KHYBER MEDICAL UNIVERSITY

MEDICAL LAB TECHNOLOGY CURRICULUM

YEAR TWO STUDY GUIDE

(SEMESTER 3)

16 Weeks Activity Planner

2022-23

CENTRAL CURRICULUM & ASSESSMENT COMMITTE FOR NURSING, REHABILITATION SCIENCES & ALLIED HEALTH SCIENCES

Table of Contents

PMS-614 PHARMACOLOGY-I

PMS-615 COMMUNICATION SKILLS

MLT-601 HAEMATOLOGY-I

MLT-602 CLINICAL BACTERIOLOGY

MLT-603 MOLECULAR BIOLOGY-I

RECOMENDED BOOKS

Introduction

KMU VISION

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

KMU MISSION

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

CENTRAL CURRICULUM COMMITTEE

Opened new door, for the beginning of new era under the supervision of Prof Dr. Zia ul Haq, VC Khyber Medical University and Dr. Brekhna Jamil Director IH¬PE&R the Central Curriculum & Assessment Committe has been formulated. This is first step taken to change the dynamics of Allied Health Sciences and Nursing Education in Pakistan. Committee by using a craft man approach has developed study guide which will provide pathways for other to follow and KMU will pre-serve the leadership in providing quality education across Pakis9tan and will be a reference point of quality in future. Committe has developed curricula to promote inter-professional learning, enhancing and improving the quality of life for people by discovering, teaching and applying knowledge related to Nursing, rehabilitation Sciences & Allied Health sciences.

High-quality education is relevant to patient needs and the changing patterns of skills that are demanded by modern health care and aligning assessment and providing quality training to students will definitely will be the outcome. Which will strengthen and enhance quality of Health System across Pakistan.

The Central Curriculum & Assessment Committee is as follows:

Dr. Brekhna Jamil	**Chairperson**	**Director Institute of Health Professions Education & Research, KMU**
Prof. Dr. Zia Ul Islam	Member	Professor ENT
Dr. Syed Hafeez Ahmad	Member	Addl. Controller of Examination Khyber Medical University
Dr. Danish Ali Khan	Member	Deputy Dean Medical Professional Education Department Alliance Healthcare (PVT) LTD
Sardar Ali	Member	Assistant Professor Institute of Nursing Khyber Medical University
Muhammad Asif Zeb	Member	Lecturer Institute of ParaMedical Sciences Khyber Medical University
Nazish A Qadir	Member	Lecturer Institute of Physical Medicine & Rehabilitation Khyber Medical University
Syed Amin Ullah	Member	Assistant Director Academics Khyber Medical University

INTRODUCTION

Allied Health Sciences deal with all kind of diagnostic techniques used in the medical sector and are very crucial for the treatment of the patients. With diag¬no-sis depending on technology, the role of allied health professional has become vital for delivering successful diagnostic and therapeutic. The allied health profes¬sionals include Medical laboratory technologists, Dental, Radiology, Anesthesia, Cardiology, Cardiac perfusion, Surgical, renal dialysis and Emergency technolo¬gists. Their role is to use scientific principles and evidence-based practice for the diagnosis, eval-uation and treatment of various disorder; prevention of diseases, and to promote health of the community. In addition, it also deal with the applica¬tion of adminis-tration and management skills.

OBJECTIVES

By the end of this program, students should be able to:

1. **To prepare a cadre of health technologists and workers who can effe-tively assist senior health professionals in the delivery of quality health services.**
2. **To prepare paramedical workers for all levels of the health care delivery system from the primary to the tertiary level.**
3. **To introduce and impart standard technical education with new modern techniques, within the fields of medical technologies, by replacing the conventional methods of pre-service training (certificate level).**
4. **To provide paramedical workers a status and recognition in the health care delivery system through improving their capacity along with in-creasing awareness of their responsibilities, authority and job descrip-tion.**
5. **To equip paramedical staff with modern skills and latest technical knowl-edge and bring them at par with other national and international level.**

THIRD SEMESTER SUBJECTS MLT

S.No	Subjects	Duration
1	PMS-612 GENERAL PATHOLOGY-I 3(2-1)	16 weeks
2	PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)	16 weeks
3	PMS-614 PHARMACOLOGY-I 3(2-1)	16 weeks
4	PMS-615 COMMUNICATION SKILLS 2(2-0)	16 weeks
5	MLT-601 HAEMATOLOGY-I 3(2-1)	16 weeks
6	MLT-602 CLINICAL BACTERIOLOGY 3(2-1)	16 weeks
7	MLT-603 MOLECULAR BIOLOGY-I 3(2-1)	16 weeks

3rd Semester

PMS-612 GENERAL PATHOLOGY-I 3(2-1)

Course Description

Students are being able to understand the basic concepts of pathology and their mechanisms. They should be able to understand cell injury and adaptation, inflammation, repair, healing, and regeneration. They should be able to understand hemodynamic disorders, shock, tumor development and types. Students are also introduced with practical and demonstrative work to acquire skills in the field of pathology

Cognitive Domain

By the end of this subject, students should be able to:

1. **Understand basic concepts of pathology and their mechanisms**
2. **Understand cell injury and adaptation, inflammation, repair, healing, and regeneration.**
3. **Understand hemodynamic disorders and their mechanisms**
4. **Understand shock and compensatory mechanism of shock**
5. **Understand oncology, tumor development, types and mechanisms**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate basics concepts of pathology on charts and models**
2. **Demonstrates cell injury, cellular adaptation, inflammation repair, healing and regeneration, hemodynamic disorders, shock, oncology on video demonstrations.**
3. **Acquire skills in estimating clotting time, bleeding time, PT and APTT.**
4. **Identify different slides related to pathology on microscope.**

Affective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**
4. **Comply SOPs to discuss pathology on charts and videos demonstrations**
5. **Adopt how to care and handle charts and models related to pathology**
6. **Comply to SOPs for slides representation related to pathology and how to care instruments and equipment's used in slides representation**
7. **Comply to SOPs estimating clotting time, bleeding time, PT and APTT and how to care instruments and equipment used in it.**

TOS -PMS-612 GENERAL PATHOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: CELLULAR ADAPTATION										
1	Week-1	Introduction	Define Pathology and cellular adapatation	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Terminology	Discuss different terminology related to pathology	C2						
3		Types	Enlist the different types of cellular adaptation	C1						
4		Causes	Illustrate the causes of different cellular adaptation	C2						
5		Practical	Identify the defferent causes of cellular adaptation on chart and video demonstration		P4		Demo	2	OPSE	5
6			Adopt how to care and handle charts of causes cellular adoptation			A	Role Play		Formative Assess-ment	
7	Week-2	Pathophysiology	Discuss the pathophysiology of different cellular adapation	C2			Interactive Lecture/SGD	2	MCQ's	5
8		Physiological and Pathological example	Describe the cellular adaptaton with different ex-ample	C2						
9		Practical	Identify the defferent types of cellular adaptation on chart and video demonstration		P4		Demo	2	OPSE	5
10			Adopt how to care and handle charts of cellular adoptation			A	Role Play		Formative Assess-ment	
TOPIC: CELLULAR INJURY										
11	Week-3	Introduction	Define Cellular injury	C1			Interactive Lecture/SGD	2	MCQ's	5
12		Types	Discuss different types of cellular injury	C2						
13		Causes	Enlist the causes of cellular injury	C1						
14		Morphology	Describe the morphology of cellular injury	C2						
15		Pathophysiology	Discuss the pahtophysiology of cellular injury	C2						
16		Practical	Examination the cellular injury mechanism on charts and video demonstration identification of different mechanism of cellular injury		P4		Demo	2	OPSE	5
17			Comply to SOPs to identify and to show different process-es of cellular injury			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: NECROSIS										
18	Week-4	Introduction	Define necrosis	C1			Interactive Lecture/SGD	2	MCQ's	5
19		Causes	Enlist the causes of necrosis	C2						
20		Types	Describe the different types of necrosis	C2						
21		Morphology	Discuss the morphology of necrosis	C2						
22		Example	Describe the different types of necrosis with exam-ple	C2						
23		Clinical features	Describe clinical features of necrosis	C2						
24		Practical	Differentiate types of necrosis on charts and vedio demon-stration		P4		Demo	2	OPSE	5
25			Comply SOPs to observe pattern of necrosis and adopt how to care and handle charts of necrosis			A	Role Play		Formative Assess-ment	
TOPIC: APOPTOSIS										
26	Week-5	Introduction	Define Apoptosis	C1			Interactive Lecture/SGD	2	MCQ's	5
27		Example	Enlist different example of apoptosis	C1						
28		Morphology	Discuss the morphology of apoptosis	C2						
29		Pathophysiology	Describe the pathogenesis of apoptosis	C2						
30		Practical	Demonstrate the mechanism of apoptosis thourgh video demonstration and charts		P4		Demo	2	OPSE	5
31			Recognize the mechanism of apoptosis and adopt how to care and handle charts of apoptosis			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACUTE INFLAMMATION										
32	Week-6	Introduction	Define Acute inflammation	C1			Interactive Lecture/SGD	2	MCQ's	5
33		histroy back-ground and sign symptom	Discuss the histroy background of inflammation and cardinal sign of inflammation	C2						
34		Characteristics	Explain the characteristics of acute inflammation	C2						
35		Pathophysiology	illustrate vacsular and cellular changes in acute in-flammation.	C2						
36		Practical	Demonstrate the vascular and cellular changes on charts and video		P4		Demo	2	OPSE	5
37			Comply SOPs to examine the sign of inflammation in affective way			A	Role Play		Formative Assess-ment	
TOPIC: PHAGOCYTOSIS AND CHEMCIAL MEDIATORS										
38	Week-7	Introduction	Define Phagocytosis and chemical mediators	C1			Interactive Lecture/SGD	2	MCQ's	5
39		Types	Describe different types of chemical mediators	C2						
40		Function	Describe the function of different chemical mediators	C2						
41		Pathophysiology	Describe the pathogenesis of phagocytosis	C2						
42		Practical	Demonstrate the phagocytosis processes through video charts		P4		Demo	2	OPSE	5
43			Comply SOPs to draw a chart of different types of phagocytosis and chemical mediators independent-ly			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: CHRONIC INFLAMMATION										
44	Week-8	Introduction	Define Chronic inflammation and granulomatous inflammation	C1			Interactive Lecture/SGD	2	MCQ's	5
45		Cuases	Discuss the causes of chronic and granulomatous inflammation	C2						
46		Morphology	Discuss the morphology of chronic inflammation	C2						
47		Pathophysiology	Describe the pathogensis of chrnoic inflammation	C2						
48		Practical	Identify the difference between granulomatous inflammation and chronic throuhg charts		P4		Demo	2	OPSE	5
49			Comply SOPs to ensure the safe utilization of charts			A	Role Play		Formative Assessment	
TOPIC: REPAIR AND REGENERATION PROCESSES										
44	Week-9	Introduction	Define repair and regeneration processes	C1			Interactive Lecture/SGD	2	MCQ's	5
45		Steps of repair processes	Discuss the repair processes of wound healing	C2						
46		Complication	Enlist the different complication of wound healing	C1						
47		Risk factors	Describe the factors which effeccts wound healing	C2						
48		Practical	Identification of repair mechanism through video demonstration		P4		Demo	2	OPSE	5
49			Recognize how to take care of wound in affective way			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: EDEMA										
50	Week-10	Introduction	Define Edema	C1			Interactive Lecture/SGD	2	MCQ's	5
51		Types	Classify different types of edema	C2						
52		Pathophysiology	Discuss pathophysiolog of edema	C2						
53		Clinical features	Describe clinical features of edema	C2						
54		hyperemia and cogestion	Describe the hyperemia and congestion	C2						
55		Practical	Identification of edema mechanism through charts/video demonstration		P4		Demo	2	OPSE	5
56			Comply to SOPs to ensure the safe utilization of charts indepently			A	Role Play		Formative Assess-ment	
TOPIC: HEMORRAGE AND THROMBOSIS										
57	Week-11	Introduction	Define Hemorrahage and thrombosis	C1			Interactive Lecture/SGD	2	MCQ's	5
58		Etiology	Enlist the causes of hemorrage and thrombosis	C2						
59		Types	Discuss the types of thrombosis	C2						
60		Pathogenesis	Illustrate the pathogenesis of thrombosis	C2						
61		Practical	Estimation of Prothrombin Time		P4		Demo	2	OPSE	5
62			Estimation of Clotting Time		P4					
63			Estimation of Bleeding Time		P4					
64			Estimation of Activated Partial Thromboplastin Time		P4					
65			Adopt how to care and handle instruments and equipments used in the above tests			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: EMBOLISM AND INFARCTION										
66	Week-12	Introduction	Define embolism and infarction	C1			Interactive Lecture/SGD	2	MCQ's	5
67		clinical features	Enlist the clinical feature of embolism and infarc-tion	C1						
68		types	Discuss the types of infarction and embolism	C2						
69		Pathogenesis	Discuss the pathophysiology of embolism and in-farction	C2						
70		Practical	Identification of embolism and infarction mecha-nism thourgh video/charts		P4		Demo	2	OPSE	5
71			Comply to SOPs to ensure the safe utilization of chars independly			A	Role Play		Formative Assess-ment	
TOPIC: SHOCK										
72	Week-13	Introduction	Define shock	C1			Interactive Lecture/SGD	2	MCQ's	5
73		Causes	Enlist the causes of shock	C1						
74		Types	Explaine the types of shock	C2						
75		Clinical features	Enlist the clinical feature of shock	C1						
76		Pathogenesis	Disuss the pathogenesis of shock	C2						
77		Practical	Identification of different types of shock and mech-anism thrugh charts/video demonstration		P4		Demo	2	OPSE	5
78			Comply to SOPs to differentiate types of shock			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HYPEREMIA, CONGSTION AND NEOPLASIA										
79	Week-14	Definition	Define Neoplasia, hyperemia and congestion	C1			Interactive Lecture/SGD	2	MCQ's	5
80		Components	Explain the components of neoplasia	C2						
81		Etiology	Enlist the etiological factors of hyperemia and con-gestion	C1						
82		Types	Discuss the types of hyperemia and congestion	C2						
83		Practical	Identification of hypermia, congestion and neo-plasia through slides		P4		Demo	2	OPSE	5
84			Comply to SOPs the safe utilization of lab equip-ments			A	Role Play		Formative Assess-ment	
TOPIC: BENIGN TUMOR										
85	Week-15	introduction	Define Benign tumor	C1			Interactive Lecture/SGD	2	MCQ's	5
86		Nomenclature	Explain the nomenclature of benign tumor	C2						
87		Characteristics	Discuss the characteristics of benign tumor	C2						
88		Mechanism	illustrate the mechanism of benign tumor	C2						
89		Practical	Identification of benign tumor via slides		P4		Demo	2	OPSE	5
90			Comply to SOPs the safe utilization of lab equip-ments			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: MALIGNANT TUMOR AND METASTASIS										
91	Week-16	Definition	Define Malignant tumor and metastasis	C1			Interactive Lecture/SGD	2	MCQ's	5
92		Nomenclature	Explain the nomenclature of malignant tumor	C2						
93		Characteristics	Discuss the characteristics of malignant tumor	C2						
94		Pathway	Discuss the metastasis thourgh different pathways	C2						
95		Mechanism	Illustrate the mechanism of malignant tumor	C2						
96		Practical	Identification of malignant tumor mechanism thourgh chart and video demonstration		P4		Demo	2	OPSE	5
97			Comply to SOPs for recognizing pattern of malig-nant tumor and adopt how to care and handle charts of malignant tumor			A	Role Play		Formative Assess-ment	

PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)

Course Description

The purpose of this course is to equip the students by imparting knowledge and understanding of the bacteria and fungi, to foster the development of professional skills through this curriculum by understanding the transmission, pathogenesis and diagnosis of bacteria and fungi and see how this knowledge comes into play in real-world scenarios and in clinical settings. For this curriculum is designed in such a way to get insight of basics and explanations of different bacterial and fungal infection.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Discuss the history and scope of Medical Microbiology**
2. **Describe the structure and function of prokaryotic cell**
3. **Discuss the basic concepts in bacteriology and mycology**
4. **Identify different bacteria's with their importance in medical science**
5. **Discuss the nature of pathogenic bacteria and fungi**
6. **Describe the transmission, pathogenesis, clinical finding and laboratory diagnosis of bacteria and fungi.**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate ability to Identify and label different instruments in microbiology lab**
2. **Demonstrate the lab safety practices**
3. **Perform sterilization and different specimen culturing**
4. **Demonstrate gram staining and acid fast staining**
5. **Study of Microscope and use the microscope to look slides effectively.**
6. **Perform biochemical testing, MHA preparation and AST.**

Affective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION AND HISTORICAL REVIEW OF MICROBIOLOGY										
1	Week-1	History	Explain the history of microbiology	C2			Interactive Lecture/SGD	2	MCQ's	5
2		Scope	Discuss scope of medical microbiology	C2						
3		Definition	Define Prokaryotic Cell	C1						
4		Prokaryotic cell	Explain structure of Prokaryotic Cell	C2						
5		Practical	Explain laboratory safety practices and use of PPE		P2		Demo	2	OPSE	5
6			Comply SOPs of laboratory safety practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
7	Week-2	Gram positive and Gram negative	Discuss Gram positive and gram negative cell	C2			Interactive Lecture/SGD	2	MCQ's	5
8		Size, shape and types of bacteria	Describe size, shape and types of prokaryotic cell	C2						
9		Differentiation	Differentiate the difference prokaryotic and eukaryotic cell	C4						
10		Practical	Demonstrate microscopes; slides; test tubes; petri dishes; growth mediums, inoculation loops; pipettes and tips; incubators; autoclaves		P1		Demo	2	OPSE	5
11			Comply SOPs of laboratory safety practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: NORMAL FLORA AND MEDICAL IMPORTANT BACTERIA										
12	Week-3	Normal flora	Describe normal microbial flora of human flo-ra	C2			Interactive Lecture/SGD	2	MCQ's	5
13		Bacterial Classification	Classify medically Important Bacteria	C2						
14		Bacterial Diseases	Enlist the diseases caused by medically important bacteria's	C2						
15		Practical	Perform sterilization of different equipment's and culture media use in Microbiology lab		P4		Demo	2	OPSE	5
16			Adopt the care, use and SOPs of sterilization			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HOST DEFENCES AND BACTERIAL PATHOGENESIS										
17	Week-4	Definition	Define Pathogenesis	C1			Interactive Lecture/SGD	2	MCQ's	5
18		Pathogenesis	Explain the mechanism of bacterial pathogen-esis	C2						
19		Definition	Define Immunity	C1						
20		Immunity	Discuss Innate immunity and adaptive im-munity	C2						
21		Host defense failure	Illustrate host defense failure	C3						
22		Practical	Explain appropriate specimen for different bacterial infec-tion		P2		Demo	2	OPSE	5
23			select the specimen for bacterial infection			A	Role Play		Formative Assess-ment	
TOPIC:LABORATORY DIAGNOSIS										
24	Week-5	Bacteriologic approach for diagnosis	Explain the bacteriologic approach for bacterial diagnosis	C2			Interactive Lecture/SGD	2	MCQ's	5
25		Bacterial Specimen	Enlist the specimen for infection caused by different bacteria's	C1						
26		Immunologic approach for diagnosis	Explain the immunologic approach for bacterial diagnosis	C2						
27		Practical	Perform appropriate preservative for preservation and transportation		P2		Demo	2	OPSE	5
28			Adopt to preserve and transport the specimens			A	Role Play		Formative Assess-ment	
TOPIC: GRAM POSITIVE COCCI										
29	Week-6	Definition	Define Staphylococci and streptococci	C1			Interactive Lecture/SGD	2	MCQ's	5
30		Staphylococci and Streptococci	Explain medically important species of staphy-lococci and streptococci with important prop-erties	C2						
31		Practical	Perfrom culture media preparation		P1		Demo	2	OPSE	5
32			Adopt the how to prepare culture media and inoculate the specimeny			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
33	Week-7	Clinical Findings	Analyze the clinical findings of different spe-cies of staphylococci and streptococci	C4			Interactive Lecture/SGD	2	MCQ's	5
34		Laboratory tests and Medicines	Enlist the lab tests for staphylococci and strep-tococci	C1						
35		Practical	Perform inoculation and isolation of bacterial culture		P2		Demo	2	OPSE	5
36			Adopt the how to prepare culture media and inoculate the specimen			A	Role Play		Formative Assess-ment	
TOPIC: GRAM NEGATIVE COCCI										
37	Week-8	Gram Negative Cocci	Illustrate medically important species of Neis-seria with important properties	C2			Team Base Learning	2	MCQ's	5
38		Clinical Findings	Analyze the clinical findings N. meningitides and N. gonorrhea	C4						
39		Laboratory tests and Medicines	Enlist the lab tests for staphylococci	C1						
40		Practical	Show different bacterial morphologies on culture media		P2		Demo	2	OPSE	5
41			Comply to bacterial identification affectively			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: GRAM POSITIVE RODS										
42	Week-9	Classification	Classify medically important gram positive rods with the list of diseases caused by them	C3			Interactive Lecture/SGD	2	MCQ's	5
43		Bacillus and Clostridium	Illustrate medically important species of Bacil-lus, Clostridium and Corynebacterium with important properties	C3						
44		Clinical Findings	Analyze the clinical findings of Bacillus, Clos-tridium and Corynebacterium species	C4						
45		Laboratory tests and Medicines	Enlist the lab tests recommended for Gram positive rods	C1						
46		Practical	Perform Gram staining		P3		Demo	2	OPSE	5
47			Comply to SOPs of gram staining affectively			A	Role Play		Formative Assess-ment	
TOPIC: GRAM NEGATIVE RODS										
48	Week-10	Classification	Classify medically important gram negative rods with the list of diseases caused by them	C3			Interactive Lecture/SGD	2	MCQ's	5
49		Gram Negative bacterias	Illustrate medically important species of gram negative rods with important properties	C3						
50		Practical	Identify microscopy of gram stain smear		P2x		Demo	2	OPSE	5
51			Comply to SOPs of practical affectively.			A	Role Play		Formative Assess-ment	
52	Week-11	Clinical Findings	Analyze clinical findings of different gram negative rods	C4			Interactive Lecture/SGD	2	MCQ's	5
53		Laboratory tests and Medication	Enlist the lab tests for gram negative rods	C1						
54		Practical	Explain biochemical tests for different bacteria's cultured on culture media		P4		Demo	2	OPSE	5
55			Comply to SOPs of practical affectively			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACID FAST BACTERIA										
56	Week-12	Definition	Define acid fast bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
57		Classification	Classify acid fast bacteria with prominent diseases caused by them	C2						
58		Mycobacterium tuber-culosis	Explain important properties of Mycobacte-rium tuberculosis	C2						
59		Clinical Findings of M. tuberculosis	Analyze clinical findings of Mycobacterium tuberculosis	C4						
60		Lab tests and antibiot-ics	Enlist the lab tests for Mycobacterium tuber-culosis	C1						
61		Practical	State acid fast staining for Mycobacterium Tuberculosis		P2		Demo	2	OPSE	5
62			Comply to SOPs of practical affectively			A	Role Play		Formative Assess-ment	
TOPIC: SHOCK										

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
63	Week-13	Definition	Define obligate intracellular bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
64		Intracellular bacteria	Recognize obligate intracellular bacteria with their important properties	C1						
65		Chlamydia and Rickettsia	Analyze the clinical findings of Chlamydia and Rickettsia	C4						
66		Diagnosis and treatment	Enlist the diagnostic approaches for obligate intracellular bacteria	C1						
67		Definition	Define Spirochetes and wall less bacteria	C1						
68		Spirochetes	Enlist medically important spirochetes	C1						
69		Clinical findings of spi-rochetes	Analyze the clinical findings of Spirochetes	C4						
70		Mycoplasma	Explain the disease caused by mycoplasma	C2						
71		Diagnosis	Enlist the lab tests for spirochetes and Myco-plasma	C1						
72		Practical	Explain the preparation of Muller Hinton agar		P2		Demo	2	OPSE	5
73			Comply to MHA preparation affectively			A	Role Play		Formative Assess-ment	
TOPIC: INTRODUCTION TO MYCOLOGY										
74	Week-14	Definition	Define mycology	C1			Interactive Lecture/SGD	2	MCQ's	5
75		Classification	Classification of fungi	C3						
76		Fungal structure	Describe structure and growth of fungi	C2						
77		Pathogenesis	Discuss the pathogenesis of fungal infection	C2						
78		Diagnostic procedure	Explain different diagnostic procedure used for the diagnosis of fungal infection	C2						
79		Practical	Perform antibiotic susceptibility testing on MHA for bacterial isolates		P2		Demo	2	OPSE	5
80			Comply to AST affectively			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC:CUTANEOUS, SUBCUTANEOUS AND OPPORTUNISTIC MYCOSIS										
81	Week-15	Definition	Define Cutaneous and subcutaneous mycosis	C1			Interactive Lecture/SGD	2	MCQ's	5
82		Cutaneous and Subcu-taneous fungi	Enlist the fungi that cause Cutaneous and sub Cutaneous mycosis	C3						
83		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4						
84		Diagnostic tests and Treatment	Enlist the diagnostic tests for Cutaneous and subcutaneous mycosis	C3						
85		Definition	Define opportunistic mycosis	C1						
86		Opportunistic Mycosis	Enlist the fungi that causes opportunistic my-cosis	C3						
87		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4						
88		Diagnostic tests and Treatment	Enlist the diagnostic tests for opportunistic mycosis	C1						
89		Practical	Perform KOH preparation for fungal infection specimens		P2		Demo	2	OPSE	5
90			Comply to practical affectively			A	Role Play		Formative Assess-ment	
TOPIC: SYSTEMIC MYCOSIS										
91	Week-16	Definition	Define Systemic Mycosis	C1			Interactive Lecture/SGD	2	MCQ's	5
92		Systemic Mycosis	Enlist the fungi that causes systemic mycosis	C3						
93		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4						
94		Diagnostic tests and Treatment	Enlist the diagnostic tests systemic mycosis	C1						
95		Practical	Explain the interpretation of microbiological culture reports		P4		Demo	2	OPSE	5
96			Adopt how to interpret the microbiological reports			A	Role Play		Formative Assess-ment	

PMS-614 PHARMACOLOGY-I 3(2-1)

Course Description

Pharmacology module is designed to supplement the students with pharmacological knowledge. This flexible and self-paced course can benefit medical professionals who need to take an introductory pharmacology course for training or continuing education purposes.

This pharmacology course will introduce the principles of pharmacokinetic and pharmadynamics to explore the mechanism of action of pharmaceutical drugs on a molecular level.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe the fundamental principles of drug action, including: basic pharmacokinetics, basic pharmacodynamics and receptor binding.**
2. **Differentiate the common side effects associated with major therapeutic drug classes and how they may impact patient care.**
3. **Construct an evaluation of a recently approved FDA medication.**
4. **Differentiate the various responsibilities of healthcare providers in the prescribing and administration of medications.**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate knowledge of major drug classes, including therapeutic uses, mechanism of action and various routes of drug administration.**
2. **Compute basic and advanced dosage calculation.**
3. **Design a therapeutic treatment plan for a patient with a commonly treated disease state or disorder.**

Affective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -PMS-614 PHARMACOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO PHARMACOLOGY AND ITS BASIC PRINCIPLES										
1	Week-1	Definition and examples to explain Pharmacology	Define pharmacology	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Definition, Absorption, Dis-tribution, Metabolism and Elimination of drugs, Routes of drugs administration	Describe Pharmacokinetics and its principles	C2						
3		Practical	Perform routes of drugs administration		P4		Demo	2	OPSE	5
4			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
5	Week-2	Definition and overview of Pharmacodynamics, signal transduction, Dose response relationship, Intrinsic activity.	Explain Pharmacodynamics and its principles	C2			Interactive Lecture/SGD	2	MCQ's	5
6		Practical	Identification various types of drugs preparations		P4		Demo	2	OPSE	5
7			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: CHOLINERGIC AGONISTS AND ANTAGONISTS										
8	Week-3	Cholinergic and anti-cholinergic drugs	Define Cholinergic drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
9			Explain cholinergic ag-onists and antagonists	C2						
10		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5
11			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
12	Week-4	Introduction, Mechanism of action, adverse actions of: Ace-tylcholine, Pilocarpine, Edrophonium, Neostigmine, Echothiophate	Illustrate the properties of cholinergic agonists	C2			Interactive Lecture/SGD	2	MCQ's	5
13		Introduction, Mechanism of action, adverse actions of: At-ropine, Nicotine, Neuromuscu-lar-Blocking Agents	Describe the properties of cholinergic antagonists	C2						
14		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
15			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: ADRENERGIC AGONISTS AND ANTAGONISTS										
16	Week-5	Adrenergic Agonists and antagonists	Define Adrenergic drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
17			Explain adrenergic agonists and antagonists	C2						
18		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5
19			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
20	Week-6	Introduction, Mechanism of action, adverse actions of: Al-buterol, Dopamine, Epineph-rine, Isoproterenol, Ampheta-mine, Ephedrine	Illustrate the proper-ties of adrenergic agonists	C1			Interactive Lecture/SGD	2	MCQ's	5
21		Introduction, Mechanism of action, adverse actions of: Phenoxybenzamine, Prazosin, Atenolol, Carvedilol, Metopro-lol, Propranolol, Reserpine, Reserpine	Describe the properties of adrenergic antagonists	C2						
22		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
23			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: NSAIDS AND OPIOID ANALGESICS										
24	Week-7	Salicylates, p-Aminophenol Derivatives, Indoles (indomethacin) and Related Compounds, Fenamates, Arylpropionic Acid Derivatives, Acetic Acid Derivatives, COXT-Inhibitors	Define NSAIDS	C1			Interactive Lecture/SGD	2	MCQ's	5
25			Explain Pharmacokinetics and Pharmacodynamics of NSAIDS	C2						
26			Discuss adverse actions of NSAIDS	C2						
27		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5
28			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
29	Week-8	Morphine, Codeine and Other Phenanthrene Derivatives, Meperidine and Related Phenylpiperidine Derivatives	Explain pharmacokinetics and pharmacodynamics of opioid analgesics	C2			Team Base Learning	2	MCQ's	5
30		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
31			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: GASTROINTESTINAL DRUGS										
32	Week-9	Gastrointestinal	List gastrointestinal drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
33		Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of PPIs	C2						
34			Explain Pharmacokinetics and Pharmacodynamics H2 Blockers	C2						
35		Practical	Affects/Actions of drugs on the given systems/organs		P3		Demo	2	OPSE	5
36			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
37	Week-10	Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics Antacids	C3			Interactive Lecture/SGD	2	MCQ's	5
38		Adverse actions	Describe Adverse actions of Antacids	C3						
39		Practical	Adverse effects of this group of drugs on given body organs/ systems		P2x		Demo	2	OPSE	5
40			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: ANTI-HISTAMINE										
41	Week-11	Classification	Classify Anti-Histamine drugs	C2			Interactive Lecture/SGD	2	MCQ's	5
42		Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of Anti-Histamine drugs	C2						
43		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5
44			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
45	Week-12	Adverse actions	Describe Adverse actions of Anti-Histamine drugss	C1			Interactive Lecture/SGD	2	MCQ's	5
46		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
47			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: ANESTHETICS										
48	Week-13	Classification	Classify general anesthetics	C1			Interactive Lecture/SGD	2	MCQ's	5
49			Classify local anesthetics	C1						
50		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5
51			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
52	Week-14	Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of general anesthetics	C2			Interactive Lecture/SGD	2	MCQ's	5
53			Explain Pharmacokinetics and Pharmacodynamics of local anesthetics	C2						
54		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
55			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
TOPIC: THYROID AND ANTITHYROID DRUGS										
56	Week-15	Drugs used in the treatment of hypothyroidism, adverse effects of treatment with thyroid hormone, drugs used in the treatment of hyperthyroidism	List the Anti-Thyroid drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
57			Explain Pharmacokinetics and Pharmacodynamics of Thyroid and Antithy-roid Drugs	C2						
58		Practical	Affects/Actions of drugs on the given systems/organs		P2		Demo	2	OPSE	5
59			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	
60	Week-16	Adverse actions	Describe Adverse actions of Thyroid and Antithyroid Drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
61		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
62			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assess-ment	

PMS-615 COMMUNICATION SKILLS 2(2-0)

Course Description

In this course, we delve into the multifaceted world of communication, equipping you with essential skills to excel in both academic and professional spheres. This course will explore the diverse landscape of communication, covering topics such as academic writing, various communication types, the nuances of effective communication, formal communication protocols, and mastering the art of interviews. This course will enhance the academic writing or an aspiring professional seeking to enhance student's interview. Through practical exercises, real-world examples, and interactive discussions, ensuring students gain a well-rounded understanding of communication strategies.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe the components and processes involved in various communication models.**
2. **Explain the advantages and challenges associated with different types of communication.**
3. **Apply principles of academic writing, including proper referencing, structure, and citation.**
4. **Demonstrate an understanding of formal communication protocols in professional settings**
5. **Formulate action plans to continually enhance communication skills beyond the course.**

Afective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -PMS-615 COMMUNICATION SKILLS 2(2-0)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO COMMUNICATION										
1	Week-1	Introduction to Communication	Define Communication	C1			Interactive Lecture/SGD	2	MCQ's	5
2		The process of communication	Explain with Examples of good, Effective communication in business	C2						
3	Week-2	Effective communication	Discuss the processs of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
4		Models of communication	Discuss the Linear models of communication	C2						
5	Week-3	Models of communication	Decsribe the Transactional model of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
6			Explain the Interactive models of communication	C2						
7		Communication in business	Discuss the Importance and benfits of effective communication in business	C2						
TOPIC: COMPONENTS OF COMMUNICATION										
8	Week-4	Discuss Sender, reciever, message, channel, Nonverbal, Visual Communication, Feedback, Noise, Decoding, Encoding	Explain components of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
9		Physiological Barriers, language barriers, cultural, physical barriers	Describe communication barriers.	C2						
10	Week-5	Facial expressions, eye contact, posture, hand movements, and touch.	Explain Non-verbal communication	C2			Interactive Lecture/SGD	2	MCQ's	5
11		Active listening, Consistency, clarity, simmplicity, feedback, authenticity, coherency, empathy in communication	Discuss the principles of communication	C2						
12		Clarity, coherency, completeness, Conciseness, concretness, courtesy, correctness	Diss the Seven C in communication.	C2						

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACADEMIC WRITING										
13	Week-6	Communication for academic purpose	Explain the Key aspects of communicating for academic purpose	C1			Interactive Lecture/SGD	2	MCQ's	5
14		Introduction to academic writing	Discuss the Key elements in academic writing	C2						
15	Week-7	Introduction to academic writing	Discuss the principles in academic writing	C2			Interactive Lecture/SGD	2	MCQ's	5
16		Summarizing	Explain the Introduction to summary.	C2						
17			Explain the steps of writing summary.	C2						
18	Week-8	Paraphrasing and argumentation skills	Discuss the steps of doing paraphrasing	C2			Interactive Lecture/SGD	2	MCQ's	5
19		Textual cohesion	Explain of textual cohesion	C2						
TOPIC: FORMAL COMMUNICATION										
20	Week-9	Formal communication	Discuss The characteristics of formal communication	C1			Interactive Lecture/SGD	2	MCQ's	5
21		Informal communication networks	Differentiate the Formal vs Informal communication	C2						
22	Week-10	Computer madiated communication	Discuss the Benefits Computer-mediated communication	C3			Interactive Lecture/SGD	2	MCQ's	5

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: FORMAL WRITING										
23	Week-11	Business writing	Discuss the Types of business writing	C2			Interactive Lecture/SGD	2	MCQ's	5
24			Discuss the principles of business writing	C2						
25		Memos	Discuss the memos.	C2						
26			Discuss the steps of writing memos.	C2						
27			Discuss the structure and sample of memo.	C2						
28	Week-12	Letters	Explain the letter.	C2			Interactive Lecture/SGD	2	MCQ's	5
29			Explain the types of letters.	C2						
30			Explain the sample and informal letters.	C2						
31			Explain letter, types of letters, sample, informal letters	C2						
32		Reports	Discuss how to write report.	C2						
33			Explain the steps and structure of report	C2						
TOPIC: PRESENTATION SKILLS										
34	Week-13	Proposals	Explain types and examples of proposal	C2			Interactive Lecture/SGD	2	MCQ's	5
35		Circulars	Discuss the Key features and purposes of circulars	C2						

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
36	Week-14	Public speaking and presentation skills	Explain the similarities between public speaking and presentations.	C2			Interactive Lecture/SGD	2	MCQ's	5
37			Explain the differences between public speaking and presentations.	C2						
38		Effective public presentation skills	Discuss the Important tips for public presentation	C2						
TOPIC: AUDIENCE ANALYSIS										
39	Week-15	Audience analysis	Discuss How to analyze audience	C2			Interactive Lecture/SGD	2	MCQ's	5
40		Effective argumentation skills	Ilustrate the Techniques to enhance argumentation skills.	C2						
41	Week-16	Interview skills	Explain the tips for a good interview.	C2			Interactive Lecture/SGD	2	MCQ's	5

MLT-601 HAEMATOLOGY-I 3(2-1)

This course will introduce the students to basic concepts in hematology, structures, and functions of bone marrow, blood cells, and hemoglobin. Students will be able to understand how erythropoiesis, granulopoiesis, and megakaryopoiesis take place and how it is regulated. This course will cover quantitative disorders of neutrophils, lymphocytes, eosinophils, basophils, and monocytes. It also covers hemostasis and qualitative and quantitative disorders of platelets. It will help in developing the practical skill of students by determining hemoglobin level, clotting time, bleeding time, and complete blood count with peripheral blood smear examination.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe hematology, blood composition, bone marrow, and hematopoiesis**
2. **Discuss hemoglobin, anemia, physiological and pathological red blood cell hemolysis**
3. **Explain quantitative disorders of leukocytes and hematological neoplasms etiology and diagnosis**
4. **Describe hemostasis, coagulation pathways, quantitative and qualitative disorders of platelets**
5. **Demonstrate complete blood count and how peripheral blood smear is prepared and examined.**

Skills Domain

By the end of this subject, students should be able to:

1. **Perform the procedure of venous blood sample collection.**
2. **Demonstrate hemoglobin level in a venous blood sample**
3. **Perform qualitative carbohydrate detection in an unknown sample independently**
4. **Perform qualitative Protein/Amino Acid detection in an unknown sample independently**
5. **Perform qualitative Lipids/Cholesterol Detection in an unknown sample independently**
6. **Perform donning & doffing technique of gloves independently**

Affective Domain

By the end of this subject, students should be able to:

1. **Demonstrate Punctuality.**
2. **Follow the specified norms of the IL, SGD teaching & learning effectively,**
3. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
4. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**
5. **Comply with SOPs of practical & procedure effectively.**

TOS -MLT-601 HAEMATOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO HEMATOLOGY										
1	Week-1	Definition	Define blood	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Blood composition	Describe the cellular and plasma compartments of blood	C2						
3		Blood functions	Discuss blood functions	C2						
4		Practical	Perform the procedure of venouse blood sample collection independently		P4		Demo	2	OPSE	5
5			Comply to SOPs of venouse blood sampling collection			A	Role Play		Formative Assess-ment	
TOPIC: BONE MARROW										
6	Week-2	Introduction	Define Bone marrow	C2			Interactive Lecture/SGD	2	MCQ's	5
7		Structure	Describe bone marrow structure	C2						
8		Function	Explain bone marrow fuctions	C2						
9		Practical	Observe a bone marrow trephine biopsy slide under microscope independently		P4		Demo	2	OPSE	5
10			Comply to SOPs of bone marrow trephine biopsy slide examination			A	Role Play		Formative Assess-ment	
TOPIC: HEMATOPOIESIS										
11	Week-3	Introduction	Describe hematopoiesis	C2			Interactive Lecture/SGD	2	MCQ's	5
12		Prenatal & postnatal Hematopoiesis	Discuss blood formation intrauterine & extrauterine life	C2						
13		Sites of Hematopoiesis	Explain sites of hematopoiesis	C2						
14		Regulation of Hematopoiesis	Discuss growth factors that regulate hematopoiesis	C2						
15		Practical	Observe erythropoieis developmental stages under microscope independently		P4		Demo	2	OPSE	5
16			Comply to SOPs of bone marrow aspirate smear examination			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ERYTHROPOIESIS										
17	Week-4	Definition	Define erythropoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
18		Developmental stages	Explain developmental stages of erythropoiesis	C2						
19		Regulation of erythropoiesis	Discuss the growth factors that regulate rate of hematopoiesis	C2						
20		Practical	Pefrom the procedure of total red blood cell count by neubar chamber independently		P4		Demo	2	OPSE	5
21			Comply to SOPs red blood cell count by manual method			A	Role Play		Formative Assess-ment	
TOPIC: HEMOGLOBIN										
22	Week-5	Introduction	Define Hemoglobin	C1			Interactive Lecture/SGD	2	MCQ's	5
23		Structure	Describe hemoglobin structure	C2						
24		Hemoglobin synthesis	Discuss hemoglobin synthasis	C2						
25		Hemoglobin functions	Explain hemoglobin function	C2						
26		Practical	Peform the procedure of hemoglobin estimation by Sahlies method independently		P4		Demo	2	OPSE	5
27			Comply to SOPs hemoglobin estimation by Sahlies method			A	Role Play		Formative Assess-ment	
TOPIC: ANEMIA										
28	Week-6	Definition	Define anemia	C1			Interactive Lecture/SGD	2	MCQ's	5
29		Classification	Classify anemia on the basis of etiology and red blood cell morphlogy	C2						
30		Clinical symptoms	Describe clinical presention of different types of anemia	C2						
31		Lab diagnosis	Discuss baseline laboratory diagnosis for anemia	C2						
32		Practical	Examine peripheral blood film under microscope of anemia patient independently		P4		Demo	2	OPSE	5
33			Comply to SOPs for observation of peripheral blood smear of a patient having anemia			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: RED BLOOD CELLS HEMOLYSIS										
34	Week-7	Introduction	Define Hemolysis	C1			Interactive Lecture/SGD	2	MCQ's	5
35		Physiological & pathological Hemolysis	Describe physiological and pathological hemolysis	C2						
36		Hemolytic anemia classification	Classify hemolytic anemia	C2						
37		Clinical symptoms	Describe clinical presention of different types of hemolytic anemia	C2						
38		Lab diagnosis	Discuss laboratory diagnosis of hemolytic anemia	C2						
39		Practical	Examine peripheral blood film under microscope of hemolytic anemia patient independently		P4		Demo	2	OPSE	5
40			Comply to SOPs for observation of peripheral blood smear of a patient having hemolytic anemia			A	Role Play		Formative Assess-ment	
TOPIC: GRANULOPOIESIS / MYELOPOIESIS										
41	Week-8	Definition	Define granulopoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
42		Developmental stages	Describe developmental stages of granulopoiesis	C2						
43		Regulation of granulopoiesis	Discuss regulation of granulopoiesis	C2						
44		Practical	Perform the procedure of differential leukocytes count independently		P4		Demo	2	OPSE	5
45			Comply to SOPs for differential leukoctyte count of normal healthy individuel			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: WBC DISORDERS										
46	Week-9	Introduction	Define disorders of leukocytes	C1			Interactive Lecture/SGD	2	MCQ's	5
47		WBCs disorder types	Classify leukocytes disorders	C2						
48		Leukocytosis	Describe leukocytosis	C2						
49		Leukopenia	Describe leukopenia	C2						
50		Practical	Perform the procedure of total leukocytes count independently		P4		Demo	2	OPSE	5
51			Comply to SOPs for procedure of total leukocyte count			A	Role Play		Formative Assess-ment	
TOPIC: NEUTROPHILIA, NEUTROPENIA, MONOCYTOSIS AND MONOCYTOPENIA										
52	Week-10	Introduction to neutrophilia and neutrophenia	Define neutrophilia and neutropenia	C1			Interactive Lecture/SGD	2	MCQ's	5
53		Causes of neutrophilia and neutrophenia	Discuss cuases of neutrophilia and neutropenia	C2						
54		Indroduction to monocytosis and monocytopenia	Define monocytosis and monocytopenia	C1						
55		Causes monocytosis and monocytopenia	Discuss causes of monocytosis and monocytopenia	C2						
56		Practical	Perform the procedure of absolute neutrophil and monocyte count independently		P4		Demo	2	OPSE	5
57			Comply to SOPs for the procedure of absolute neutrophil and monocyte count			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: LYMPHOCYTOSIS AND LYMPHOPENIA										
58	Week-11	Introduction of lymphocytosis	Define lymphocytosis	C1			Interactive Lecture/SGD	2	MCQ's	5
59		Causes of Lymphocytosis	Discuss causes of lymphocytosis	C2						
60		Introduction of Lymphopenia	Define lymphopenia	C1						
61		Causes of Lymphopenia	Discuss causes of lymphocytosis	C2						
62		Practical	Perform the procedure of absolute lymphocytes count independently		P4		Demo	2	OPSE	5
63			Comply to SOPs for the procedure of absolute lymphocyte count			A	Role Play		Formative Assess-ment	
TOPIC: BASOPHILA, BASOPENIA, EOSINOPHILIA AND EOSINOPENIA										
64	Week-12	Introduction to basophilia and eosinophilia	Define basophilia and eosinophilia	C1			Interactive Lecture/SGD	2	MCQ's	5
65		Causes of Basophilia and eosiniphilia	Discuss basophilia and eosinophilia	C2						
66		Introduction of basopenia and eosinopenia	Define basopenia and eosinopenia	C1						
67		Causes of basopenia and eosinopenia	Discuss causes of basopenia eosinopenia	C2						
68		Practical	Perform the procedure of absolute basophil and eosinophil counts independently		P4		Demo	2	OPSE	5
69			Comply to SOPs for the procedure of absolute basophil and eosinophil counts			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HEMATOLOGICAL NEOPLASM										
70	Week-13	Introduction	Define hematological neoplasm	C1			Interactive Lecture/SGD	2	MCQ's	5
71		Classification	Classify hemtological neoplasm	C2						
72		Etiology of Leukemia	Discuss cuases of hematological neoplasm	C2						
73		Clinical Features	Describe clinical features of different hematological neoplasm	C2						
74		Laboratory diagnosis	Discuss laboratory diagnosis of different types hematological neoplasms	C2						
75		Practical	Examine few common leukemia slides under microscope independently		P4		Demo	2	OPSE	5
76			Comply to SOPs for the procedure of smear examination under microscope			A	Role Play		Formative Assess-ment	
TOPIC: MEGAKARYOPOIESIS										
77	Week-14	Introduction	Define megakaryopoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
78		Developmental stages	Describe deveopmental stages of megakaryopoiesis	C2						
79		Regulation of Megakaropoiesis	Discuss regulation of megkaryopoiesis	C2						
80		Thrombocytosis	Explain thrombocytosis and its causes	C2						
81		Thrombocytopenia	Explain thrombocytopenia and its causes	C2						
82		Practical	Perform the procedure of platelets count by maneul mathod independently		P4		Demo	2	OPSE	5
83			Comply to SOPs for the procedure of platlelts count			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HEMOSTASIS										
84	Week-15	Introduction	Define hemostasis	C1			Interactive Lecture/SGD	2	MCQ's	5
85		Types of Hemostasis	Classify hemostasis	C2						
86		Platelets structure and functions	Describe structure and functions of platelets	C2						
87		Coagulation factors	Discuss coagulation factors	C2						
88		Coagulation Cascade (Pathways)	Illustrate coagulation pathways	C2						
89		Practical	Perform the procedure of bleeding time and clotting time independently		P4		Demo	2	OPSE	5
90			Comply to SOPs for the procedure of bleeding time and clotting time			A	Role Play		Formative Assess-ment	
TOPIC: COMPLETE BLOOD COUNT AND PERIPHERAL BLOOD FILM EXAMINATION										
91	Week-16	Introduction	Define complete blood count and blood cell morphology	C1			Interactive Lecture/SGD	2	MCQ's	5
92		Componants of complete blood count	Describe componants of complete blood count	C2						
93		Blood cells morphology	Discuss erythrocyte, leukocyte and platelet morphology	C2						
94		Interpretation of complete blood count	Describe interpretation of each componant of complete blood count	C2						
95		Practical	Perform the procedure of peripheral blood film preperation and microscopic examination independently		P4		Demo	2	OPSE	5
96			Comply to SOPs for the procedure of peripheral blood smear preperation and examination			A	Role Play		Formative Assess-ment	

MLT-602 CLINICAL BACTERIOLOGY 3(2-1)

The course of "Clinical Bacteriology" provides a basic concept of clinical bacteriology including epidemiology, pathology, identification and differential diagnosis of different bacterial infection. It will also cover the technical skills used in clinical bacteriology.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe prokaryotic cell, size, shape and types of prokaryotic cell**
2. **Describe structure and functions of prokaryotic cell.**
3. **Explain the physical and chemical methods of sterilization and disinfections.**
4. **Discuss the diseases caused by medical important bacteria**
5. **Explain mechanism of bacterial pathogenesis.**

Skills Domain

By the end of this subject, students should be able to:

1. **Perform collection of different clinical specimen for microbiological analysis**
2. **Demonstrate operation of laboratory equipment's used in Microbiology**
3. **Perform sterilization of different equipment's and culture media used in Microbiology lab**
4. **Perform inoculation and isolation of bacterial culture**
5. **Explain the interpretation of microbiology lab reports**

Affective Domain

By the end of this subject, students should be able to:

1. **Demonstrate Punctuality.**
2. **Follow the specified norms of the IL, SGD teaching & learning effectively,**
3. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
4. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**
5. **Comply with SOPs of practical & procedure effectively.**

TOS -MLT-602 CLINICAL BACTERIOLOGY 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO BACTERIOLOGY & PROKARYOTIC AND EUKARYOTIC CELL										
1	Week-1	Bacteriology	Define bacteriology	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Scope	Explain scope and importance of bacteriology	C2						
3		Blood functions	Discuss blood functions	C2						
4		bacterial Cell	Define bacterial Cell	C1						
5		structure of Prokaryotic Cell	Explain structure of Prokaryotic Cell	C2						
6		Gram positive and gram negative bacteria	Describe Gram positive and gram negative cell	C2						
7		Morphology of prokaryotic cell	Describe size, shape and types of prokaryotic cell	C2						
8		Prokaryotic vs eukaryotic cell	Compare the difference between prokaryotic and eukaryotic cell	C4						
9		Practical	Demonstrate introduction to laboratory equipments used in Microbiology		P4		Demo	2	OPSE	5
10			Comply to sops for observation of laboratory equipments			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
11	Week-2	Classification	Explain five kingdom classifications with examples.	C1			Interactive Lecture/SGD	2	MCQ's	5
12		Diagram	Illustrate bacterial structure with the help of label diagram.	C2						
13		Classification	Classify different bacteria based on their morphology with diagram	C3						
14		Chemical composition	List the overall chemical composition of bacteria.	C1						
15		Vrious structures	Enlist different prokaryotic structures.	C1						
16		Appendages	Define bacterial appendages.	C1						
17		Flagella	Describe structure of flagella.	C2						
18		Falgellar arrangements	Enlist different arrangement of bacterial flagella .	C1						
19		Capsule	List the function and medical importance of the bacterial capsule .	C1						
20		Practical	Demonstration physical methods of sterilization and disinfection.		P4		Demo	2	OPSE	5
21			Comply to sops of different types of physical methods of sterilization and disinfection.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: STRUCTURE AND FUNCTION OF PROKARYOTIC CELLS & STERILIZATION, DISINFECTION, AND ANTISEPSIS										
22	Week-3	Structural differences	Explain the structural difference of Gram positive and Gram negative cell wall.	C2			Interactive Lecture/SGD	2	MCQ's	5
23		Gram variability	Enlist reasons for Gram staining variability.	C1						
24		Cell wall deficient bacteria	Describe cell wall deficient form of bacteria.	C2						
25		Cytoplasm	List the function and characteristics of cytoplasm.	C1						
26		Plasmid	Define plasmid	C1						
27		Pathophysiology	Enlist different types of plasmids.	C1						
28		Clinical features	Define ribosomes and its various types .	C1						
29		Sterlization & disinfections	Define Sterilization, disinfection, and antisepsis	C1						
30		Physical methods	Describe physical methods of sterilization and disinfections.	C2						
31		Chemical methods	Describe chemical methods of sterilization and disinfection.	C2						
32		Radiations	Describe radiation techniques used for sterilization and disinfection	C2						
33		Characteristics	Discuss different characteristics of disinfectants and antispetics .	C2						
34		Activities based classification	Classify disinfection based on their activities	C2						
35		Practical	Demonstration of different types of chemical methods of sterilization, and disinfection.		P4		Demo	2	OPSE	5
36			Comply to sops of different types of physical and chemical methods of sterilization, and disinfection.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: MEDICALLY IMPORTANT BACTERIA AND NORMAL FLORA & BACTERIAL GROWTH AND METABOLISM										
37	Week-4	Classification	Classify medical important bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
38		Diseases	Enlist the diseases caused by medically important bacterias	C1						
39		Normal flora	Describe normal microbial flora of human flora	C2						
40		Bacterial growth	Explain various growth conditions and requirements	C2						
41		Practical	Demonstarte operation and functions of different parts of Microscope		P4		Demo	2	OPSE	5
42			Comply to sops for the operation and maintaninece Microscope			A	Role Play		Formative Assess-ment	
TOPIC: BACTERIAL PATHOGENESIS & HOST PARASITES INTERACTION										
43	Week-5	Pathogensis	Define Pathogenesis	C1			Interactive Lecture/SGD	2	MCQ's	5
44		Mechanism	Explain the mechanism of bacterial pathogenesis	C2						
45		Host parasite interaction	Define Host parasites interaction	C1						
46		Factor involved	Explain factors invooved in host parasits interaction	C2						
47		Practical	Demonstrate steps involved in focusing a slid on a microscope		P4		Demo	2	OPSE	5
48			Comply to sops for use of Microscope			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: IMMUNE RESPONSE TO INFECTION & LABORATORY DIAGNOSIS										
49	Week-6	immunity	Define Immunity	C1			Interactive Lecture/SGD	2	MCQ's	5
50		innate &b adaptive	Discuss Innate immunity and adaptive immunity	C2						
51		host defense	Illustrate host defense failure	C2						
52		Bacterial diagnosis	Explain the laboratory approach for bacterial diagnosis	C2						
53		Approprate specimen	Select appropriate specimen for different bacterial infection	C2						
54		immunological approch	Explain the immunologic approach for bacterial diagnosis	C2						
55		Practical	Perform the procedure of Gram staining in laboratory independently		P4		Demo	2	OPSE	5
56			Comply to sops for performing Gram staining			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: GRAM POSITIVE COCCI										
57	Week-7	Staphylococcus and streptococcus	Define Staphylococci and streptococci	C1			Interactive Lecture/SGD	2	MCQ's	5
58		Medically important species	Explain medically important species of stapylococci and streptococci with important properties	C2						
59		clinical findings	Analyze the clinical findings of different species of stapylococci and streptococci	C3						
60		Lab diagnosis	Enlist the lab tests and medicine recommended for stapylococci and streptococci	C1						
61		Practical	Perform a simple staining procedure for pure culture.		P4		Demo	2	OPSE	5
62			Comply to sops for the simple staining methods of pure culture.			A	Role Play		Formative Assess-ment	
TOPIC: GRAM NEGATIVE COCCI										
63	Week-8	Nisseria	Illustrate medically important species of Neisseria with important properties	C1			Interactive Lecture/SGD	2	MCQ's	5
64		clinical findings	Analyze the clinical findings N. meningitidis and N. gonorrhoeae	C3						
65		Lab diagnosis	Enlist the lab tests and medicine recommended for stapylococci	C1						
66		Practical	Perform simple staining for mixed culture.		P4		Demo	2	OPSE	5
67			Comply to sops for the simple staining methods of mixed culture.			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: GRAM POSITIVE RODS										
68	Week-9	Gram Positive bacteria	Classify medically important gram positive rods with the list of diseases caused by them	C2			Interactive Lecture/SGD	2	MCQ's	5
69		Medically important species	Illustrate medically important species of Bacillus, Clostridium and Corynebacterium with important properties	C2						
70		clinical findings	Analyze the clinical findings of Bacillus, Clostridium and Corynebacterium species	C3						
71		Lab diagnosis	Enlist the lab tests and medicine recommended for Gram positive rods	C1						
72		Practical	Demonstare basic culture media preparation		P4		Demo	2	OPSE	5
73			Comply SOPs for basic culture media preperation			A	Role Play		Formative Assess-ment	
TOPIC: GRAM NEGATIVE RODS										
74	Week-10	Gram negative rods	Classify medically important gram negative rods with the list of diseases caused by them	C2			Interactive Lecture/SGD	2	MCQ's	5
75		clinical findings	Analyze clinical findings of different gram negative rods	C3						
76		Laboratory Diagnosis	Enlist the lab tests and medication for gram negative rods	C1						
77		Practical	Demonstarte different methods of streaking on agar plate		P4		Demo	2	OPSE	5
78			Comply SOPs for different methods of streaking on agar plate			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACID FAST BACTERIA										
79	Week-11	Acid fast bacteria	Define acid fast bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
80		Classification	Classify acid fast bacteria with prominent diseases caused by them	C2						
81		properties	Explain important properties of Mycobacterium tuberculosis	C2						
82		Clinical findings	Analyze clinical findings of Mycobacterium tuberculosis	C3						
83		Lab diagnosis	Enlist the lab tests and medication for Mycobacterium tuberculosis	C1						
84		Practical	Demonstarte morphological identification of clinical important bacterial strains		P4		Demo	2	OPSE	5
85			Comply SOPs for morphological identification of clinical important bacteria			A	Role Play		Formative Assess-ment	
TOPIC: OBLIGATE INTRACELLULAR BACTERIA										
86	Week-12	Obligate intracellular bacteria	Define obligate intracelluar bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
87		important properties	Describe obligate intracellular bacteria with their important properties	C2						
88		clinical findings	Analyze the clinical findings of Chlamydia and Rickettsia	C1						
89		Practical	Demonstarte biochemical identification of clinical importnat Gram negative bacteria on agar plates		P4		Demo	2	OPSE	5
90			Comply SOPs for biochemical identification of clinical important Gram positive bacteria			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: SPIROCHETES AND MYCOPLASMA										
91	Week-13	Spirochetes	Define Spirochetes and wall less bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
92		Medically important	Enlist medically important spirochetes	C1						
93		clinical findings	Analyze the clinical findings of Spirochetes	C3						
94		Diseases	Explain the disease caused by mycoplasma	C2						
95		Diagnosis	Enlist the diagnosis and medication recommended for spirochetes and Mycoplasma	C1						
96		Practical	Demonstarte biochemical identification of clinical importnat Gram positive bacteria		P4		Demo	2	OPSE	5
97			Comply SOPs for biochemical identification of clinical important Gram negative bacteria			A	Role Play		Formative Assess-ment	
TOPIC: NOCARDIA AND ACTINOMYCETES										
98	Week-14	Nocardia & actinomycetes	Define Nocardia and Actinomycetes	C1			Interactive Lecture/SGD	2	MCQ's	5
99		Medically important species	Enlist medically importance of Nocardia and Actinomycetes	C1						
100		diseases	Enlist the diseaese caused by Nocardia and Actinomycetes	C1						
101		clinical findings	Enlist clinical diagnosis of Nocardia and Actinomycetes	C1						
102		Practical	Perform collection of nasal and throat swab for bacteriological analysis		P4		Demo	2	OPSE	5
103			Comply SOPs for collection of nasal and throat swab			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: RICKETTSIA AND CHLAMYDIA										
104	Week-15	Rickettsia & Chlamydia	Define Rickettsia and Chlamydia	C1			Interactive Lecture/SGD	2	MCQ's	5
105		medical importance	Enlist medically importance of Rickettsia and Chlamydia	C1						
106		Diseases	Enlist the diseaese caused by Rickettsia and Chlamydia	C1						
107		clinical diagnosis	Enlist clinical diagnosis of Rickettsia and Chlamydia	C1						
108		Practical	Perform innoculation and isolation of bacterial culture		P4		Demo	2	OPSE	5
109			Comply to SOPs to perform innoculation and isolation of bacterial culture			A	Role Play		Formative Assess-ment	
TOPIC: MINOR BACTERIAL INFECTIONS										
110	Week-16	Minor bacterial pathogens	Enlist different pathogens involved in minor bacterial pathogens	C1			Interactive Lecture/SGD	2	MCQ's	5
111		Pathogensis	Describe pathogensis of minor bacterial pathoges	C2						
112		Lab diagnosis	Enlist various methods of diagnosis of minor bacterial pathohens.	C1						
113		Practical	Perform the procedure of ZN stain for the detection of Acid fast baccili		P4		Demo	2	OPSE	5
114			Comply to SOPs for performing ZN staining			A	Role Play		Formative Assess-ment	

MLT-603 MOLECULAR BIOLOGY-I 3(2-1)

This course has been designed to equip the students with professional knowledge, skill, techniques & ethical values to enable them to apply their acquired expertise in field of Molecular Biology and gives in-depth knowledge of biological and/or medicinal processes through the investigation of the underlying molecular mechanisms.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe chemical and molecular processes that occur in and between cells.**
2. **Describe and explain processes and their meaning for the characteristics of living organisms.**
3. **Explain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate ability to Identify and label different instruments in Molecular lab.**
2. **Demonstrate the lab safety practices.**
3. **Demonstrate the extraction of DNA from the biological samples.**
4. **Perform various procedures used in molecular biology.**

Affective Domain

By the end of this subject, students should be able to:

1. **Demonstrate Punctuality.**
2. **Follow the specified norms of the IL, SGD teaching & learning effectively,**
3. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
4. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**
5. **Comply with SOPs of practical & procedure effectively.**

TOS -MLT-603 MOLECULAR BIOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: CENTRAL DOGMA OF MOLECULAR BIOLOGY										
1	Week-1	Definition	Define Molecular Biology and its importance	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Flow information	Discuss flow information from DNA to Protein	C2						
3		Steps	Outline various steps of protein synthesis from DNA	C1						
4		Importance	Explain the importance of central dogma of molecular biology	C2						
5		Practical	Perfrom the procedure of preparing solution and concentration independently		P4		Demo	2	OPSE	5
6			comply to SOPs for performing the procedure of preparing solution and concentration			A	Role Play		Formative Assess-ment	
TOPIC:ONE GENE ONE ENZYME THEORY										
7	Week-2	Introduction	Define one gene one enzyme theory	C1			Interactive Lecture/SGD	2	MCQ's	5
8		History	Explain the historical steps involve in one gene one enzyme theory	C2						
9		Modification	Discuss modification of one gene-one enzyme hypothesis	C2						
10		Diagram	illutrate diagramatic presentation of one gene one enzyme theory	C2						
11		Practical	Perfom biosafety practices and procedures in laboratory		P4		Demo	2	OPSE	5
12			Comply to SOPs for the biosafety practices and procedures in laboratory			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO NUCLEOTIDE & DNA										
13	Week-3	Introduction	Define DNA and Nucleotide	C1			Interactive Lecture/SGD	2	MCQ's	5
14		composition	Discuss composition of DNA and RNA	C2						
15		Nomenclature	Discuss nomenclature used for Nucleotide and DNA	C2						
16		Synthesis	Describe pathway of DNA and nucleotide synthesis	C2						
17		Difference	Illustrate difference between purine and pyrimidine	C2						
18		Practical	Perfom practical of Extraction of Genomic DNA by enzymatic method		P4		Demo	2	OPSE	5
19			comply to SOPs for the Extraction of Genomic DNA by enzymatic method			A	Role Play		Formative Assess-ment	
TOPIC: STRUCTURE OF DNA AND DNA REPLICATION IN PROKARYOTES										
20	Week-4	Structure	Describe structural composition of Nucleotide base pairs	C2			Interactive Lecture/SGD	2	MCQ's	5
21		Types	Discuss bond interaction within and between DNA base pairs	C2						
22		Definition	Explain DNA replication	C2						
23		Difference	Discusss difference between prokaryotic and eukaryotic replication	C2						
24		Mechanism	Describe the mechanism of DNA replication in Prokaryotes	C2						
25		stages	Explain stages of cell cycle	C2						
26		Practical	Perfrom the Extraction of Genomic DNA by chemical Method		P4		Demo	2	OPSE	5
27			comply to SOPs for the Extraction of Genomic DNA by chemical method			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: DNA REPLICATION IN EUKARYOTES										
28	Week-5	Introduction	Discuss DNA replication in Eukaryotes	C1			Interactive Lecture/SGD	2	MCQ's	5
29		Components (Features,enzymes, process)	Enlist components of Eukaryotic replication	C2						
30		Difference	Identify Difference in replication process of prokaryotes and eukaryotes,							
31		Mechanism	Describe the mechanism of DNA replication in Eurokaryotes	C1						
32		Significance	Conclude signicance of Eukarotic DNA Replication	C2						
33		Practical	Perfrom the Extraction of Genomic RNA		P4		Demo	2	OPSE	5
34			comply to SOPs for the Extraction of Genomic RNA			A	Role Play		Formative Assess-ment	
TOPIC: TRANSCRIPTION										
35	Week-6	Introduction	Introduce transcription process	C1			Interactive Lecture/SGD	2	MCQ's	5
36		Components (Features,enzymes, process)	Enlist components of transcription i.e enzyme/protein etc involved	C1						
37		Process	Describe mechanism of Transcription process	C2						
38		Regulation	Determine factors involve in regulation of transcription in prokaryote and eukaryote	C3						
39		Transcription evaluation	Compare Eukaryotic vs prokaryotic mechanism	C4						
40		Significance	Defend phenomena of Differential gene expression in context of gene transcription	C5						
41		Practical	Perform procedure of RFLP		P4		Demo	2	OPSE	5
42			comply to SOPs for the RFLP analysis			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: POST TRANSCRIPTIONAL MODIFICATION										
43	Week-7	Introduction	Introduce Posttranscription modification process	C1			Interactive Lecture/SGD	2	MCQ's	5
44		Process	Discuss th process of methylation and capping , from pre-mRNA to mature RNA	C2						
45		Purpose	Inference purpose of post transcriptional modification	C2						
46		Regulation	Examine factors involve in regulation of RNA processing	C3						
47		Comparison	Compare similarity and difference between transcription and replication	C4						
48		Significance	Explain significance of gene splicing and alternate splicing	C2						
49		Practical	Revise RFLP analysis		P4		Demo	2	OPSE	5
50			Revision to comply to SOPs for the RFLP analysis			A	Role Play		Formative Assess-ment	
TOPIC: RNA										
51	Week-8	Introduction	Introduce RNA	C1			Interactive Lecture/SGD	2	MCQ's	5
52		Composition	Discuss composition of RNA	C2						
53		Difference	Illutrate difference between DNA and RNA	C2						
54		Types	Describe different types of RNA including coding and non coding and its Function in prokaryote and Eukaryote	C2						
55		Importance	Evaluate role of RNA as an agent of molecular Medicine	C4						
56		Advancement	Discuss RNA beyond the central Dogma in diagnosis and treatment of disease	C2						
57		Significance	Discuss significance of difference RNA tyoes	C2						
58		Practical	Perform procedure of protein gel electrophoresis independantly		P4		Demo	2	OPSE	5
59			Revision to comply to SOPs for the RFLP analysis			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: TRANSLATION										
60	Week-9	Introduction	Introduce translation process	C1			Interactive Lecture/SGD	2	MCQ's	5
61		Components (Features,enzymes, process)	Enlist components of translation i.e enzyme/protein etc involved	C1						
62		Process	Describe mechanism of Translation process	C2						
63		Regulation	Determine factors involve in regulation of translation in prokaryote and eukaryote	C3						
64		Translation evaluation	Compare Eukaryotic vs prokaryotic mechanism	C4						
65		Practical	revise seps of SOPS initiate protein gel electrophoresis in affective way		P4		Demo	2	OPSE	5
66			Revision to comply to SOPs for the gel electrophoresis			A	Role Play		Formative Assess-ment	
TOPIC: POSTTRANSLATIONAL MODIFICATION										
67	Week-10	Introduction	Introduce Posttranslational modification process	C1			Interactive Lecture/SGD	2	MCQ's	5
68		Process	Discuss the process of post translation modification including protein, phosphorylation, protein glycosylation, protein ubiquitination,protein methylation and acetylation	C2						
69		Purpose	Inference purpose of post translationall modification	C3						
70		Practical	Perfrom the procedure of Gel preperation for electrophoresis		P4		Demo	2	OPSE	5
71			Revision: comply to SOPs for performing the procedure of preparing gel for electrophoresis			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: POSTTRANSLATIONAL MODIFICATION										
72	Week-11	Regulation	Examine factors involve in regulation of Post translational modification	C3			Interactive Lecture/SGD	2	MCQ's	5
73		Comparison	Compare similarity and difference between post transcription and post translational modfication	C3						
74		Significance	Explain significance of post translational modification	C2						
75		Practical	Revision : Perfom practical demonstarion about instrument/ equipment used in molecular biology		P4		Demo	2	OPSE	5
76			Revision to comply to SOPs for the use of instrument/ equipment			A	Role Play		Formative Assess-ment	
TOPIC: MUTATION										
77	Week-12	Introduction	Define Mutation	C1			Interactive Lecture/SGD	2	MCQ's	5
78		Types	Discuss different types of Mutation including Missense, Nonsense, Deletion, Insertion etc	C2						
79		Comparison	compare somatic vs germline and chromosomal vs gene mutation	C1						
80		Practical	Revision :Perfrom the Extraction of Genomic DNA by chemical Method		P4		Demo	2	OPSE	5
81			Revision to comply to SOPs for the Extraction of Genomic DNA by chemical method			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: MUTATION										
82	Week-13	Mutagenesis	Enlist different mutagens	C1			Interactive Lecture/SGD	2	MCQ's	5
83		Impact	Describe the impact of muations on gene function	C2						
84		Disoders	Explain disease associated with mutation	C2						
85		Practical	Revision to Perfrom the Extraction of Genomic RNA		P4		Demo	2	OPSE	5
86			Revision to comply to SOPs for the Extraction of Genomic RNA			A	Role Play		Formative Assess-ment	
87	Week-14	Disoders	Explain disease associated with mutation	C2			Interactive Lecture/SGD	2	MCQ's	5
88		Practical	Revision to Perfrom the Extraction of Genomic RNA		P4		Demo	2	OPSE	5
89			Revision to comply to SOPs for the Extraction of Genomic RNA			A	Role Play		Formative Assess-ment	
TOPIC: DNA DAMAGE										
90	Week-15	Introduction	Define DNA damage	C1			Interactive Lecture/SGD	2	MCQ's	5
91		Types	Discuss types of DNA damage	C2						
92		Sources	Decribe sources of DNA damage	C2						
93		Mutagens	Enlist various physical and chemical mutagens	C1						
94		Mechanism	Decribe mechanism of Cellular Stress and DNA Damage Response	C2						
95		Practical	Designed Molecular Biology Lab in context of Biosafety guidelines		P4		Demo	2	OPSE	5
96			Comply to SOPs for different Biosafety guilines			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: DNA REPAIR										
97	Week-16	Introduction	Define DNA repair	C1			Interactive Lecture/SGD	2	MCQ's	5
98		Types	Enlist different types of DNA repair mechanism	C1						
99		Mechanism	Decribe mechanism of different DNA repair mechanism	C2						
100		Regulation	Discuss gene involve in regulation of DNA repair i.e BRCAl and BRCAΓ etc.	C2						
101		Difference	Descibe the DNA Repair mechanism of Polymerase enzyme in eukaryotes and prokaryotes	C2						
102		Importance	Discuss the importance of DNA repair mechanism	C2						
103		Disorder	Explain disorder related to defect in repair mechanism	C2						
104		Practical	Perform Gel electrophoresis for DNA visualization		P4		Demo	2	OPSE	5
105			Comply to SOP for gel electrophoresis for DNA visualization			A	Role Play		Formative Assess-ment	

Recommended Text Books

PMS-612 GENERAL PATHOLOGY-I

- Kumar, Abbas and Aster; 9 th edition. Robbins Basic Pathology.
- Review of general pathology by Muhammad Firdous 9th edition
- Short textbook of pathology 3rd edition by Inam Danish

PMS-613 MEDICAL MICROBIOLOGY-I

- Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4 th ed. McGraw-Hill, 2003.
- Clinical Microbiology Made Ridiculously Simple. Gladwin, M. & Trattler, B., 3rd ed. MedMaster, 2004.
- Medical Microbiology and Infection at a Glance. Gillespie, S., H., Bamford, K., B., 4th ed. WileyBlackwell, 2012.
- Medical Microbiology, Kayser, F., H.,. & Bienz, K., A., Thieme, 2005.
- Review of Medical Microbiology and Immunology. Levinson, W., 10th ed. McGraw Hill Professional, 2008.
- Jawetz, Melnick, & Adelberg's Medical Microbiology. Brooks, G., Carroll, K., C., Butel, J., & Morse, S., 26th ed. McGraw-Hill Medical, 2012.

PMS-614 PHARMACOLOGY-I

- Lippincott s pharmacology (text book) by Mycek 6th Edition published by Lippincott Raven 2012.
- I Katzung textbook of pharmacology (Reference Book) by Bertram Katzung 12th Edition,Published by Appleton.

PMS-615 COMMUNICATION SKILLS

- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

MLT-601 HAEMATOLOGY-I

- Essential of Hematology, A.V Hoff Brand, 6th edition 2006
- Essential of hematology by JP
- Clinical Hematology, G.C Degrunchi, 5th edition 2002
- Practical Hematology, Dacie J.V. 10th edition 2012

MLT-602 CLINICAL BACTERIOLOGY

- Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4th ed. McGraw-Hill, 2003.
- District Laboratory Practice in Tropical Countries, Part1 & Part 2. Cheesbrough, M., 2nd ed. Cambridge University Press, 2006.
- Clinical Microbiology Made Ridiculously Simple. Gladwin, M.,& Trattler, B., 3rd ed. MedMaster, 2004.
- Bailey & Scott's Diagnostic Microbiology. Forbes, B., A., Sahm, D., A., Weissfeld, A., S., & Bailey, W.,R., 12th ed. Elsevier Mosby, 2007.
- Medical Microbiology, Kayser, F., H., & Bienz, K., A., Thieme, 2005
- Review of Medical Microbiology and Immunology. Levinson, W., 10th ed. McGraw Hill Professional, 2008.
- Jawetz, Melnick, & Adelberg's Medical Microbiology. Brooks, G., Carroll, K., C., Butel, J., & Morse, S.,26th ed. McGraw-Hill Medical, 2012.

MLT-603 MOLECULAR BIOLOGY-I 3(2-1)

- Cell and molecular Biology By Gerald Karp, 5th edition 2005.
- Molecular Biology By Robert F. Weavet 3rd edition 2010

Phase 5 Hayatabad Peshawar Tel: 091-9217703, 9217696-9 fax:091-9217704 Website:www.kmu.edu.pk