

Microbiology

Lectures	SGT/ SEM/ CD/ DOAP/ Integration	SDL	TOTAL
70 hrs	110 hrs	10 hrs	190 hrs

List of Lectures (70 Hrs):

No	COMPETENCY The student should be able to	Lectures	No of Hrs
Topic: General Microbiology and Immunity Number of competencies: (11) Number of procedures that require certification : (01)			
MI 1.1	Describe the different causative agents of Infectious diseases+ A208 the methods used in their detection	L	7Hrs
MI1.3	Describe the epidemiological basis of common infectious diseases	L	1 Hr
MI1.4	Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice	L	2 Hrs
MI1.6	Describe the mechanisms of drug resistance, and the methods of antimicrobial susceptibility testing	L	2 Hrs

	and monitoring of antimicrobial therapy			
MI1.7	Describe the immunological mechanisms in health	L	13. Immunity 14. Antigen 15. Antibody 16. Complement	4 Hrs
MI1.8	Describe the mechanisms of immunity and response of the host immune system to infections	L	17. Structure and Function of Immune System 18. AMI and CMI	2 Hr
MI1.9	Discuss the immunological basis of vaccines and describe the Universal Immunisation schedule	L	19. Immunoprophylaxis	1 Hr
MI1.10	Describe the immunological mechanisms in immunological disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection.	L	20. Hypersensitivity 21. Autoimmunity	2 Hrs
MI1.11	Describe the immunological mechanisms of transplantation and tumor immunity	L	22. Transplantation 23. Tumour Immunity and IDD	2 Hrs
	TOTAL		23	23 Hrs
Topic: CVS and Blood		Number of competencies: (7)		Number
		of procedures that require certification		
		: (NIL)		
MI2.1	Describe the etiologic agents in rheumatic fever and their diagnosis	L	1. Streptococcus,	2hrs

MI2.2	Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	L	2.Pneumococcus and Enterococcus	
MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course diagnosis and prevention and treatment of the common microbial agents causing Anemia	L	3.Dengue and Chickungunya	1 hr
MI2.5	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kalaazar, malaria, filariasis and other common parasites prevalent in India	L	4. Trypanosoma 5. Filaria 6. Leishmania (Kala Azar)	3 hrs
MI2.7	Describe the epidemiology, the etio-pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	L	7. HIV	1 hr
	TOTAL		7	7 Hrs
Topic: Gastrointestinal and hepatobiliary system			Number of	
competencies: (8)			Number of procedures	
that require certification : (NIL)				

MI3. 1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents	L	1. E.coli, Proteus, Klebseilla 2. Vibrio 3. E.histolytica 4. Taenia 5. Ascaris, Hookworm Trichuris, E Vermicularis, Strongyloides	5 hrs
MI3. 3	Describe the enteric fever pathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them	L	6. Enteric Fever and Non typhoidal salmonella	1 hr
MI3. 5	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	L		
MI3 .6	Describe the etio-pathogenesis of Acid peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	L	7. H.pylori, campylobacter and Cl.difficile	1 hr
MI3. 7	Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis	L	8. Hepatitis	1hr
	TOTAL		8	8 hrs
Topic: Musculoskeletal system skin and soft tissue infections Number of competencies: (3) Number of procedures that require certification : (NIL)				

MI4.1	Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections	L	1. Cl.perfringens 2. Cl.tetani and Cl.botulinum	2 hrs
MI4.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections	L	3. Staphylococcus	1 hr
MI4.3	Describe the etiopathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis	L	4. M leprosy 5. Dermatophytes 6. Actinomycetes	3 hrs
	TOTAL		6	6 hrs
Topic: Central Nervous System infections				
competencies: (3)			Number of	
require certification : (NIL)			Number of procedures that	
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	L	1. H.influenzae 2. Cryptococcus and Mucor 3. Toxoplasma	3 hrs
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	L	4. polio virus 5. Rabies Virus	2hrs
	TOTAL		5	5 hr
Topic: Respiratory tract infections				
certification : (02)			Number of competencies: (3)	
			Number of procedures that require	
MI6.1	Describe the etiopathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory	L	1. C.Diphtheria 2. M.Tb 3. Atypical Mycobacteria 4. Bordatella 5. Mycoplasma and Chlamydia 6. Orthomyxo virus 7. Paramyxovirus	7 hrs

	tract			
	TOTAL		7	7 hr
Topic: Genitourinary & Sexually transmitted infections Number of competencies: (3)				
Number of procedures that require certification : (NIL)				
MI7.1	Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system	L	1. Gonococci and NGU 2. Herpes and CMV	2 hrs
MI7.2	Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures	L	3. T pallidum	1 hr
MI7.3	Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections	L	4. UTI	1 hr
	TOTAL		4	4 hr
Topic: Zoonotic diseases and miscellaneous Number of competencies: (16)				
Number of procedures that require certification : (01)				
MI8.1	Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and	L	1. Yersinia 2. Leptospira and Borrelia 3. E. granulosus	3 hrs

	prevention			
MI8.2	Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	L	4. Candida 5. Histoplasma and Other dimorphic fungi	2 hrs
MI8.3	Describe the role of oncogenic viruses in the evolution of virus associated malignancy	L	6. Oncogenic Viruses and emerging and reemerging infections	1 hr
MI8.4	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	L		
MI8.5	Define Healthcare Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention	L	7. Pseudomonas and HAI and its control	1 hr
MI8.6	Describe the basics of Infection control	L		
MI8.8	Describe the methods used and significance of assessing the microbial contamination of food, water and air	L	8. Microbiology of Food, water and Air	1 hr
MI8.9	Discuss the appropriate method of collection of samples in the performance of laboratory tests in the	L	9. Collection of Sample	1 hr

	detection of microbial agents causing infectious diseases			
MI8.12	Discuss confidentiality pertaining to patient identity in laboratory results	L	10. National Health Programs in the prevention of common infectious disease and Bioethics: Universal Safety Principles	1hr
MI8.16	Describe the National Health Programs in the prevention of common infectious disease (for information purpose only as taught in CM)	L		
	TOTAL		10	10 hrs

System wise Total of Lectures:

S r N o	Systems	No of Lecture	Hrs
1	Gen Microbiology and Immunology	23	23
2.	CVS and Hematology	7	7
3.	GIT and Hepatobiliary	8	8
4.	Musculoskeletal and Skin soft tissue	6	6
5.	Central Nervous system	5	5
6.	Respiratory System	7	7
7.	Genitourinary and Sexually transmitted Infections	4	4
8.	Zoonotic and Miscellaneous	10	10
	TOTAL	70	70 Hrs

LIST of SGTs/ Sem/ Integrated/ DOAP: (110 Hrs)

No	COMPETENCY The student should be able to	SGT/Sem/Case/Integrated	No of Hrs	Practical DOAP	No of Hrs
Topic: General Microbiology and Immunity Number of competencies: (11) Number of procedures that require certification : (01)					
MI 1.1	Describe the different causative agents of Infectious diseases+ A208 the methods used in their detection	1. Culture Medias (SG) 2. Biochemicals (SG)	2 hrs		
MI1.2	Perform and identify the different causative agents of Infectious diseases by Gram Stain, ZN stain and stool routine microscopy	-		1. Diagnostic Microbiology 1 2. Morphology of Bacteria 3. Microscopy 4. Gram staining 5. ZN Staining	10 hrs
MI1.4	Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice			6. Sterilisation and Disinfection	2 hrs
MI1.5	Choose the most appropriate method of sterilization and disinfection to be used in specific situations in the laboratory, in clinical and surgical practice	3. Disinfection (Lab, OT, OPD) (Integrated)	1 hr		
MI1.6	Describe the mechanisms of drug resistance, and the methods of antimicrobial	4. Bacteriophage (Sem) 5. Minimisation of Drug Resistance and antibiotic	2 hrs	7. Diagnostic Microbiology 2 and Gram Staining 8. ZN Staining (repeat)	4hrs

	susceptibility testing and monitoring of antimicrobial therapy	Policy (SG)			
MI1.7	Describe the immunological mechanisms in health			9. Serological Reactions 1	4 hrs
MI1.8	Describe the mechanisms of immunity and response of the host immune system to infections			10. Serological reactions 2	
	TOTAL	5	5 Hrs	10	20hrs
Topic: CVS and Blood Number of competencies: (7) Number of procedures that require certification : (NIL)					
MI2.1	Describe the etiologic agents in rheumatic fever and their diagnosis	1. Causative agents of Rheumatic Fever and its diagnosis (Integrated)	1 hr		
MI2.2	Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	2. classification etio- pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis (Sem)	1 hr		
MI2.3	Identify the microbial agents causing Rheumatic Heart Disease & infective Endocarditis			1. Streptococcus, Pneumococcus and Enterococcus	2hrs
MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course diagnosis and	3. Rickettsia (SG)	1hr		

	prevention and treatment of the common microbial agents causing Anemia				
MI2.5	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kala-azar, malaria, filariasis and other common parasites prevalent in India	4. Integrated : Malaria	2 hrs		
MI2.6	Identify the causative agent of malaria and filariasis			2. Blood protozoa	2 hrs
MI2.7	Describe the epidemiology, the etio-pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	5. Integrated: HIV	2 hrs		
	TOTAL	5	7 Hrs	2	4hrs

Topic: Gastrointestinal and hepatobiliary system **Number of competencies: (8)** **Number of procedures that require certification : (NIL)**

MI3. 1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents	1. Shigella (SG) 2. Isospora , Cryptospora (Sem) 3. Giardia (Sem)	3hrs	1. Enterobacteria caie (E coli, Proteus, Klebsella) 2. Vibrio and Shigella 3. Intestinal Nematodes and Stool	6 hrs
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				Examination	
MI3. 2	Identify the common etiologic agents of diarrhea and dysentery			4. Intestinal Protozoa and Stool Examination	2hrs
MI3 .4	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness			5. Salmonella	2hrs
MI3. 5	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	4. Food Poisoning (Integrated)	2hr		
MI3. 7	Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis	5. Liver Fluke (SG) 6. Integrated: Hepatitis	2hrs		
MI3 .8	Choose the appropriate laboratory test in the diagnosis of viral hepatitis with emphasis on viral markers			6. Diagnostic tests used in Virology	2hrs

	TOTAL	6	7Hrs	6	12 hrs
Topic: Musculoskeletal system skin and soft tissue infections Number of competencies: (3) Number of procedures that require certification : (NIL)					
MI4.1	Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections	1. Non sporing anaerobes (SG)	1hr	1. Clostridia and Non sporing anaerobes	2 hrs
MI4.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections			2. Staphylococcus	2 hrs
MI4.3	Describe the etiopathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis	2. Pox Virus (Sem) 3. Mycetoma and S/c Mycosis (Integrated) 4. B anthracis (Integrated)	3hrs	3. Mycology 4. M leprae 5. Bacillus	6 hrs
	TOTAL	4	4hrs	5	10 hrs
Topic: Central Nervous System infections Number of competencies: (3) Number of procedures that require certification : (NIL)					
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	1. Meningococcus and Meningitis (Integrated)	1hr		
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	2. Slow Viral Diseases (SEM)	1hr		

MI5.3	Identify the microbial agents causing meningitis			1. Microbial agents causing Meningitis (Meningococcus)	2 hrs
	TOTAL	2	2hrs	1	2 hrs
<p>Topic: Respiratory tract infections (3) Number of competencies: (3) Number of procedures that require certification : (02)</p>					
MI6.1	Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory tract	1. Tuberculosis (Integrated) 2. Lung fluke (SEM) 3. Legionella (SEM) 4. Aspergillus (SG) 5. Other opportunistic fungi (SG) 6. Adenovirus (SEM)	6hrs		
MI6.2	Identify the common etiologic agents of upper respiratory tract infections (Gram Stain)			1. C diphtheria and Gram staining 2. Bordatella and Hemophilus	6 hrs
MI6.3	Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain)			3. M tuberculosis and ZN staining	
	TOTAL	6	6hrs	3	6 hrs
<p>Topic: Genitourinary & Sexually transmitted infections Number of competencies: (3) Number of procedures that require certification : (NIL)</p>					
MI7.1	Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system	1. T vaginalis (SEM)	1hr	1. Gonococcus	2hrs

MI7.2	Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures	2. STDs (Integrated)	1hr	2. Spirochaetes	2 hrs
MI7.3	Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections	3. UTI (SEM)	1hr		
	TOTAL	3	3hrs	2	4hrs
<p>Topic: Zoonotic diseases and miscellaneous Number of competencies: (16) Number of procedures that require certification : (01)</p>					
MI8.1	Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention	1. Zoonosis and Brucella (SG)	1hr	1. Yersinia and Brucella	2 hrs
MI8.4	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	2. Emerging and Re-emerging infections (Integration) 3. Misc bacteria (SEM)	2 hr		
MI8.5	Define Healthcare Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the	4. HAI (SEM) 5. Integrated: PUO	1hr s2 hrs		

	methods for prevention				
MI8.6	Describe the basics of Infection control	6. Infection Control (Integration)	1hrs		
MI8.7	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)			2. Pseudomonas and HAI and PPE	2 hrs
MI8.8	Describe the methods used and significance of assessing the microbial contamination of food, water and air				
MI8.9	Discuss the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing infectious diseases	7. Biomedical waste Disposal (SG)	1Hrs		
MI8.10	Demonstrate the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing Infectious diseases			3. Collection of samples and Medical Entomology	2 hrs
MI8.11	Demonstrate respect for patient samples sent to the laboratory for performance of laboratory tests in the detection of microbial agents causing Infectious diseases	8. confidentiality pertaining to patient identity in laboratory results (SG)	1hr		
MI8.12	Discuss confidentiality pertaining to patient identity in laboratory results				

MI8.13	Choose the appropriate laboratory test in the diagnosis of the infectious disease	9. Appropriate laboratory test in the diagnosis of the infectious disease (SEM)	1hr		
MI8.15	Choose and Interpret the results of the laboratory tests used in diagnosis of the infectious disease	10. Molecular tests (SG) 11. Serological Reactions (SG)	1hr 1hr 1hr		
	TOTAL	11	12 hrs	3	6hrs

System wise Total SGTs/ Sem/ Integrated/ DOAP:

Sr No	Systems	No of SGT/ Seminar s/	Hrs	DOAP session/Practicals	Hrs
1	Gen Microbiology and Immunology	5	5	10	20
2.	CVS and Hematology	5	7	2	4
3.	GIT and Hepatobiliary	6	7	6	12
4.	Musculoskeletal and Skin soft tissue	4	4	5	10
5.	Central Nervous system	2	2	1	2
6.	Respiratory System	6	6	3	6
7.	Genitourinary and Sexually transmitted Infections	3	3	2	4
8.	Zoonotic and Miscellaneous	11	12	3	6
	TOTAL	42	46 Hrs	32	64 Hrs
	GRAND TOTAL	110 hrs			

L: Lecture **SG:** Small Group **CD:** Case Discussion **SEM:** Seminar
DOAP: Demonstrate, Observe, Assess and Perform

SDL (Self Directed Learning):

Sr No	Topics	No of Hrs
1	ELISA test	1 hr
2	Widal test	1 hr
3	Needle stick Injury	1Hr
4	Hand Hygiene	1Hr
5	MRSA Surveillance	1 hr
6	Antibiotic Sensitivity testing	1 hr
7	Antimicrobial agents	1 hr
8	Viral Vaccines	1 hr
9	Malarial Vaccines	1 hr
10	Free living amoeba	1 hr
	Total	10 Hrs

**MAPPING OF PROGRAMME OUTCOMES [POs] AND
COURSEOUTCOMES [COs] OF- II - MBBS
PROGRAMMES**

PROGRAMME OUT COMES :

Programme Name: MBBS	
Subject Code: 01010202	
Sr. No.	By the end of the programme, the MBBS Graduate will have /be:
PO 1	Knowledge and Skills
PO 2	Planning and problem-solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

Year II	
Course Code	Course Title
01010201	Pathology
01010203	Pharmacology and Therapeutics
01010202	Microbiology
01010304	Forensic Medicine and Toxicology

Microbiology: (01010202)		
CO No.	At the end of the course, the learners should be able to:	Mapped Programme Outcomes
CO 1	The student should be well equipped with the knowledge of prevalent communicable diseases of national importance and of the newer emerging pathogens.	PO1,PO2,PO3,PO5,PO6,PO7,PO8,PO9
CO 2	Know and describe the etiology and pathogenesis of diseases caused by microorganisms	PO1,PO2,PO3,PO4,PO5,PO7,PO9
CO 3	Plan and interpret laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO9
CO 4	Be conversant with proper methods of collection, storage & transport of clinical material for microbiological investigations.	PO1,PO2,PO3,PO5,PO6,PO7,PO8,PO9
CO 5	Understand the principles of immunology and its application in the diagnosis and prevention of infectious diseases including vaccinology.	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9
CO 6	Understand methods of disinfection and sterilization and their application to control and prevent hospital and community acquired infections including universal biosafety precautions and waste disposal.	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9
CO 7	The student will understand the use of the different antimicrobial agents including antibiotics to use judiciously and prevent misuse	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9