBN: 9788175960299
Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge, 1980.

Reference Books

Bhatnagar, R.P. & R. Bhargava, Law and language, New Delhi: Macmillan.
Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.
Madabhushi Sridhar, Legal Language, Asia Law House, Hyderabad.
Legal Language and Legal Writing – P.K. Mishra

Course Content

Module	Topics
I	Fundamentals of Communications; Reading Comprehension; Paragraph Development- Techniques Methods; Introduction to Parts of Speech; Subject-Verb Agreement; Time, Tense and Aspects
II	Basic sentence structure, Formal and Functional Analysis of sentences; Prepositions; Letter Writing-Constituents, Formats; Types of Letter (Enquiry, Complaint, Adjustment, Place an Order)
III	Clauses, Active and Passive Voice; Homophones; Homonyms; Non-Verbal Communication; Para linguistics; Group Discussion and Interview

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	Course Outcomes (COs)	Mapped Programme Outcomes
1	Able to write simple and meaningful sentences with proper punctuation, to understand words, in isolation and in context, to understand instructions, requests and class lectures	1,2,5,10,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
ENG 133	**Communicative English**	2	1			1					2	2	1

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

ENG 183	Communicative English-I (P)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

1. To help the students understand and communicate in English as used in day to day activities.
To help the students enhance their competence in the English language

Course Outcomes

The students will get the required training in LSRW through the prescribed texts and would be:

Able to write simple and meaningful sentences with proper punctuation.
Able to understand words, in isolation and in context
Able to understand instructions, requests and class lectures.
Able to pronounce words correctly in everyday use

Catalog Description

Though, we take students of undergraduate courses to be proficient in English language, we have been proved wrong time and again. The course presented here, is a skill based programme, where we would try to improve all the four skills of the students i.e. LSRW (Listening, Speaking, Reading and Writing). The quest is to improve their understanding and expression so that they are able to do much better in their studies and life as a resultant.

Text Books

Cambridge Grammar for IELTS with answers. ISBN NO 9780521706117
Byne: Teaching Writing Skills, Longman, London 1989.
Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.
Jones Daniel, English Pronouncing Dictionary.

Reference Books

Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge,1980.
Kelkar, Ashok R. “Communication and Style in Legal Language”, Indian Bar Review Vol. 10 (3): 1993.
English Vocabulary in Use. Michael McCarthy & Felicity O’Dell ISBN: 9780521684569

Course Content

Topics
Basics of Pronunciation: Organs of Speech, Articulation System, Three Term Label, Consonant Sounds, Vowel Sounds; Introduction (Self and Lab Partners); Extempore; Presentation Techniques; Book Review, Newspaper Reading, Mock Lecture

Mode of Evaluation: The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	Course Outcomes (COs)	Mapped Programme Outcomes
1	Able to write simple and meaningful sentences with proper punctuation, to understand words, in isolation and in context, to understand instructions, requests and class lectures	1,2,5,10,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
ENG 183	**Communicative English-I (P)**	2	1			1					2	2	1

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

EVS-102	Energy and Environmental Sciences	L	T	P	C
Version1.1	Date of Approval:	3	0	0	3
Pre-requisites/Exposure	NA				
Co-requisites					

Course Objectives

1. To develop awareness about our environment.
2. To develop a concern about sustainable development.

Course Outcomes

The students will be able to understand the followings:-

1. Understand About environment and its components and Problems associated with natural resources and their sustainable use
2. Chemical Toxicity of the chemicals in the environment and Sources of pollution in air , water and soil and Solid waste management and natural Disaster management.
3. Understanding about social issues.
4. Understanding of role of information technology to address environmental issues.
5. Application of sustained Chemistry.

Catalogue Description

The students will understand the objective of environmental studies and importance of natural resources conservation. The will realize the effect of toxic chemicals available in the environment. The students will learn about the sources, effects and control measures of air, water, soil, noise, thermal pollution. They will also be made aware of natural disaster management. The students will understand the need of sustainable development, environment laws, role of information technology in the environment. The students will be explained basic principles of green Chemistry and concept of atom economy.

Text Books

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008,
   ISBN:978-81-224-2159-0.
2. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5
3. Text Book of Environmental Studies, Erach Bharucha, University Press (India) Private Limited, 2005,ISBN: 978 81 7371 540 2
4. Environmental Studies (From Crisis to Cure) Second Edition. , R. Rajagopalan, Oxford University Press, 2012, ISBN 0-19-807208-2.
5. Environmental Studies, Ranu Gadi, Sunitta Rattan, Sushmita Mohapatra, S.K. Kataria and Sons , 2008, ISBN: 81-89757-98-9.

Reference Books/ Other Study material

1. Environmental Studies , Benny Joseph , Tata McGraw Hill Education Private Limited, 2009, ISBN: 987-0-07-064813-5.
2. Environmental Studies, Anindita Basak, Pearson Education, 2009, ISBN: 978-81-317-2118-6.
3. Principles of Environmental Science (Inquiry and Applications), William P. Cunningham & Mary Ann Cunningham, Tata McGraw Hill Education Private Limited,2007, ISBN: 987-0-07-064772-0.

Course Content

Unit I: Environment & Natural Resources

Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.

Unit II: Chemical Toxicology

Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides

Unit III: Environmental Pollution

Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.

Unit IV: Social Issues, Human Population and the Environment

Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare, Role of Information Technology – Visit to local polluted site /Case Studies.

Unit V: Green Chemistry

Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.

Mode of evaluation: The theory and lab performance of students are evaluated separately.

	Theory	
Components	**Internal**	**SEE**
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	Understand About environment and its components and Problems associated with natural resources and their sustainable use	**7, 12**
2	Chemical Toxicity of the chemicals in the environment and Sources of pollution in air , water and soil and Solid waste management and natural Disaster management.	**7, 12**
3	Understanding about social issues.	**7, 12**
4	Understanding of role of information technology to address environmental issues.	**7, 12**
5	Application of sustained Chemistry.	**7, 12**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
EVS102	Energy and Environmental Sciences							3					1

1=addressed to small extent
2= addressed significantly
3=major part of course

BML201	General Microbiology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with General Microbiology.

Course Outcomes

On completion of this course students will be able to understand the general history and basics of General microbiology, & imparts the knowledge about equipments and basic procedures Microscopy, sterilization, disinfection, Bacterial Growth, culture methods required to perform different microbiological tests done in clinical microbiology lab, & Concept of Bacterial Genetics.

Catalog Description

The course gives the general insight into history & Basics of General Microbiology, Sterilization Methods, Bacterial growth; Different types of culture media used for the growth of Bacteria & Bacterial genetics the subject deals with all these

Text Books

1. Aneja K.R. Experiments in Microbiology
2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
3. Text book of Microbiology by Prescott
4. Text book of Microbiology by Ananthanerayan

Reference Books

1. Practical Medical Microbiology by Mackie and MacCartney
2. Text book of Microbiology by Ananthanereyan
3. Medical Microbiology by Paniker &Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monia Cheesbrough
6.. Practical Medical Microbiology by Mackie & MacCartney Volume 1 and 2

Course Content

Module I

Introduction to Medical Microbiology & Microscopy, Definition - History - Host-Microbe relationships. Microscopy- Introduction and history, Types of microscopes; Light microscope, Fluorescent, Phase contrast, Electron microscope. General characteristics & classification of Microbes, Prokaryotes & Eukaryotes, Morphological classification of bacteria, Bacterial anatomy (Bacterial cell structures)

Module II

Sterilization- Definition, Principles & Types of sterilization -Physical methods, Chemical methods

Module III

Growth and Nutrition of Microbes - General nutritional & other requirements of the bacteria, Classification of bacteria on the basis of their nutritional requirements, Physical conditions required for growth., Normal growth cycle of bacteria (growth curve) Types of microbial cultures: Synchronous, Static, continuous culture.

Module IV

Culture media & Streaking techniques:- Introduction , Classification , Composition, & types of of culture media Example & Uses . Antibiotic sensitivity Test. Aerobic & anaerobic culture methods

Module V

Microbial genetics: Bacterial genomes and basic functions; Microbial Replication, transcription and translation; microbial gene organization and Operon; Plasmid; Transduction; Transposition; Transformation; Conjugation; DNA Mutation and DNA Repair

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the general history and basics of General microbiology, & imparts the knowledge about equipments and basic procedures Microscopy, sterilization, disinfection, Bacterial Growth, culture methods required to perform different microbiological tests done in clinical microbiology lab, & Concept of Bacterial Genetics.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 201	**General Microbiology**	3				1	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML202	Biochemical Metabolism	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with Biochemical metabolism

Course Outcomes

At the end of the course, the student should be able to demonstrate his knowledge and understanding on integration of the various aspects of metabolism, and their regulatory pathways. This course deals with basic biochemistry. It covers biochemistry and clinical biochemistry and metabolism of whole body.

Catalog Description

This course deals with the metabolism that takes place in the human body. It also deals with biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

Text Books

1. Varley, *Clinical Chemistry.*
2. Kaplan, *Clinical Chemistry.*
3. Das, Debajyothi, *Biochemistry*, Academic, Publishers, Calcutta.
4. Chatterjee, A *Text book of Medical Biochemistry.*
5. Satyanarayan,U., *Medical Biochemistry.*

Reference Books

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chaterjee Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet & Voet
9. Biochemistry by Stryer

Course Content

Module I

Carbohydrate Metabolism

Introduction, Digestion and Absorption Metabolism: - Glycolysis, Citric acid cycle, Gluconeogenesis, Glycogen metabolism, Disorders of carbohydrate metabolism.

Module II

Protein Metabolism

Introduction, Important properties of proteins, Digestion & absorption of Proteins, Protein synthesis, Metabolism of proteins. Formation & Transport of Ammonia , Urea Synthesis. Disorders of protein metabolism.

Module III

Lipid: Introduction , Digestion & absorption of fats, Beta ocxidation of Faftty acids, Metabolism of Cholesterol, Lipoproteins, Triglycerides.,Ketonebodies

Module IV

Nucleic acids: Importance of nucleic acids in living system, general composition of nucleic acids, the purine and pyrimidine bases, structure of nucleosides and nucleotide, deoxynucleotides, cyclic nucleotides and polynucleotides. Watson and crick model for DNA. Different types of DNA and RNA. Synthesis of Purines and Pyrimidines

Module V

Enzymes: Introduction, Classification, & Properties of enzymes, Mechanism of enzyme action, Factors affecting enzyme action, Enzyme kinetics, Enzyme Inhibition & Isoenzymes

Mode of Evaluation:

The theory and lab performance of students are evaluated separately.

	Theory	
Components	**Internal**	**SEE**
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1.	Students will understand the integration of the various aspects of metabolism, and their regulatory pathways. the biochemistry and clinical biochemistry as well as overview metabolism of whole body.	**1,5,6,11,12**

		Medical Lab Technology Knowledge	Thinking Abilities	Planning Abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 202	**Biochemical Metabolism**	3				2	2					2	2

1=Addressed to small extent
2= Addressed significantly
3=Major part of course

BML203	General Anatomy and Physiology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Human Anatomy & Physiology.

Course Outcomes

On completion of this course, the students will be able to understand anatomy of different body systems and functions exhibited by these systems in our body and fundamentals of different organ systems.

Catalog Description

This subject will develop an understanding of the Structure & Function of organs and Organ systems, in normal Human Body– Urinary system, Endocrine, Nervous system, Reproductive system, & sensory organs.

Text Books

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill
2. Chaursia's, *A Text Book of Anatomy*
3. Ranganathan, T.S., *A Text Book of Human Anatomy*

Reference Books

1. Fattana, *Human Anatomy*, (Description and Applied), Saunder's & C P Prism Publishers, Bangalore
2. Ester. M. Grishcimer, *Physiology & Anatomy with Practical Considerations*, J.P. Lippin Cott. Philadelphia
3. Guyton, Arthur, Text Book of Physiology, Prism Publishers
4. Chatterjee, C C, Human Physiology, Medical Allied Agency.

Course Content

Module I

Execratory System

Anatomy of Kidneys, Ureters, Urinary Bladder, Urethra. Physiological functions of kidneys, Nephron, Mechanism of urine formation, Juxta Glomerular Apparatus, Renal Blood circulation.

Module II:

Endocrines system: Anatomy & Physiology of all Endocrine Glands; Thyroid, Parathyroid, Pituitary & Adrenal Glands, Gonads & Islets of Langerhans

Module III

Nervous System

CNS: Brain: Fundamental parts of brain: Hind Brain, Mid Brain- Fore Brain; Location, & coverings of brain. Spinal cord: Anatomy, functions, Reflex Actions, Meninges, CSF: Formation, circulation, properties, Composition, & Functions; Lumbar Puncture.

Module IV

Male Reproductive system: Testis, Duct system, Functions. Semen-secretion, composition, Factors Influencing, Abnormalities, Oligozoospermia.

Female Reproductive system: Ovaries, Duct system & Accessory Organs, Functions. Ovulation, Menstrual Cycle, Pregnancy, Parturition.

Module V

Special Senses

Skin: Skin-histology, Appendages of skin, Eye: Parts of eye & lacrimal apparatus, Refractive Errors of Eye & corrections, Field of vision. Structure & functions of Retina. Color Vision. Ear: parts of ear- external, middle and inner ear and contents, Deafness.

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	This subject will develop an understanding of the Structure & Function of organs and Organ systems, in normal Human Body– Urinary system, Endocrine, Nervous system, Reproductive system, & sensory organs.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 203	**General Anatomy and Physiology**	3				1	2					2	1

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML251	General Microbiology(Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with practical aspects of General Microbiology.

Course Outcomes

Students will imparts the knowledge about equipment used in Medical Microbiology and basic procedures done in medical microbiology laboratory i.e. microscopy, sterilization, disinfection, culture methods required to perform different microbiological tests in clinical microbiology lab. sterilization techniques and their validation, evaluation of antiseptics and disinfectants,

Catalog Description

The course gives the general insight into history & Basics of General Microbiology, Sterilization Methods, Bacterial growth; Different types of culture media used for the growth of Bacteria & Bacterial genetics the subject deals with all these essays. The micro org. causes diseases & contamination the subject deal with all these.

Text Books

1. Aneja K.R. Experiments in Microbiology
2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
3. Text book of Microbiology by Prescott
4. Text book of Microbiology by Ananthanarayan

Reference Books

1. Practical Medical Microbiology by Mackie and MacCartney
2. Text book of Microbiology by Ananthanarayan
3. Medical Microbiology by Paniker &Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monica Cheesbrough
6. Practical Medical Microbiology by Mackie & MacCartney Volume 1 and 2

Course Contens

1. Demonstration of safe code of practice for a Microbiology laboratory
2. To prepare cleaning agents & to study the technique for cleaning & sterilization of glassware.
3. Demonstration of working & handling of Compound microscope
4. Demonstration of method of sterilization by autoclave

5. Demonstration of method of sterilization by hot air oven.
6. Demonstration of method of sterilization of media/solution by filtration
7. Demonstration of antiseptics, spirit, cetrimide & Povidone-Iodine
8. Demonstration of the use of disinfectants.
9. Demonstrate the precaution while using disinfectants.
10. Demonstration of streaking methods.
11. Demonstration of Hanging drop technique
12. Demonstration of the different morphological types of bacteria.
13. Preparation of one culture media from each type

Mode of Evaluation: The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To study about equipment used in Medical Microbiology and basic procedures done in medical microbiology laboratory i.e. microscopy, sterilization, disinfection, culture methods required to perform different microbiological tests in clinical microbiology lab. sterilization techniques and their validation, validation of sterilization techniques, evaluation of antiseptics and disinfectants,	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 251	**General Microbiology (Practical)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML252	BIOCHEMICAL METABOLISM(Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with practical aspects of Biochemical Metabolism

Course Outcomes

At the end of the course, the student should be able to expose and demonstrate estimation of urea,creatinine,glucose,cholesterol,transaminase enzymes,total protein in Serum/blood samples and clinical significance

Catalog Description

This course deals with the metabolism that takes place in the human body. It also deals with biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

Text Books

1. Text book of Medical Biochemistry by Chaterjee Shinde
2. Principal of Biochemistry by Lehninger
3. Biochemistry by Voet & Voet
4. Biochemistry by Stryer

Reference Books

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand

Course Content

1. Determination of Glucose in serum & plasma
2. Determination of Blood urea
3. Determination of Serum Creatinine
4. Determination of serum Total Protein

5. Determination of Serum Cholesterol
6. Determination of serum Transaminases
7. Determination of A:G ratio

Mode of Evaluation:

The lab performance of students are evaluated as

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1.	Students will understand the biochemistry and clinical biochemistry as well as overview and metabolism of whole body as well as the diagnosis, determination of different biochemical constituents present in Blood/Serum	**1,5,6,8,11,12**

		Medical Lab Technology Knowledge	Thinking Abilities	Planning Abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 252	**BIOCHEMICAL METABOLISM**	3				2	2		1			2	2

1=Addressed to small extent

2= Addressed significantly

3=Major part of course

ENG 233	Communicative English -II	L	T	P	C
Version1.01	Date of Approval: Jun 15, 2013	2	0	0	2
Pre-requisites	Communicative English -I				

Course Description

Though, we take students of undergraduate courses to be proficient in English language, we have been proved wrong time and again. The course presented here, is a skill based programme, where we would try to improve all the four skills of the students i.e. LSRW (Listening, Speaking, Reading and Writing). The quest is to improve their understanding and expression so that they are able to do much better in their studies and life as a resultant.

Course Objectives

1 To help the students understand and communicate in English as used in day to day activities.
2. To help the students enhance their competence in the English language.

Course Pre-requisite Basic understanding of English language/ Diagnostic Test

Course Outcomes

The students will get the required training in LSRW through the prescribed texts and would be:

1. Able to write simple and meaningful sentences with proper punctuation.
2. Able to understand words, in isolation and in context
3. Able to understand instructions, requests and class lectures.
4. Able to pronounce words correctly in everyday use

Prescribed Texts

1. Murphy Raymond, Essential English Grammar, Cambridge Uni. Press.
2. Intermediate English Grammar. Raymond Murphy ISBN NO 978-81-7596-676-5
3. Essential English Grammar. Raymond Murphy ISBN: 9788175960299
4. Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge, 1980.

Additional References

1. Bhatnagar, R.P. & R. Bhargava, Law and language, New Delhi: Macmillan.
2. Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.
3. Madabhushi Sridhar, Legal Language, Asia Law House, Hyderabad.
4. Legal Language and Legal Writing – P.K. Mishra

Pedagogy

The course will aim at the facilitation of acquisition of the four basic language skills (listening, speaking, reading and writing) in English language among the heterogeneous set of student base through their active participation in various language skills development related activities.

	Theory		Laboratory		Theory and laboratory
Components	**Internal**	**SEE**	**Internal**	**SEE**	
Marks	20	80	20	80	
Total Marks	100		100		
Scaled Marks	80		20		100

Evaluation Scheme

Description	**Weight age** (Percentage)
• **Assignment & Quiz (1,2 &3)**	**20%**
• **CAT 1 ***	**15%**
• **CAT 2**	**15%**
• **End Term Exam (3 hours)**	**50%**

***continuous Assessment Test**

Detailed Outlines of the Course

SESSION WISE INSTRUCTION PLAN

Course Name			**L**	**T**	**P**	**C**
			2	**0**	**0**	**2**
Session No	**Module**	**Topics**	**Core Reading**		**Additional Reference**	
	I	The Art of Condensation; Reading Comprehension; Introduction to Adjectives; Adverbs, Reported Speech; Word Formation				
	II	Constituents of Effective Writing; Modals; Letter Writing (Sales Letter, Cover letter); Resume Writing; Vocabulary (Antonyms, Synonyms, One Word Substitution)				
	III	Presentation Techniques; Fundamentals of Report Writing; Essay Writing, E-mail and Telephonic Etiquettes				

GALGOTIAS UNIVERSITY Greater Noida, Uttar Pradesh	**Name:** **Enrolment No:** **Batch No:**

Model Question Paper

Semester End Examination(SEE) – June, 2013

Course : Communicative English II ENG 104

Department: English

Programme: B. Tech,BCA, B.Sc(F.Sc),BHM,B.A.(H)Eco,B.Com, BBL,BAL,
Semester: Winter

Time: 3 hrs **Max. Marks:100**

PART – A (10 X 2 = 20 Marks)

Answer ALL the Questions

1.	Choose the correct word to fill in the blanks I. He is suffering from an unknown ..... a. decease b. disease II. Very strong ..... was blowing from the east. a.air b.wind	**[2]**
2.	The range of interpersonal distance of the public zone is: a. 0 inch to 18 inches b. 18 inches to 3 feet c. 4 feet to 6 feet d. more than 12 feet	**[2]**
3.	Give one word substitutes for the following:	**[2]**

	i. One who knows everything ii. One dies for his people or country	
4.	Mention any two additional elements of a business letter.	**[2]**
5.	Give synonyms for the following: i. anger ii. affluent	**[2]**
6.	Use the following phrasal verbs in your sentences: i. look into ii. put off	**[2]**
7.	What is the meaning of 'couch' in the line "For oft when on my couch I lie, in vacant or in pensive mood"?	**[2]**
8.	Write any four challenges that a presenter faces while giving a PowerPoint Presentation.	**[2]**
9.	List any two kinds of cases with reference to the topic 'case study'.	**[2]**
10.	Write the definition of a leader.	**[2]**
	PART – B (5 X 8 = 40 Marks) **Answer <u>ALL</u> the Questions**	
11.	Correct the following sentences: i. I am reading a book since morning. ii. They have completed their homework this morning. iii. I reached home before my father came. iv. My friend told me that he will gift me my favourite book on my birthday. v. I am understanding your problem. vi. She did not liked rice . vii. Where you are going this evening? viii. you hurted my feelings.	**[8]**
12.	Mark the part/s with errors in the following sentences: i. My cat was/ hungry as she had /not eaten/ from morning. ii. . I am more happier/ than my friends/ who are/ playing football. iii. After she completed/ her work she /locked her office/ and went home. iv. Rahul is brighter/ than any boy/ in my class. v. He said something/ but I could/ not listen at it. vi. In spite of been/ quite prosperous/ he is unhappy. vii. Gitika was/ a most intelligent/ girl in the class. viii. The train left /before I reached/ the station.	**[8]**
13.	Change the following as indicated: i. How can you say this? (Passive) ii. He is known to everyone. (Active)	**[8]**

	iii. Delhi is one of the biggest cities in India. (Positive degree) iv. No other building in India is as beautiful as the Taj. (Comparative degree) v. On hearing a noise, he woke up. (Complex sentence) vi. Who does not know Mahatma Gandhi? (Affirmative) vii. He is too weak to walk. (Complex sentence) viii. My friend congratulated me on my getting selected in IAS. (Passive)	
14.	Frame the following sentences by choosing the correct options :He is junior (than/to) me. i. The Taj is one of the most beautiful (buildings/building) in the world. ii. Do you have (any/some) friends in this city? iii. Mr. Smith is (a/an) European. iv. Delhi is (the/a/ No article) London of India. v. You (should/should have) gone there yesterday. vi. I (am/have been/has been) waiting for you since morning. vii. Rahul is one of the tallest (boys/boy) in the class.	**[8]**
15.	Correct the following sentences: i. Mohit purchased many costly furnitures for his new house. ii. My friend helps the poors whenever he meets them. iii. One should do his duty. iv. I told everyone to bring their coats since the temperature is falling. v. We reached at the airport at 9 pm. vi. If you speak slow, children will understand you better. vii. Sumit is more wiser than his brother. viii. Rahul works very fastly.	**[8]**
	PART – C (2 X 20 = 40 Marks) **Answer <u>ANY</u> two Questions**	
16.	(a) i. Draft an advertisement of an imaginary car BSR Land Glider (SUV) in less than 40 words. This advertisement is intended for hoardings. Invent the details. ii. Why was Phatik's decision to go to Calcutta not right? (b) Assuming yourself the Librarian of your university, draft a letter to Oxford Publications, Jai Singh Road, New Delhi 110001, enquiring about the availability and price of some books required for your library. Invent the details regarding titles, authors, etc.	**[5]** **[5]** **[10]**

17.	(a) Read the following extracts carefully and answer the questions that follow. (i) Certainly, in taking revenge, a man is but even with his enemy; but in passing it over, he is superior; for it is a prince's part to pardon. And Solomon, I am sure, saith, It is the glory of a man, to pass by an offence. That which is past is gone, and **irrevocable**; and wise men have enough to do, with things present and to come; therefore they do but trifle with themselves, that labor in past matters. A. Name the author of these lines. B. What is the meaning of the word "Irrevocable" in this passage? C. What did Solomon say? D. Why is forgiving better than taking revenge? (ii) You are all knowing, friends, What sweetness is in Miss Pushpa. I don't mean only external sweetness but internal sweetness. Miss Pushpa is smiling and smiling even for no reason but simply because she is feeling. A. Name the poem and the poet. B. What are the good qualities of Ms Pushpa? C. How does the poet make fun of common errors in Indian English? (b) Write a report on the Republic Day celebration in your university for the university news letter. Invent the details.	**[1]** **[1]** **[1]** **[1]** **[1]** **[2]** **[2]** **[10]**
18.	(a) Prepare a classified advertisement for a job vacancy for the post of Assistant Sales Managers in Usha Fans Pvt. Ltd. (b) What are the challenges that a presenter faces while making presentation? How can he/she overcome these challenges?	**[10]** **[10]**

ENG 283	Communicative English -II PRACTICAL	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Description:

Though, we take students of undergraduate courses to be proficient in English language, we have been proved wrong time and again. The course presented here, is a skill based programme, where we would try to improve all the four skills of the students i.e. LSRW (Listening, Speaking, Reading and Writing). The quest is to improve their understanding and expression so that they are able to do much better in their studies and life as a resultant.

Course Objectives:

1. To help the students understand and communicate in English as used in day to day activities.
2. To help the students enhance their competence in the English language.
3.

Course Pre-requisite: Basic understanding of English language/ Diagnostic Test

Course Outcomes:

The students will get the required training in LSRW through the prescribed texts and would be:

1. Able to write simple and meaningful sentences with proper punctuation.
2. Able to understand words, in isolation and in context
3. Able to understand instructions, requests and class lectures.
4. Able to pronounce words correctly in everyday use

Prescribed Texts:

1. Cambridge Grammar for IELTS with answers. ISBN NO 9780521706117
2. Byne: Teaching Writing Skills, Longman, London 1989.
3. Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.
4. Jones Daniel, English Pronouncing Dictionary.

Additional References:

1. Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge,1980.
2. Kelkar, Ashok R. "Communication and Style in Legal Language", Indian Bar Review Vol. 10 (3): 1993.
3. English Vocabulary in Use. Michael McCarthy & Felicity O'Dell ISBN: 9780521684569

Pedagogy The course will aim at the facilitation of acquisition of the four basic language skills (listening, speaking, reading and writing) in English language among the heterogeneous set of student base through their active participation in various language skills development related activities.

Evaluation Scheme

	Laboratory		Laboratory
Components	**Internal**	**SEE**	
Marks	50	50	
Total Marks	100		
Scaled Marks	25		25

***Continuous Assessment Test**

Detailed Outlines of the Course

SESSION WISE INSTRUCTION PLAN

Course Name			**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**
Session No	**Module**	**Topics**	**Core Reading**		**Additional Reference**	
		Basics of Pronunciation: Phonemes, Allophones, Syllables, Stress, Accent, Intonation,' Phonetic Transcription; Group Discussion, Do's and Don'ts of GD; Debate; Role Play; Live Presentations ; Movie Review; Book Review, Newspaper Reading; Mock Lecture; Mock Interview; Skit ; Picture Interpretations; Powerpoint Presentations				

BML301	Analytical Biochemistry	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar and understand the Analytical biochemistry

Course Outcomes

On completion of this course, the students will be able to understand and learn basic Principle, Procedures and various types of Techniques commonly performed in Analytical Biochemistry.

Catalog Description

This course mainly deals with the basic Principle, Procedures, Usage and types of various techniques commonly performed in analytical biochemistry with plasma /serum of patients which has diagnostic importance.

Text Books

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D.R. Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 20035. Instrumental Analysis by Chatwal Anand
3. Text book of Medical Biochemistry by Chaterjee Shinde
4. Principal of Biochemistry by Lehninger
5. Biochemistry by Voet & Voet
6. Biochemistry by Stryer

Reference Books

1. Varley, *Clinical Chemistry*
2. Teitz, *Clinical Chemistry*
3. Kaplan, *Clinical Chemistry*
4. Practical Clinical Biochemistry by Harold Varley
5. Text book of Medical Laboratory Technology by P. B. Godker
6. Medical Laboratory Technology by Mukherjee
7. Principal of Biochemistry by M. A. Siddiqi

Course Content

MODULE I

Cleaning and care of general laboratory glass ware and equipment: Steps involved in cleaning soda lime glass, Steps involved in cleaning borosil glass. Preparation of chromic acid solution, Storage.

Calibration of volumetric apparatus: Flask, Pipettes, Burette & Cylinders.

MODULE II

Spectrophotometry and colorimetry: Introduction, Theory of spectrophotometry and colorimetry, Lambert`s law and Beer`s law , Applications of colorimetry and spectrophotometry

MODULE III

Photometry: Introduction, General principles of flame photometry, Limitations of flame photometry, Instrumentation, Applications of flame photometry

MODULE IV

Chromatography: Introduction, Types of chromatography

Paper Chromatography: Introduction, principle, types, details for qualitative and quantitative analysis, application; Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations; High performance thin layer chromatography; Column chromatography: Introduction, principle, column efficiency, application of column chromatography; Gas chromatography: Introduction principle, instrumentation, application; Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application;Gel Chromatography: Introduction Principle and method, application and advantages

MODULE V

Electrophoresis: Principle, Instrumentation , Applications , Types of electrophoresis, Paper electrophoresis, Gel electrophoresis

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos

Sl. No.	Course Outcomes (COs)	Mapped Programme Outcomes
1	To understand and learn basic Principle, Procedures and various types of Techniques commonly performed in Analytical Biochemistry.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 301	**Analytical Biochemistry**	3				2	1					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML302	Pathology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with Pathology

Course Outcomes

On completion of this course students will be able to understand the Normal cell injury,cell death, inflammation and repair mechanism, Examination of different body fluids, urine, semen, feces, Sputum, Terminology ,preparation of biopsy specimens & various instruments used in Histopathology and its maintenance.

Catalog Description

The course deals with the Normal cell injury,cell death, inflammation and repair mechanism Handling and testing of various samples for Histopathological investigations, & diagnosis of abnormalities of various body fluid and tissues.

Text Books

1. Hand book of Pathology by Harshmohan
2. Practical Hematology by Davies & Lewis

Reference Books

1. Handbook of Histopathological Techniques by C F A Culling
2. Medical Lab technology by Lynch
3. An Introduction to Medical Lab Technology by F J Baker and Silverton
4. Bancroft's Theory and Practice of Histopathological Techniques by John D Bancroft

Clinical Diagnosis in lab methods by Todd & Sanford

Course Content

Module-I

Introduction to Pathology , Normal Cell injury and cell death ,Basic mechanisms involved in the process of inflammation and repair,Alternations in Vascular permeability and blood flow,migration of WBC's mediaters of Inflammation,breif outline of the process of repair.

Module-II

Clinical Pathology: Introduction, Urine Examination: Physical, Chemical & Microscopic, Semen count, Morphology & Abnormolities, Examination of feces for occult blood, Sputum Examination.

Module-III

|Examination of body fluids: Transudate, Exudate& Cell counts

Module-IV

Histopathology: Introduction, Reception of specimens, & Various fixatives-Mode of action, indications, Preparation. Grossing techniques

Module-V

Steps of tissue processing and embedding, Section cutting, Decalcification. Mounting & Staining of Slides. Microtome Knives, Sharpening of Microtome Knives, Honing, Stropping, various types of microtome and their applications

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the Normal cell injury,cell death, inflammation and repair mechanism,Examination of different body fluids, urine, semen, feces, Sputum, Terminology ,preparation of biopsy specimens & various instruments used in Histopathology and its maintenance.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 302	**Pathology**	3				1	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML303	Systemic Bacteriology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with Systemic Bacteriology.

Course Outcomes

The students will learn Systematics study and scientific study of organisms, with the ultimate objective of characterizing and arranging them in an orderly manner. Methods and approaches used to characterize, classify, and identify bacteria are examined, and some commonly encountered groups of bacteria are considered as examples.

Catalog Description

The course Systemic Bacteriology deals with Classification, nomenclature, and identification of bacteria. Methods and approaches for the isolation and identification of bacteria are considered in the laboratory. The characteristics of some groups of common bacteria and the contributions of molecular systematics to bacterial classification are discussed.

Text Books

1. Aneja K.R. Experiments in Microbiology
2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
3. Text book of Microbiology by Prescott
4. Text book of Microbiology by Ananthanerayan

Reference Books

1. Practical Medical Microbiology by Mackie and MacCartney
2. Text book of Microbiology by Ananthanereyan
3. Medical Microbiology by Paniker &Satish Gupte
4. Medical laboratory Technology vol.I ,II, III by Mukherjee
5. District Laboratory Practice in tropical countries Vol II Microbiology by Monica
6. Cheesbrough
7. Practical Medical Microbiology by Mackie & MacCartney Volume 1 and 2

Course Content

Module I

Gram positive & Negative cocci: Staphylococci, Streptococci, Neisseria

Module II
Gram Positive & negative Bacilli: Positive: Anthrax, Diphtheria, Clostridium species
Negative: Enterobacteriaceae, Vibrios, Brucella. Bordetella, Haemophillus, Pasteurulla, Non sporing anerobic bacteria

Module III
Mycobacterium species:TB, Leprosy, AFB stain

Module IV
Spirochaetes: Leptospira. Borella, Treponema

Module V
Bacterial infections & diagnosis: Wound infection, post operative infection, Urinary tract infection, Respiratory tract infection, Diarrhoeas & food poisoning, Infection of CNS, Nosocaimal Infections

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand Systematic study and scientific study of organisms, with the ultimate objective of characterizing and arranging them in an orderly manner. Methods and approaches used to characterize, classify, and identify bacteria are examined, and some commonly encountered groups of bacteria are considered as examples.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 303	**Systemic Bacteriology**	3				1	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML304	COMPUTER FUNDAMENTALS Theory	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar with computers and programming Language.

Course Outcomes

Students will learn about basics of computer, programming.

Catalog Description

Students will learn about basics of computer, programming.

Text Books

1. Mendhanm J, Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Conners K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.

Reference Books

1. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
2. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors.

Course Content

MODULE I 08

Definition and Overview of Computer, Computer classification, Computer Organization, Computer code, computer classification of Boolean algebra. Input Devices Output devices, Storage devices. Computer Software, Types of software. Overview of Computer Networks,LAN, MAN, WAN, Internet, Intranet, network topology. Internetworking: Bridges, Repeaters and Routers

MODULE II 08

Introduction: Operating system and function, Evolution of operating system, Batch, Interactive, Time sharing and Real Time System. Single User Operating System and Multi-user Operating system, Compare MS-DOS vs. UNIX, Various window features. Internal and External commands in MS-DOS

MODULE III 08

Introduction to MS-OFFICE-2003, word 2003 Document creation, Editing, formatting table handling, mail merge, Excel-2003, Editing, working Retrieval, Important functions, short cut keys used in EXCEL

MODULE IV 08

MS-Power point 2003-Job Profile, Elements of Power point , ways of delivering Presentation, concept of Four P's (Planning , Preparation, Practice and Presentation) ways of handling presentations e.g. creating, saving slides show controls, Adding formatting, animation and multimedia effects. Database system concepts, Data models schema and instance. Database language, Introduction to MS-Access 2003, main components of Access tables, Queries, Reports, Forms table handling, working on Query and use of database

MODULE V 08

Computer applications in Medical studies, uses of Internet in Medical Laboratory Industry

Mode of Evaluation: The theory performance of students is evaluated separately as.

	Theory	
Components	**Internal**	**SEE**
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	Students will learn about basics of computer, programming	1,5,6,11

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML304	**COMPUTER FUNDAMENTALS Theory**	2				1	2					2	

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML 351	Analytical Biochemistry(Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar and understand the Analytical biochemistry practicals

Course Outcomes

On completion of this course, students will be exposed to glass ware usage & cleaning procedure,handling,usage &Safe maintenance of Colorimeter, Spectrophotometer,Flame photometer.The students also get exposed to various analytical techniques like chromatography and Electrophoresis.

Catalog Description

This course deals with the basic Principle, Procedures and types of various techniques commonly performed in analytical biochemistry with plasma /serum of patients which has diagnostic importance.

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Text Books

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Manipal Manual of Biochemistry by Shivanand Nayak

Reference Books

1. Text book of Medical Biochemistry by Chaterjee Shinde
2. Principal of Biochemistry by Lehninger
3. Biochemistry by Stryer
4. Principal of Biochemistry by M. A. Siddiqi

Course Content

1. Demonstration of cleaning of Glassware used in laboratory
2. Demonstration of principle, working & maintenance of spectrophotometer.
3. Demonstration of absorption spectra of proteins by spctrophotometer
4. Demonstration of absorption spectra of Nucleic acids by spectrophotometer
5. Demonstration of principle, working & maintenance of colorimeter.
6. Demonstration of principle, working & maintenance of flame photometer.
7. Demonstration of principle, procedure of paper chromatography.
8. Demonstration of principle & procedure of Gas chromatography.
9. Demonstration of principle & procedure of column chromatography.
10. Demonstration of principle & procedure of Electrophoresis.

Mode of Evaluation:

The lab performance of students are evaluated as

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1.	To understand the basic Principle, Procedures and types of various techniques commonly performed in analytical biochemistry laboratory and its usage.	**1,5,6,8,11,12**

		Medical Lab Technology Knowledge	Thinking Abilities	Planning Abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 351	**Analytical Biochemistry (Practical)**	3				2	2		1			2	2

1=Addressed to small extent
2= Addressed significantly
3=Major part of course

BML352	Pathology (practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with pathology practical.

Course Outcomes

On completion of this course students will be able to understand Examination of different body fluids, urine, semen, feces, sputum ,Collection of specimen,Preparation & Staining of slides for Histopathological study.

Catalog Description

The course deals with the Normal cell injury,cell death, inflammation and repair mechanism Handling and testing of various samples for Histopathological investigations, & diagnosis of abnormalities of various body fluid and tissues.The course deals with the identification, Abnormalities causes of disease to enable prevention of disease.

Text Books

1. Hand book of Pathology by Harshmohan
2. Practical Hematology by Davies & Lewis

Reference Books

1. Handbook of Histopathological Techniques by C F A Culling
2. Medical Lab technology by Lynch
3. An Introduction to Medical Lab Technology by F J Baker and Silverton
4. Bancroft's Theory and Practice of Histopathological Techniques by John D Bancroft
5. Clinical Diagnosis in lab methods by Todd & Sanford

Course Content

1. Urine Physical,Chemical & Microscopic Examination
2. Examination of Sputum
3. Examination of Feces for Occult Blood.
4. Demonstration of analysis of Semen
5. Reception and labeling of histological specimens
6. Preparation of various fixatives, Helly's fluid , Zenker's fluid ,Bouin's fluid , Corney's fluid , 10% Neutral formalin ,Formal saline, Formal acetic acid Pereyn's fluid
7. Testing of melting point of paraffin wax and perform embedding of given tissue in paraffin block
8. Preparation of ascending and descending grades of alcohol from absolute

alcohol

9. Processing of tissue by manual and automated processor method
10. Usage of microtome & types of microtome
11. Sharpening of microtome knife (Honing and stropping technique), and types of disposable blades in use (High and Low Profile)
12. Demonstration of section cutting , Preparation of slides, Staining & Mounting of stained slides.
13. Demonstration & practice of the Haematoxylin and Eosin staining technique
14. Demonstration & practice of the Mallory's Phospho tungstic Acid Haematoxylin (PTAH) staining technique

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand Normal cell injury,cell death, inflammation and repair mechanism Handling and testing of various samples for Histopathological investigations, & diagnosis of abnormalities of various body fluid and tissues by tissue processing.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 352	**Pathology (practical)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML353	Systemic Bacteriology (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To familiar with practical aspects of systemic bacteriology.

Course Outcomes

Students will be exposed to different staining methods &Biochemical tests for the identification of microbes.

Catalog Description

The course Systemic Bacteriology deals with Classification, nomenclature, and identification of bacteria. Methods and approaches for the isolation and identification of bacteria are considered in the laboratory. The characteristics of some groups of common bacteria and the contributions of molecular systematic to bacterial classification are discussed.

Text Books

1. Aneja K.R. Experiments in Microbiology
2. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
3. Text book of Microbiology by Prescott
4. Text book of Microbiology by Ananthanerayan

Reference Books

1. Practical Medical Microbiology by Mackie and MacCartney
2. Text book of Microbiology by Ananthanereyan
3. Medical Microbiology by Paniker &Satish Gupte

Course Contents

1. Demonstration of Simple staining
2. Demonstration of Gram stain
3. Demonstration of Albert stain
4. Demonstration of Z-N staining
5. Demonstration of Capsule staining
6. Demonstration of Hanging drop technique
7. Demonstration of Biochemical tests
8. Demonstration of CAMP

Mode of Evaluation:

The lab performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (Pos)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To study the nutritional requirements of microbes and identification of microbes by different staining methods, methods of sterilization, motility, and identification of microbes by biochemical tests.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 353	**Systmic Bacteriology (Practical)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML354	COMPUTER FUNDAMENTALS (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

The basic objective of this course is to get familiar with computers and programming Language.

Course Outcomes

Students will learn about basics of computer, programming.

Catalog Description

T he basic objective of this course is to get familiar with computers and programming Language.

Text Books

1. Mendhanm J, Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Conners K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.
3. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
4. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors.

Reference Books

1. Mendhanm J, Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Conners K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.
3. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
4. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors.

Course Content

Practical to be conducted

Software Lab to be used for the following:-

1. Windows, Managing Windows, Working with Disk , Folders and files.
2. MS-Office 2003 (MS Word, MS Power point, MS Excel, MS Access).
3. Computer Operating System Like DOS and Windows.
4. Internet Features (E-mail, Browser etc.)

Mode of Evaluation:

The lab performance of students is evaluated separately as:

	Lab	
Components	**Internal**	**SEE**
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	Students will learn about basics of computer, programming	1,5,6,11

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 354	**COMPUTER FUNDAMENTALS Practical**	2				1	2					2	

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML401	Hematology & Hematological diseases	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic **Hematology & Hematological diseases**

Course Outcomes

On completion of this course, the students will be able to understand the composition of blood and methods of estimating different components of blood. Students will be able to know the basic concepts of Hematology & routine clinical investigations of Hematology laboratory. The students will be made aware of various diseases like anemia, quantitative disorders of Leucocytes, morphological alterations in blood cells, bleeding disorders etc,.It also deals with the study of preparation of different types of anticoagulants and their mode of action.

Catalog Description

This subject involves study of hematology & hematoligal diseases to made aware of various diseases like anemia, quantitative disorders of Leucocytes, morphological alterations in blood cells, bleeding disorders.

Text Books

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Practical Haematology by JB Dacie
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Books

1. Clinical Diagnosis &Management by Laboratory methods (20th edition) by John Bernard Henary
2. Atlas of haematology (5th edition) by G.A. McDonald
3. De Gruchy's clinical haematology in medical practice

Course Content

Module I

Basic Hematology : Introduction of hematology, hematopoiesis, RBC, ESR, PCV, Redcell Indices, classification of anemia (Morphology, Etiology), clinical features of anemia.

Module II

Anemieas: Anemia, Introduction, Classification, Microcytic hypochromic anemia, Macrocytic anemia, Normocytic normochromic anemia. LE- Cell Phenomenon, Reticulocyte count

Module III

Leucopoiesis & disorders, WBC: Quantitative disorders of Leukocytes Cause and significance, Infectious mononucleosis , Monocytic Disorders(AML & CML), Lymphocytic Disorders(ALL & CLL), Hodgkin's Lymphoma

Module IV

Thrombopoiesis and its disorders: Introduction Causes of bleeding disorders,Vascular defect Platelet defect, Factor deficiency, Inhibitors, Hyper fibrinolysis, Types of bleeding disorders, Inherited bleeding disorders, Acquired bleeding disorders, Thrombosis, Introduction, Causes of thrombosis

Module V

Anticoagulants used in hematology and mode of action, Steps in hematology investigation, Reticulocyte count

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the composition of blood and methods of estimating different components of blood. Students will be able to know the basic concepts of Hematology & routine clinical investigations of Hematology laboratory. The students will be made aware of various diseases like anemia, quantitative disorders of Leucocytes, morphological alterations in blood cells, bleeding disorders. It will also covers bone marrow examination, LE cell Phenomenon, & Chromosomal studies in Hematological disorders.	1,2,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 401	**Hematology & Hematologiical diseases**	3	1			1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML402	Immunology & Bacterial serology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the Immunology & Bacterial serology

Course Outcomes

On completion of this course, the students will be able to understand the basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases. It will also covers Auto Immune diseases, Types of vaccines & Vaccination schedule.

Catalog Description

This subject involves study of immunology & bacterial serology useful in laboratory diagnosis of various human infections & disease states

Text Books

1. Text book of Microbiology by Ananthanarayanan s
2. Text book of Microbiology: CP. Baveja
3. Text book of immunology by: SK: Gupate

Reference Books

1. Practical Medical Microbiology by Mackie & McCartney Volume 1 and 2
2. Medical Microbiology by Paniker & Satish Gupte
3. Medical laboratory Technology Vol. I ,II, III by Mukherjee
4. Medical Laboratory manual for tropical countries Vol II Microbiology by Monica Cheesbrough

Course Content:

ModuleI

Basic Immunology: History and introduction to immunology , Immunity ; Innate & Acquired immunity- Basic concepts about their mechanisms; Definition, types of antigens and determinants of antigenicity ; Definition, types, structure and properties of immunoglobulin

ModuleII

Antigen Antibody reaction: Antigen-Antibody reactions-Definition, Classification, General features and mechanisms , Applications of Preciptation, Agglutination, Immunodiffussion Complement fixation test, Immuno- fluorescence, RIA , ELISA

Module III

Serological Tests: Principle, procedure and interpretation of various serological tests: Widal VDRL, ASO, CRP, Brucella tube agglutination, Rose-Waaler

Module IV

Complement system: Definition, complement activation pathways

Immune response: Introduction & Basic concepts of Humoral and Cellular immune responses

Module V

Auto Immunity: Basic concepts of autoimmunity and brief knowledge about autoimmune diseases

Vaccines: Definition, Types, Vaccination schedule

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases. It will also covers Auto Immune diseases, Hypersensitive reactions, Types of vaccines & Vaccination shedule	1,5,6,11

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 402	**Immunology & Bacterial serology**	2				1	2					2	

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML403	Clinical Biochemistry	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives:

The basic objective of this course is to understand and get familiar with Organ function tests, Maintenance of Quality Controle & Automation in Clinical Biochemistry

Course Outcomes:

The students will learn about the analysis of various methods of patient sample for diagnosing different biochemical parameters to assess different organ functioning .Students will also learn how to maintain quality and usage of different types of autoanalyzers in clinical biochemistry laboratory.

Catalog Description:

The subject involves the study of Autoanalyzers- principle & applications ,Quality controle,hypertention atrerosclerosis,Pattern of cardiac enzymes,,assessment of kidney ,liver,gastric functioning .

Text Books

1. Raju Bindu, *Review of Medical Biochemistry*
2. Damodaran K, *Practical Biochemistry*

Reference Books

1. DS Sheriff, *Textbook of Medical Biochemistry*
2. U.Satyanarayan, *Textbook of Medical Biochemistry*

Course Content

Module 1

Liver function tests: Liver functions, Assessments - Based on its metabolic functions, Measurement of serum enzyme levels, Bile Pigment metabolism, jaundice, its types, & their biochemical findings.

Module 2

Urolithiasis & Renal Function Tests:

RFT- Clearence tests, Concentration tests, dilution tests.

Renal calculi- Introduction, Etiology, Pathophysiology, Factors influencing, Types, Risk Factors, Control.

Module 3

Gastric Function tests: Composition of Gastric Juice, free acidity & total Acidity, Gastric stimulants, Tubeless gastric analysis

Cardiac Profile- Hypertension, MI, pattern of Cardiac Enzymes in Heart diseases

Module 4

Diabetes Mellitus: Introduction, symptoms, types, Clinical Manifestations, Diabetic ketoacidosis, Control of Hyperglycemia.
Lipoproteinemia, Atherosclerosis & control of Hypercholesterolemia.
Alkaptonuria, Albinism, Maple syrup urine disease.

Module 5
Quality control & Automation in clinical biochemistry laboratory

Mode of Evaluation:

The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand analysis of various methods of patient sample for diagnosing different biochemical parameters to assess different organ functioning .Students will also learn how to maintain quality and usage of different types of autoanalyzers in clinical biochemistry laboratory	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12

BML 403	**Clinical Biochemistry**	3				1	2					2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML451	Hematology & Hematological diseases(Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To get familiar with practical aspects of hematology.

Course Outcomes

On completion of this course students will be exposed to Basic requirements for hematology laboratory, Glass wares & Equipments used in Hematology, study of Blood cell counts , Determination of Hemoglobin& Blood cell indices,Examination and identification of blood smear for different types of anemia.

Catalog Description

This subject involves study of hematology & hematoligal diseases to made aware of various diseases like anemia, quantitative disorders of Leucocytes, morphological alterations in blood cells, bleeding disorders.

Text Books

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Practical Haematology by JB Dacie
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Books

4. Clinical Diagnosis &Management by Laboratory methods (20th edition) by John Bernard Henary
5. Atlas of haematology (5th edition) by G.A. McDonald
6. De Gruchy's clinical haematology in medical practice

Course Content

1. Good laboratory practices in hematology laboratory
2. Handling and usage of Microscope
3. Preparation of different types of anticoagulants used in hematology
4. Demonstration of Collection of blood
5. Preparation of Blood smears
6. Demonstration of DLC
7. Demonstration of TRBC
8. Demonstration of TWBC
9. Demonstration of Platelet count
10. Demonstration of ESR
11. Demonstration of PCV
12. Demonstration of BT & CT
13. Calculation of Blood Cell Indices
14. Examination of Blood Smear for Abnormal Cells
15. Demonstration of Reticulocyte count

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the Basic requirements for hematology laboratory, Glass wares & Equipments used in Hematology, study of Blood cell counts , Determination of Hemoglobin & Blood cell indices, Examination and identification of blood smear for different types of anemia.	1,2,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 451	**Hematology & Hematological diseases (P)**	3	1			1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly

3=Major part of course

BML452	Immunology & Bacterial serology (Practical)	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the practicals of Immunology & Bacterial serology

Course Outcomes

On completion of this course, the students will be exposed to Perform various Serological tests like Widal,VDRL,ASO,RF tests etc,demonstration of Ag or Ab by immunofluoresence/immunodiffusion techniques, and performing ELISA, SDS-PAGE techniques etc

Catalog Description

This subject involves study of immunology & bacterial serology useful in laboratory diagnosis of various human infections & disease states

Text Books

1. Text book of Microbiology by Ananthanarayanan s
2. Text book of Microbiology: CP. Baveja
3. Text book of immunology by: SK: Gupate

Reference Books

1. Practical Medical Microbiology by Mackie & McCartney Volume 1 and 2
2. Medical Microbiology by Paniker & Satish Gupte
3. Medical laboratory Technology Vol. I ,II, III by Mukherjee
4. Medical Laboratory manual for tropical countries Vol II Microbiology by Monica Cheesbrough

Course Content:

1. Collection of blood sample by vein puncture, separation and preservation of serum
2. Performance of Serological tests
    a. Widal Test
    b. VDRL (including Antigen Preparation),
    c. ASO (Anti streptolysin 'O')
    d. C-Reactive Protein (Latex agglutination)
    e. Rheumatoid factor (RF) Latex agglutination
3. Demonstration of antigen / antibody, determination by Immuno fluorescence (IF), Immuno diffusion, precipitation in Agarose gel (Ouchterlony)
4. Demonstration of ELISA
5. Demonstration of SDS - PAGE
6. Preparation of Vaccination schedule

Mode of Evaluation:

The theory performance of students is evaluated as:

	Lab

Components	Internal	SEE
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand & Perform various Serological tests like Widal,VDRL,ASO,RF tests etc,demonstration of Ag or Ab by immunofluoresence/immunodiffusion techniques, and performing ELISA, To get knowledge of Vaccination schedule.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 452	**Immunology & Bacterial serology(P)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML453	Clinical Biochemistry (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives:

The basic objective of this course is to get familiar with Clinical Biochemistry Practicals.

Course Outcomes:

The students will learn about the various methods of Patient sample analysis for diagnosing, biochemical parameters for the assessment of Different organ Functioning .students will also learn maintenance of quality and usage of different types of autoanalyzers in clinical biochemistry laboratory.

Catalog Description:

The subject involves the study of Autoanalyzers- principle & applications ,Quality controle / assurance,hypertention ,atrerosclerosis,Pattern of cardiac enzymes,,assessment of kidney ,liver,gastric functioning in clinical biochemistry laboratory .

Text Books

1. Raju Bindu, *Review of Medical Biochemistry*
2. Damodaran K, *Practical Biochemistry*

Reference Books

1. DS Sheriff, *Textbook of Medical Biochemistry*
2. U.Satyanarayan, *Textbook of Medical Biochemistry*

Course Content

1. Serum Bilirubin total estimation
2. Serum amylase estimation
3. Serum GOT (AST) estimation
4. Serum GPT (ALT) estimation
5. Alkaline phosphatase estimation
6. Acid phosphatase estimation
7. Determination of OGTT
8. Serum Total Proteins estimation
9. Serum Creatinine estimation
10. Blood Urea Estimation
11. Serum Cholesterol estimation
12. Demonstration of Collection of Gastric Juice
13. Demonstration of working of Random Access Analyzer(RAA)

Mode of Evaluation:

The theory performance of students is evaluated as:

	Lab

Components	Internal	SEE
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand various methods of Patient sample analysis for diagnosing, biochemical parameters for the assessment of Different organ Functioning .To learn maintenance of quality and usage of different types of autoanalyzers in clinical laboratory	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 453	**Clinical Biochemistry(P)**	3				1	2		1			2	2

1=Addressed to small extent, 2=Addressed significantly, 3=Major part of course

BML501	Mycology & Virology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This course deals with the mycology & Virology

Course Outcomes

On completion of this course, the students will be able to understand Introduction of Mycology & virology . Terms & Classification, Lab Diagnosis of Fungal Infections. The student will be taught about introduction, general characteristics, life cycle and laboratory diagnosis of various Medically important Fungi and Viruses.

Catalog Description

This subject involves study of Superficial Mycoses, Subcutaneous Mycoses, Mycetoma, Sporotrichosis, Dermatophytes, Systemic Mycoses, Penicillosis, Zygomycosis, PneumocystisMycotoxins. & virus morphology, types, classification & their diagnosis.

Text Books

1. Arora, *Medical Lab Technology*
2. Karykartee and Damle, *Textbook of Parasitology*
3. 3 Text book of Microbiology by Ananthanarayanan
4. Medical Microbiology by Paniker & Satish Gupte
5. Medical laboratory Technology Vol. I ,II, III by Mukherjee

Reference Books

1. Practical Medical Microbiology by Mackie & Mac. Cartney Volume 1 and 2
2. Medical Laboratory manual for tropical countries Vol. II Microbiology by Monica Cheesbrough
3. Medical Mycology by Dr Jagdish Chander

Course Content

Module 1(Mycology)

Introduction to medical mycology, basic concepts about superficial and deep mycoses taxonomy , classification & general characteristics of various medically important fungi.

Module 2

Names of fungi & diseases caused by them; superficial mycoses, candida, dermatophytes, opurtunistic fungi, subcutaneous mycoses, Cryptococcus.

Module 3(Virology)

Introduction, classification of virus, collection, Transport, & Storage of sample for Viral diagnosis. Staining Techniques used in virology, Processing of sample for viral diagnosis (Egg Inoculation & Tissue culture0

Module 4

RNA Viruses: Polio myelitis, Rhino virus, Influenza, Rabies, Arbo viruses, Measles Mumps, Rubella, HIV

Module 5

DNA viruses: Small Pox, HSV, CMV, EBV, Varicella Zoster, Hepatitis, Adeno virus

Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand Introduction of Mycology & virology . Terms & Classification, Lab Diagnosis of Fungal Infections. To learn about the introduction, general characteristics, life cycle and laboratory diagnosis of various Medically important Fungi and Viruses.	1,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 501	**Mycology & Virology**	3					2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML502	Immunopathology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basics of Immunopathology

Course Outcomes

On completion of this course, the students will be able to understand learn about the various methods of patients' sample analysis for immunological parameters. The students will learn how to analyze various clinical samples, for estimation of different components which are the cause of the immune disease or the diagnostic/prognostic markers.To diagnose various Immunodeficiency disorders and to know the transplant immunology.

Catalog Description

This subject provides information about various clinically important cells of immune system, lymphoid organs, Antigen, Antibody, Ag-Ab. Reactions, Transplant immunology etc. & automation techniques a consistent cellular and molecular basis in understanding ,diagnosis,and treatment of immunological defects in various clinical conditions

Text Books

1. Text Book of Immunology By Kuby ,7 th edition
2. Essential Immunology and Immunopathology by Louis Reichardt and Mehrdad Matloubian
3. Immunology by Ivan Roitt, Jonathaan Brostoff and David Male
4. Medical Immunology by Daniel P Stites
5. Basic & Clinical Immunology by P. Daniel Fudenberg. H. Hugh and Stites

Reference Books

1. Immunology and Immunopatholgy Samter's Immunologic Diseases,6th Edition,2001
2. Diagnostic Immunopathology, 2ND Ed Hardcover – Dec 12 1994 by Colvin (Author)
3. Text book of immunology by David Male,Jonathan,Brostoff,David B Roth,Ivan Roitt,7th Edition,2006
4. Textbook of Immunopathology, Volume 1Peter A. Miescher, Hans J. Muller-Eberhard, Grune & Stratton, 1976

Course Content

Module I

Introduction to Immunology, Cells of the immune system, Lymphoid organs of the Immune system. Antigens, Antibodies, Antigen-Antibody reactions

Module II

Complement, MHC I & II, HLA Typing & Cross matching, Hypersensitivity Type I & II,

Hypersensitivity Type III & IV

Module III

Immunodeficiency -Approach to evaluation of the immunodeficient host , Primary immunodeficiency disorders. HIV/AIDS ,Secondary immunodeficiency disorders (excluding AIDS)

Module IV

Systemic immune diseases - Mechanisms of autoimmunity - Serum sickness and pathology of immune complex mediated diseases , Systemic Lupus Erythematosus , Rheumatoid arthritis , Rheumatic fever ,Amyloidosis, Sarcoidosis

Module V

Organ transplantation -Transplant Immunology , Concepts and challenges in transplantation ,Graft Vs Host reactions

Mode of Evaluation: The theory performance of students is evaluated as:

Theory		
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand and learn about the various methods of patients' sample analysis for immunological parameters of various Immunodeficiency disorders .To get the knowledge of autoimmunity, immunodeficiency disorders and immunological reactions ,complications of organ transplants.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 502	**Immunopathology**	2				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML503	Transfusion medicine	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the Transfusion Medicine

Course Outcomes

On completion of this course, the students learn about blood grouping & blood transfusion. students will learn about the concept of blood grouping, compatibility testing in blood transfusion & screening of donated blood for various infectious diseases, Donor selection & rejection criteria, Preparation of various fractions of blood.

Catalog Description

This subject Transfusion medicine (or transfusiology) is the branch of medicine that deals with the study of collection, transfusion of blood and blood components, must be ordered and administered safely and appropriately

Text Books

1. Practical haematology by JB Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Books

1. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein

Course Content

Module I

History of transfusion medicine, RBC, WBC, Platelets-production, structure, functions & Life span. Hemoglobin structure function & degradation. Hemostasis, role of platelets, coagulation pathways, Fibrinolysis.

Module II

Introduction to Human Blood Group systems, ABO systems, Rh System, Hemolytic Disease of Newborn & Prevention. Blood grouping techniques, Cell grouping, Serum grouping,(Slide & Tube Method) Rh grouping by slide & tube method, Difficulties in ABO grouping & its importance.

Module III

Donor selection & rejection criteria, Health checks before donating, Types of anticoagulants, types of blood bags, component separation, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing cross matching (Major & Minor). Coombs test Direct & Indirect

Module IV

Instructions given to the donor after blood donation, Adverse donor reaction. Complication & hazards of blood transfusion reactions & mismatched blood transfusion. Artificial blood

Module V

Preparation of various fractions of blood, packed red cells, washed red cells, & frozen red cells, platelet rich plasma, platelet concentrate, frozen platelets, fresh plasma, fresh frozen plasma, cryoprecipitate.

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To learn about the concept of blood grouping, compatibility testing in blood transfusion & screening of donated blood for various infectious diseases, Donor selection & rejection criteria, Preparation of various fractions of blood	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12

BML 503	**Transfusion medicine**	3				1	2		1			2	3

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML551	Mycology & Virology (P)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Mycology & Virology practicals

Course Outcomes

On completion of this course, the students will be exposed to understand the culture media used routinely in mycology, staining technique used to identify fungi, various routes of inoculation in fertilized hen egg, laboratory diagnosis of various Medically important Fungi and Viruses.

Catalog Description

This subject involves study of Superficial Mycoses, Subcutaneous Mycoses, Mycetoma, Sporotrichosis, Dermatophytes, Systemic Mycoses, Penicillosis, Zygomycosis, PneumocystisMycotoxins. & virus morphology, types, classification & their diagnosis.

Text Books

1. Arora, *Medical Lab Technology*
2. Karykartee and Damle, *Textbook of Parasitology*
3. 3 Text book of Microbiology by Ananthanarayanan
4. Medical Microbiology by Paniker & Satish Gupte
5. Medical laboratory Technology Vol. I ,II, III by Mukherjee

Reference Books

4. Practical Medical Microbiology by Mackie & Mac. Cartney Volume 1 and 2
5. Medical Laboratory manual for tropical countries Vol. II Microbiology by Monica Cheesbrough
6. Medical Mycology by Dr Jagdish Chander

Course Content

1. Good laboratory practices in mycology laboratory
2. To prepare the culture media used routinely in mycology
3. To perform the staining technique to identify the fungi
4. Collection of clinical samples from skin, nails, hair, body fluids & Secreations
5. Good laboratory practices in virology laboratory
6. Demonstration of fertilized hen egg
7. Demonstration of various routes of inoculation in fertilized hen egg

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**

Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the culture media used routinely in mycology, staining technique used to identify fungi, various routes of inoculation in fertilized hen egg, laboratory diagnosis of various Medically important Fungi and Viruses.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	**Life-long Learning**
		1	2	3	4	5	6	7	8	9	10	11	12
BML 551	**Mycology & Virology**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML552	Immunopathology (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the practical aspects of Immunopathology

Course Outcomes

On completion of this course, the students will be exposed to understand learn about the various methods of patients' sample analysis for immunological parameters. The students will learn how to analyze various clinical samples, for estimation of different components which are the cause of the immune disease or the diagnostic/prognostic markers..

Catalog Description

This subject provides information about various clinically important cells of immune system, lymphoid organs, Antigen, Antibody, Ag-Ab. Reactions, Transplant immunology etc. & automation techniques a consistent cellular and molecular basis in understanding ,diagnosis,and treatment of immunological defects in various clinical conditions

Text Books

1. Text Book of Immunology By Kuby ,7 th edition
2. Essential Immunology and Immunopathology by Louis Reichardt and Mehrdad Matloubian
3. Immunology by Ivan Roitt, Jonathaan Brostoff and David Male
4. Medical Immunology by Daniel P Stites
5. Basic & Clinical Immunology by P. Daniel Fudenberg. H. Hugh and Stites

Reference Books

5. Immunology and Immunopatholgy Samter's Immunologic Diseases,6th Edition,2001
6. Diagnostic Immunopathology, 2ND Ed Hardcover – Dec 12 1994 by Colvin (Author)
7. Text book of immunology by David Male,Jonathan,Brostoff,David B Roth,Ivan Roitt,7th Edition,2006
8. Textbook of Immunopathology, Volume 1Peter A. Miescher, Hans J. Muller-Eberhard, Grune & Stratton, 1976

Course Content

1) Good Laboratory practices in immunopathology laboratory
2) Serum separation
3) T & B cell separation by gradient centrifugation

4) Antigen antibody reactions
5) PCR
6) FACS for CD4 & CD8
7) Nephlometry
8) ELISA
9) Electrophoresis

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To learn about the various methods of patients' sample analysis for immunological parameters. The students will learn how to analyze various clinical samples, for estimation of different components which are the cause of the immune disease or the diagnostic/prognostic markers..	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning

		1	2	3	4	5	6	7	8	9	10	11	12
BML 552	**Immunopathology(P)**	2				1	2		1			2	3

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML553	Transfusion Medicine (Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basics of Transfusion Medicine Practical.

Course Outcomes

On completion of this course, the students will be able to understand Collection and preservation of blood from donars, Screening of blood, Preparation of various fractions of blood and also to perform Coomb's test,Cross matching procedure,Grouing techniques etc in detail.

Catalog Description

This subject Transfusion medicine (or transfusiology) is the branch of medicine that deals with the study of collection, transfusion of blood and blood components, must be ordered and administered safely and appropriately

Text Books

1. Practical haematology by JB Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Books

1. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein

Course Content

2. To prepare Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions
3. Screening of blood donor: physical examination including medical history of the donor
4. Collection and preservation of blood for transfusion purpose
5. Screening of blood for Malaria, Microfilaria, HBsAg, syphilis and HIV
6. To determine the ABO & Rh grouping

5.1 Direct or preliminary grouping
5.2 Indirect or proof grouping
5.3 Rh grouping and determination of Du in case of Rh negative

7. To perform Direct and Indirect Coomb's test
8. To perform cross matching

7.1 Major cross matching
7.2 Minor cross matching

9. Preparation of various fractions of blood.

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand Collection and preservation of blood from donars, Screening of blood, Preparation of various fractions of blood and also to perform Coomb's test,Cross matching procedure,Grouing techniques etc in detail. .	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 553	**Transfusion Medicine (Practical)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

LLL101	Universal Human Values and Ethics	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the value of harmonious relationship based on trust and respect in their life and profession
4. Understand the role of a human being in ensuring harmony in society and nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Text Books

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

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Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik)

KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Content

Module 1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Module II Understanding Harmony in the Human Being - Harmony in Myself

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Swasthya

Module III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding harmony in the Family- the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

Module IV Understanding Harmony in the Nature and Existence - Whole existence as Co-

existence

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence

Module V Implications of the above Holistic Understanding of Harmony on Professional Ethics

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

26. Competence in Professional Ethics:
    a) Ability to utilize the professional competence for augmenting universal human order,
    b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
27. Case studies of typical holistic technologies, management models and production systems
28. Strategy for transition from the present state to Universal Human Order:
    a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
    b) At the level of society: as mutually enriching institutions and organizations

Mode of Evaluation: The theory performance of students is evaluated separately as

	Theory	
Components	**Internal**	**SEE**
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	1.Understand the significance of value inputs in a classroom and start applying them in their life and profession 2.Distinguish between values and skills, happiness and	12

	accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. 3.Understand the value of harmonious relationship based on trust and respect in their life and profession 4.Understand the role of a human being in ensuring harmony in society and nature. 5.Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	

MLT 504	Medical Laboratory Technician-I (T)	L	T	P	C
Version 1.0	Date of Approval: 11 – 01 – 2016	**12**	0	0	**12**
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This program is aimed at training candidates for the job of a "Medical Laboratory Technician", in the "Healthcare" Sector/Industry and aims at building the following key competencies amongst the learner

Course Outcomes

On completion of this course student will able to Demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.

Reference Books

1. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone
2. Anatomy for Nurses By Asha Latha
3. Essentials of Physiology by Sembulingam
4. Hand book of Health care quality & patient safety
5. Text book of Biochemistry by U. Satyanarayana
6. Text book of Medical Laboratory Technology by Godkar
7. Textbook of Microbiology By Presscott
8. Textbook of Parasitology by CP. Baveja
9. Textbook of Pathology by Harshamohan
10. Textbook of Immunology by S.K gupta
11. Textbook of Hematology & Clinical pathology by Ram das naik

COURSE CONTENT

Module I

- Healthcare Systems, Laboratory and Delivery: Basic Understanding of Healthcare Service Providers (primary, secondary & tertiary), Basic Understanding of Hospital Functions, Basic Understanding of Diagnostic Centers and medical laboratory facilities, Understanding of Laboratory at different level (National / State / District)
- Role of the Medical Laboratory Technician: To develop broad understanding of the Role of MLT, To identify Laboratory maintenance needs to be taken care by MLT, To develop Understanding of Patient Comforts and Safety, To develop understanding of Laboratory Test Results, To exhibit Ethical Behaviour.
- Introduction to Laboratory related Medical Terminology: Understand appropriate use of laboratory related medical terminology in daily activities with colleagues, patients and family.

Module 2

- Introduction to Biochemistry, Haematology and Clinical Pathology & Examination of Semen, CSF and Knowledge about Other Body Fluids Like Pleural Fluid, Pericardial Fluid, Peritoneal Fluid, Synovial Fluid, Ascitic Fluid.
- Personnel Hygiene: To develop understanding of the concept of Healthy Living, procedures of Hand Hygiene, to develop techniques of Grooming, To be equipped with Techniques of Use of PPE, To be vaccinated against common infectious diseases
- Bio Medical Waste Management: To learn & gain understanding of importance of proper and safe disposal of bio-medical waste & treatment, categories of biomedical waste, colour coding, types of containers, transportation of waste, etc.

Module 3

- Pre-analytical Laboratory Testing Process: To gain broad understanding of different types of samples to be taken in medical laboratory, sample Handling, different equipment useful for blood sample collection, correct method of blood sample collection, collection method of samples other than blood samples, correct procedure of sample transportation.
- Introduction to Clinical Biochemistry: Electrolytes, Therapeutic Drug Monitoring, Acid Base Balance.
- Introduction to Bacteriology, Immunology and Serology

- Sensitization to Blood Banking Understand Immuno- hematology

Module 4

- Professional Behavior in Healthcare Setting How to maintain restful environment, General and Specific etiquettes to be observed on duty, Understand need for compliance of organizational hierarchy and reporting, Understand the legal and ethical issues & importance of conservation of resources in laboratories
- Analytical Laboratory Testing Process-I:To gain broad understanding about Laboratory planning, laboratory operations, care of laboratory glassware, equipment and instruments, Specimen Handling, uderstanding of setting up, calibrating, operating, cleaning, maintaining, troubleshooting and validation of laboratory equipment used in quantitative or qualitative analysis.

Module 5

- Observing & Reporting: Understand the importance and method of Observing and reporting while dealing with patients during sample and report collection, method of Observing and reporting while assisting the pathologists and other members of the team, importance of verbally informing the person in authority
- Documentation: Understand guidelines for documentation,. Collecting documentation, Types of records in laboratory set up, uses and importance of records, Essential requirement of records, abbreviations and symbols, Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form

Mode of Evaluation: The theory performance of students is evaluated as

	Theory	
Components	Internal	SEE
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
S.No	Course Outcomes (COs)	Mapped programme Outcomes
1	To understand & demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.	**1,2,3,4,5,6, 7,8,9,10**

	Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment & sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
	1	2	3	4	5	6	7	8	9	10	11	12
MLT 504	2	2	2	2	1	3	1	2	2	2		

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

MLT 554	Medical Laboratory Technician-I (P)	L	T	P	C
Version 1.0	Date of Approval: 11 – 01 – 2016	**0**	0	12	**6**
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This program is aimed at training candidates for the job of a "Medical Laboratory Technician", in the "Healthcare" Sector/Industry and aims at building the following key competencies amongst the learner

Course Outcomes

On completion of this course student will able to Demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.

Reference Books

12. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone
13. Anatomy for Nurses By Asha Latha
14. Essentials of Physiology by Sembulingam
15. Hand book of Health care quality & patient safety
16. Text book of Biochemistry by U. Satyanarayana
17. Text book of Medical Laboratory Technology by Godkar
18. Textbook of Microbiology By Presscott
19. Textbook of Parasitology by CP. Baveja
20. Textbook of Pathology by Harshamohan
21. Textbook of Immunology by S.K gupta
22. Textbook of Hematology & Clinical pathology by Ram das naik

Course Content:

1. **Ethics of Laboratory**
2. **Laboratory safety and First aid**
3. **Demonstration of different systems of whole body(Models/Charts)**
4. **Demonstration of Blood collection**
5. **Separation of Serum/Plasma**
6. **Collection and preservation of Urine**
7. **Estimation of Hemoglobin by various methods**
8. **Demonstration of Reticulocyte count**
9. **Demonstration of Total Red blood cell count**
10. **Demonstration of Total White blood cell count**
11. **Demonstration of Bleeding Time**
12. **Demonstration of Clotting Time**
13. **Determination of ESR**
14. **Examination of Urine(Physical/Chemical/Microscopic)**
15. **Microscopic examination of stool**
16. **Collection and examination of sputum**
17. **Examination of Semen**

18. Sample formats for test requisition
19. Sample formats for equipment maintenance
20. Demonstration of procedure for hand hygiene
21. Demonstration of handling and disposal of Biomedical waste
22. Demonstration of biohazard bags for waste disposal
23. Demonstration of Grams staining
24. Demonstration of cultivation of bacteria
25. Demonstration of different sterilization methods
26. Demonstration of ABO Grouping
27. Demonstration of Rh typing
28. Demonstration of Cross matching of blood
29. Demonstration of investigating transfusion reactions
30. Demonstration of working of Semiautoanalyzer

Mode of Evaluation: The theory performance of students is evaluated as

	Practical	
Components	Internal	SEE
Marks	30	70
Total Marks	100	

Mapping between Cos and Pos		
S.No	Course Outcomes (COs)	Mapped programme Outcomes

1	To understand & demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.	**1,2,3,4,5,6, 7,8,9,10**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

1=Addressed to small extent

2=Addressed significantly

3=Major part of course

	Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment & sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
	1	2	3	4	5	6	7	8	9	10	11	12
MLT 554	2	2	2	2	1	3	1	2	2	2		

BML601	Cytopathology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the fundamental concept of cytopathology

Course Outcomes

On completion of this course, the students will be able to understand fundamental aspects of Respiratory tract,Urinary tract,Female Genital tract's cytology ,Techniques of collection of samples ,Processing of samples by various staining Techniques like H&E,Romonowsky stains etc.

Catalog Description

This subject cytology is the branch of pathology, the medical specialty that deals with making diagnoses of diseases and conditions through the examination of tissue samples from the body and also involves study of cells in terms of structure, function.

Text Books

1. Hand book of Exfoliative cytology; M.C. Lure, Lippincott
2. Clinical Diagnosis in Lab methods by Todd&Sanford ,1984

Reference Books

1. Lab Techniques WHO Manual Bio-safety ,2003
2. An Introduction to Medical Lab Technology by F J Baker and Silverton

Course Content

Module I

Techniques of collection of Samples

a) Exfoliative cytology b) Interventional cytology

Exfoliative cytology

Techniques for collecting the smears from Female genital Tract

Pap smears- Lateral vaginal wall smears, vaginal pool vault, cervical smears, combined smears,triple smears, Endocervical & endometrial smears.

Module II

Respiratory tract:

Selection of material & making smears, Bronchial Aspiration(washings, & Brushings)

Urinary tract:

Collection & Preparation of samples

Urinary sediment cytology, Bladder irrigation(Washings) &cytology, Prostatic massage &its cytology

Module III

Body fluids

a) Effusions in body cavities: Ascitic, Pleural, Etc..
b) Fluids of small volume: CSF, Normal, Neoplastic & Non- neoplastic diseases

Module IV
Interventional cytology
Fine needle aspiration cytology, Imprint cytology, crush smear cytology, Biopsy sediment cytology.

Module V
Processing of samples in laboratory,
Staining smears: Papanicolu, H& E stain, Romonowisky stains like Leishman's stain, May Grunwald Geimsa (MGG) & Wrights Stains.

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand fundamental aspects of Respiratory tract,Urinary tract,Female Genital tract's cytology ,Techniques of collection of samples ,Processing of samples by various staining Techniques like H&E,Romonowsky stains etc.	1,5,6,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 601	**Cytoytopathology**	3				1	2					1	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML602	Parasitology	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Parasitology

Course Outcomes

On completion of this course, the students will be able to understand the classification of parasites, symptoms in parasitic infection, different types of sample collection, diagnosis, treatment, & preventive measures.

Catalog Description

This subject involves study of life cycle, clinical symptoms in each type of infection, diagnosis treatment, control & prevention of various Medically important parasites

Text Books

1. Text book of Parasitology by CP. Baveja
2. Medical microbiology by Satish Gupte
3. Text book of parasitology for BDS by CP. Baveja
4. Karkartee and Damle,Text book of Parasitology

Reference Books

1. Parasitology in relation to the clinical medicine by K D Chhatterjee
2. Anantha Narayan and Panikar,Textbook of Microbiology.

Course Content

Module I

Introduction about Parasitology, taxonomy and classification, parasite, host, mechanism of disease production by parasites, Reaction of host to parasite.

Module II

Classification of Protozoa

a) Rhizopoda (E. Hsitolytica)
b) Mastigophora(Giardia Lamblia, Leishmania Donovani, Trichomonas Homnis)

Module III

Classification of Protozoa

a) Sporozoa (Malarial Parasites, Toxoplasma Gondi)
b) Ciliata (Balantidium Coli)

Module IV

Clasification of Helimints

a) Nematodes (Trichinella Spiralis, Trichuris trichura, Ascaris Lumbricoids, Ancyclostoma duodenale, Strongyloides stercoralis, Enterobuds Vermicularis, Dracanculus Medinensis, Wuchereria Bancrofti)

Module V

Clasification of Helimints

b) Cestodes (Diphyllobothrium Latum, Taenia saginata, Taenia solium, Cystericus cellulosae, Echinococcus granulosus,
c) Trematodes (Schoistosoma hematobium)

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the classification of parasites, symptoms in parasitic infection, different types of sample collection, diagnosis, treatment, & preventive measures.	1,5,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 602	**Parasitology**	3					2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML603	Clinical Laboratory Practice(CLP)	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Clinical Laboratory Practice

Course Outcomes

On completion of this course, the students will be able to understand the basic concept of laboratory services,infrastructure of laboratories,clinical laboratory procedures to help prevent harm to workers, property, the environment and the general public, help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Catalog Description

This subject involves study of good clinical laboratory practices used in organization and infrastructure of clinical laboratory,Ethical considerations to be followed, maintaining quality &safety in Laboratory,Bio medical Waste management etc

Text Books

1. ICMR(2008) guidelines for good clinical laboratory practices.
2.Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Books

1.NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
2.WHO : Good Clinical Laboratory Practice (GCLP),2009

Course Content

Module I
Laboratory services : Levels of laboratories-Primary level,Secondary level and Tertiary level,Reference laboratories, Research laboratories and Specific disease reference laboratories.
Accidents and emergencies in the laboratory
Module 2
Infrastructure in the laboratories; Laboratory space :Reception, specimen collection, quality

water supply, work area, specimen/sample/slide storage, cold storage, record room, wash room, biomedical waste room, fire safety, etc. Personal in the laboratory –Qualifications as per NABL document Equipment Listing, cleaning, maintenance, SOP, verification of performance, Internal quality controle

Module 3

Bio medical waste management and environment safety- a. Definition of Biomedical Waste b. Waste minimization c. BMW – Segregation, collection, transportation, treatment and disposal (including color coding) d. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste e. BMW Management & methods of disinfection f. Modern technology for handling BMW

Module 4

Safety in Laboratories – General safety measures,biosafety precautions,levels of biosafety laboratories :BSL1,BSL2,BSL3,BSL4,BSL5,

Module 5

Ethical Considerations: Non- maleficence,beneficence,risk minimization,ethical review,transmission of ethical values,voluntariness,compliance. Quality Assurance –Internal and external Quality assessment

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the basic concept of laboratory services,infrastructure of laboratories,clinical laboratory procedures to help prevent harm to workers, property, the environment and the general public.To understand the	1,2,3,5,6,8,10,11,12

	basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. Legal and ethical considerations etc	

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 603	**Clinical Laboratory Practice**	3	1	2		2	3		2		1	2	3

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML604	Research Methodology & Biostatistics	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This course deals with the study of Research Methodology & Biostatistics

Course Outcomes

Help the students to understand the basic principles of research and methods applied to draw inferences from the research findings. statistics course we will explore the use of statistical methodology in designing, analyzing, interpreting, and presenting biological experiments and observations.

Catalog Description

The subject involves the study of methods to be adapted to do research work data analysis and biostatistics

Text Books

1. The Analysis of Biological Data (2nd edition) by Whitlock & Schluter
2. TB of Biostatisics and Research methodology by Karthikeyan,R.M .Chathurvedi,R.M.Bhosale

Reference Books

1. Textbook of Methods in Biostatistics by B.K.Mahajan 7th Edition
2. Textbook of Biostatistics by B.Annadural

Course Content

Module I

Introduction to research methods , Identifying research problem

Module 2

Ethical issues in research, Research design

Module 3

Basic Concepts of Biostatistics, Types of Data, Research tools and Data collection methods

Module 4

Sampling methods, Probability rules & Probability distributions (Normal & Binomial)

Module 5

Developing a research proposal,

Mode of Evaluation: The theory performance of students is evaluated as:

	Theory	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the basic principles of research and methods applied to draw inferences from the research findings. statistics course we will explore the use of statistical methodology in designing, analyzing, interpreting, and presenting biological experiments and observations.	1,2,3,5,6,8,10,,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 604	**Research Methodology & Biostatistics**	2	2	2		1	2		1		1	2	3

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML651	Cytopathplogy(Practical)	L	T	P	C
Version	Date of Approval:	3	0	0	3
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

To understand the basic Cytology Practical

Course Outcomes

On completion of this course, the students will be able to understand preparation of reagents, Wet film preparation ,Staining(H&E, Pap) of Vaginal,Cervical,Sputum, FNAC etc

Catalog Description

This subject cytology is the branch of pathology, the medical specialty that deals with making diagnoses of diseases and conditions through the examination of tissue samples from the body and also involves study of cells in terms of structure, function.

Text Books

1. Hand book of Exfoliative cytology; M.C. Lure, Lippincott
2. Clinical Diagnosis in Lab methods by Todd&Sanford ,1984

Reference Books

3. Lab Techniques WHO Manual Bio-safety ,2003
4. An Introduction to Medical Lab Technology by F J Baker and Silverton

Course Content

1. Collection & Prearation of Vaginal,Cervical,Sputum smears
2. Preparation of Wet film
3. Demonstration of Fixation
4. Demonstration of H&E Staining
5. Demonstration of Pap smear preparation
6. Demonstration of Fine Needle Aspiration Cytology(FNAC)
7. Demonstration of Vaginal,Cervical,Sputum staining

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand and learn understand preparation of reagents, Wet film preparation ,Staining(H&E, Pap) of Vaginal,Cervical,Sputum, FNAC etc	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 651	**Cytopathology(P)**	3				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML652	Parasitology(Practical)	L	T	P	C
Version	Date of Approval:	0	0	2	1
Pre-requisites//Exposure					
Co-requisites					

Course Outcomes

On completion of this course, the students will be exposed to understand the classification of parasites, symptoms in parasitic infection, different types of sample collection, diagnosis, treatment, & preventive measures.

Catalog Description

This subject involves study of life cycle, clinical symptoms in each type of infection, diagnosis treatment, control & prevention of various Medically important parasites

Text Books

1. Text book of Parasitology by CP. Baveja
2. Medical microbiology by Satish Gupte
3. Text book of parasitology for BDS by CP. Baveja
4. Karkartee and Damle,Text book of Parasitology

Reference Books

3. Parasitology in relation to the clinical medicine by K D Chhatterjee
4. Anantha Narayan and Panikar,Textbook of Microbiology.

Course Content

1) Good laboratory practices in Parasitology
2) Collection of various samples in parasitic infections
3) Demonstration of cysts (models/slides)
4) Demonstration of eggs (models/slides)
5) Demonstration of parasites in blood (models/slides)
6) Demonstration of parasites in stool (models/slides)
7) Different types of stool examination methods.

Mode of Evaluation: The theory performance of students is evaluated as:

	Lab	
Components	**Internal**	**SEE**
Marks	**30**	**70**
Total Marks	**100**	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
Sl. No.	**Course Outcomes (COs)**	**Mapped Programme Outcomes**
1	To understand the classification of parasites, symptoms in parasitic infection, different types of sample collection, diagnosis, treatment, & preventive measures.	1,5,6,8,11,12

		Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment and sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
		1	2	3	4	5	6	7	8	9	10	11	12
BML 652	**Parasitology(Practical)**	2				1	2		1			2	2

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

MLT605	Medical Laboratory Technician-II (T)	L	T	P	C
Version 1.0	Date of Approval: 11 – 01 – 2016	**12**	0	0	**12**
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This program is aimed at training candidates for the job of a "Medical Laboratory Technician", in the "Healthcare" Sector/Industry and aims at building the following key competencies amongst the learner

Course Outcomes

On completion of this course student will able to Demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.

Reference Books

23. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone
24. Anatomy for Nurses By Asha Latha
25. Essentials of Physiology by Sembulingam
26. Hand book of Health care quality & patient safety
27. Text book of Biochemistry by U. Satyanarayana
28. Text book of Medical Laboratory Technology by Godkar
29. Textbook of Microbiology By Presscott
30. Textbook of Parasitology by CP. Baveja
31. Textbook of Pathology by Harshamohan
32. Textbook of Immunology by S.K gupta
33. Textbook of Hematology & Clinical pathology by Ram das naik

COURSE CONTENT

Module I

- Patient's Rights & Responsibilities: Understand sensitivities involved in patient's right, Learn medical laboratory technician's role in maintaining patient's rights.
- Introduction to Histopathology: Brief introduction of histopathology, Elementary knowledge of specimen collection, tissue fixatives, Tissue processing, section cutting, Staining, Decalcification.
- Introduction to Cytopathology: Elementary knowledge of specimen collection, transportation, precautions to be taken for gynaecological samples, specimen collection, transportation and preservation of nongynaecological Samples, fixation and fixative, fluid specimen, Papanicolaou stain, mounting of cell sample, special stains.
- Analytical Laboratory Testing Process-II: To gain broad understanding of chemicals/reagents useful in sample analysis, broad understanding of maintaining record of inventory, test results, etc. Able to inspect the availability of medical supplies or diagnostic kits, laboratory safety.

Module 2

- Introduction to Advanced techniques and future trends in laboratory science-I: Updated on advanced techniques and future trends in field of biochemistry, haematology & blood banking, field of clinical pathology, histopathology & cytopathology.
- Sensitization on current best practices in laboratory: Elementary knowledge on Good Clinical Laboratory Practices (GCLP) of WHO, laboratory safety, OSHA (Occupational Safety and Health Administration), U.S. Department of Labor, other current practices in laboratory used worldwide.
- Infection control and prevention: Understand practices to curb infection, hospital borne infections, prevention and treatment of needle, stick injury, management of blood and body, substance spills in the health caresetting

Module 3

- Fine needle Aspiration: Understand the purpose of fine needle aspiration, procedure of fine needle aspiration, & section cutting
- Introduction to Parasitology, Mycology and Virology, Describe the Morphology, pathogenicity and laboratory diagnosis of human viruses.
- Basic Computer Knowledge: To gain broad understanding about Application of computers in laboratory Practice,

Introduction to Computers, Block diagram, Input and Output devices, Storage devices, operating systems, Operating systems (OS), Function of OS, MS-Office.

Module 4

- Post-Analytical Laboratory Testing Process: Describe archiving protocol emphasizing on storage and retrieval of samples, specimens, data, and records. Archiving, Describe source of error/ interference/ quality of work and initiate corrective action as applicable, assessment of results to initiate followup, testing, Differentiation between clinically, Significant and insignificant findings, Able to establish and monitor quality assurance, programs or activities to ensure the accuracy of laboratory results
- Patient's Environment: Describe things necessary to make the patient feel safe and comfortable while collection, impact of comfort on patients health, importance and methodology of cleanliness, and hygiene environment in collection space

Module 5

- Soft Skills and Communications Theory Duration: Understand Art of Effective Communication, Able to handle effective Communication with, Patients & Family, Able to handle effective Communication with Peers/ colleagues using medical terminology in communication, reading and writing skills, sentence formation, grammar and composition, enhance vocabulary, Goal setting, team building, team work, time, management, thinking and reasoning & communicating with others, problem solving, Understand need for customer service and service excellence in Medical service, ethics in hospital set up, objection handling, Telephone and Email etiquettes, Basic computer working like feeding the data, saving the data and retrieving the data, analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently; rapidly changing situations, adapt accordingly, decision making ability, planning and organization of work

Mode of Evaluation: The theory performance of students is evaluated as

	Theory	
Components	Internal	SEE
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
S.No	Course Outcomes (COs)	Mapped Programe Outcomes
1	To understand & demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.	**1,2,3,4,5,6, 7,8,9,10**

	Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment & sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
	1	2	3	4	5	6	7	8	9	10	11	12
MLT605	2	2	2	2	1	3	1	2	2	2		

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

MLT 653	Medical Laboratory Technician-II (P)	L	T	P	C
Version 1.0	Date of Approval: 11 – 01 – 2016	**0**	0	12	**6**
Pre-requisites//Exposure					
Co-requisites					

Course Objectives

This program is aimed at training candidates for the job of a "Medical Laboratory Technician", in the "Healthcare" Sector/Industry and aims at building the following key competencies amongst the learner

Course Outcomes

On completion of this course student will able to Demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.

Reference Books

34. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone
35. Anatomy for Nurses By Asha Latha
36. Essentials of Physiology by Sembulingam
37. Hand book of Health care quality & patient safety
38. Text book of Biochemistry by U. Satyanarayana
39. Text book of Medical Laboratory Technology by Godkar
40. Textbook of Microbiology By Presscott
41. Textbook of Parasitology by CP. Baveja
42. Textbook of Pathology by Harshamohan
43. Textbook of Immunology by S.K gupta
44. Textbook of Hematology & Clinical pathology by Ram das naik

Course Content:

1. **Demonstration of working of spectrophotometer**
2. **Demonstration of maintenance of equipments and reagents**
3. **Sample formats for reporting test result**
4. **Demonstration of policies and procedures for infection control**
5. **Demonstration of mock diagnostic lab for learning & understanding patients right**
6. **Demonstration of mock environment to learn and understand conducive patient environment**
7. **Collection and handling of specimen for histopathology/cytopathology examination**
8. **Demonstration of working of Microtome**
9. **Demonstration of sharpening methods of microtome knife**
10. **Demonstration of tissue processing**
11. **Demonstration of PAP staining**
12. **Demonstration of PAS staining**
13. **Collection and handling of specimen for cytopathology examination**
14. **Demonstration of Mounting technique**

15. Demonstration of maintaining record of inventory, test results etc
16. Demonstration of automation in clinical biochemistry laboratory
17. Demonstration of automation in hematology laboratory
18. Demonstration of automation in pathology laboratory
19. Demonstration of automation in microbiology laboratory
20. Demonstration of FNAC
21. Demonstration of laboratory diagnosis of HIV
22. Demonstration of laboratory diagnosis of HCV
23. Demonstration of maintenance of IQA
24. Demonstration of maintenance of EQA
25. Demonstration of advanced techniques in the field of Molecular biology
26. Demonstration of Computer and its applications
27. Demonstration of operating systems
28. Demonstration of MS –Word
29. Demonstration of MS-Excel
30. Ethics of hospital setup

Mode of Evaluation: The theory performance of students is evaluated as

	Practical	
Components	Internal	SEE
Marks	30	70
Total Marks	100	

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between Cos and Pos		
S.No	Course Outcomes (COs)	Mapped programme Outcomes
1	To understand & demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.	**1,2,3,4,5,6, 7,8,9,10**

	Medical Lab Technology Knowledge	Thinking Abilities	Planning abilities	Leadership skills	Professional Identity	Medical Lab Technology and society	Environment & sustainability	Ethics	Individual or team work	Communication	Modern & Usage	Life-long Learning
	1	2	3	4	5	6	7	8	9	10	11	12
MLT653	2	2	2	2	1	3	1	2	2	2		

1=Addressed to small extent
2=Addressed significantly
3=Major part of course

BML701	Professional Training	L	T	P	C
Version	Date of Approval:	0	0	40	20
Pre-requisites//Exposure					
Co-requisites					

Medical Lab Technology Internship Programme :

All the students shall undergo Internship for a period of one year under the supervision of Lab super indent/Lab incharge/Pathologist at Super specialty/Multi specialty- hospitals/Diagnostic & research Centers of repute, work in the areas of Clinical Biochemistry,Microbiology,Immunology & serology,Blood bank and Molecular Techniques,Pathology,Histopathology,Hematology and Sample collection,processing and rejection.

Duration: Internship is for 12 months (July – December; January – June) or 1 year. (6 days / week; 6 hours / day) A minimum of 720 hours /semester (If 120 days working days).

Course Objectives:

During this period the interns would gain knowledge and exposure in the following domains-

- Perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.
- Explain quality assurance in Laboratory works
- Practice infection control measures
- Advanced knowledge of the scientific principles on which the tests and equipment function.
- Ensure readily availability of medical and diagnostic supplies
- Demonstrate techniques to maintain the personal hygiene needs
- Demonstrate actions in the event of medical and facility emergencies
- Exhibit professional behavior, personal qualities and characteristics of a Medical laboratory Technician
- Demonstrate good communication, communicate accurately and appropriately in the role of Medical laboratory Technician

Submission:

1.A log book must be maintained for day to day activities and signed by Lab superintendent or Lab incharge ,HoD of department on each semester end.

2.Project work completed with prior approval every semester end presented in End term external exam.

Examination:

At the end of each semester assessment made by external experts as per the university guidelines and evaluation made accordingly.

Evaluation Scheme:

Internal Assessment (IA)	CAT	End Term Exam (ETE)	Total Marks
		100	100

BML801	Professional Training	L	T	P	C
Version	Date of Approval:	0	0	40	20
Pre-requisites//Exposure					
Co-requisites					

Medical Lab Technology Internship Programme :

All the students shall undergo Internship for a period of one year under the supervision of Lab super indent/Lab incharge/Pathologist at Super specialty/Multi specialty- hospitals/Diagnostic & research Centers of repute, work in the areas of Clinical Biochemistry,Microbiology,Immunology & serology,Blood bank and Molecular Techniques,Pathology,Histopathology,Hematology and Sample collection,processing and rejection.

Duration: Internship is for 12 months (July – December; January – June) or 1 year. (6 days / week; 6 hours / day) A minimum of 720 hours /semester (If 120 days working days).

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- Perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.
- Explain quality assurance in Laboratory works
- Practice infection control measures
- Advanced knowledge of the scientific principles on which the tests and equipment function.
- Ensure readily availability of medical and diagnostic supplies
- Demonstrate techniques to maintain the personal hygiene needs
- Demonstrate actions in the event of medical and facility emergencies
- Exhibit professional behavior, personal qualities and characteristics of a Medical laboratory Technician
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Examination:

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Evaluation Scheme:

Internal Assessment (IA)	CAT	End Term Exam (ETE)	Total Marks
		100	100