



MICROBIOLOGY

Syllabus for 2nd Professional MBBS AIIMS RAJKOT

All India Institute of Medical Sciences
Rajkot (Gujarat)

The goal of teaching microbiology to undergraduate medical student is to provide an understanding of the infectious disease in order to deal with the etiology, pathogenesis, laboratory diagnosis, treatment and control of infections.

OBJECTIVES

(A) Knowledge (Cognitive Domain)

At the end of the course, the student shall be able to:

1. State the infective micro-organisms of the human body and describe the host parasite relationship
2. List pathogenic micro organisms and describe the pathogenesis of the diseases produced by them
3. State or indicate the modes of transmission of pathogenic and opportunistic

organisms and their sources, including insect vectors responsible for transmission of infection

4. Describe the mechanisms of immunity to infection
5. Acquire knowledge on suitable antimicrobial agents for treatment of infection and scope of immunotherapy and different vaccines available for prevention of communicable diseases
6. Apply methods of disinfection and sterilization to control and prevent hospital and community acquired infections
7. Recommend laboratory investigations regarding bacteriological examination of food, water, milk and air

(B) Skills (Psychomotor Domain)

At the end of the course, the student shall be able to:

1. plan and interpret laboratory investigations for the diagnosis of infectious diseases and to correlate the clinical manifestations with the etiological agents
2. identify the common infectious agents with the help of laboratory procedures and use antimicrobial sensitivity tests to select suitable antimicrobial agents.

(C) Attitude & Communication (Affective Domain)

At the end of the course, the student shall be able to:

1. Demonstrate right kind of attitude, communication and ethics while dealing with clinical material and reports.
2. Work as an effective team member & leader

Syllabus

A. General Microbiology

1. Introduction & History of Microbiology
2. Introduction to Bacteriology
 - Bacterial Taxonomy
 - Morphology of Bacteria
 - Growth requirement
 - Nutrition & Metabolism
3. Normal Microbiota & Epidemiology of Infectious disease.
4. Overview of Bacterial infections
 - Gram positive organisms
 - Gram negative organisms

- Anaerobes
- 5. Bacterial Genetics
- 6. Antimicrobials
 - Antimicrobial agents
 - Antimicrobial resistance
- 7. Sterilization & Disinfection
- 8. Basic concepts of Virology
- 9. Basic concepts of Parasitology
- 10. Basic concepts of Mycology
- 11. Infection control in health care setting

B. Immunology

1. Immunological mechanisms in health
2. Antigen
3. Antibody
4. Antigen – Antibody reaction
5. Complement system
6. Components of Immune system
7. Immune response
8. Hypersensitivity
9. Autoimmunity
10. Immunodeficiency disorders
11. Transplant & Cancer immunity
12. Immunohematology
13. Immunoprophylaxis

C. Respiratory System

1. Infective syndromes of Respiratory tract
2. Upper Respiratory Tract Infections (URTI)
 - *Streptococcus pyogenes*
 - *Corynebacterium diphtheria*
3. Lower Respiratory Tract Infections (LRTI)
 - Pneumonia : *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*, Mycoplasma, Chlamydia, Legionella.
 - Miscellaneous bacterial agents of LRTI : Bordetella, Enterobacteriaceae, Non fermenters.
4. Tuberculosis

5. Non tuberculous mycobacteria
6. Viral Infections
 - Orthomyxovirus
 - Paramyxoviruses
 - Adenovirus
 - Rhinovirus
 - Epstein Barr Virus
 - COVID-19
7. Fungal infections
 - Aspergillosis
 - Zygomycosis
8. Parasitic infections
 - Pneumocystosis
 - Paragonimiasis

D. Blood & Cardiovascular System

1. Blood stream infections
 - Sepsis
 - CRBSI
2. Infective Endocarditis
3. Acute Rheumatic Fever
4. Enteric fever
5. Brucellosis
6. Leptospirosis
7. Borreliosis
8. Yersiniosis
9. Rickettsial infections
10. Parasitic infections
 - Malaria
 - Leishmania
 - Trypanosoma
 - Filaria
11. Viral infections
 - HIV
 - Dengue
 - Chikungunya

- Viral Haemorrhagic fever
12. Fungal infections
- Systemic candidiasis
 - Systemic mycoses

E. Gastrointestinal & Hepatobiliary System

1. Infective syndrome of GIT
2. Enterobacteriaceae & Diarrheagenic *E.coli*
3. Non inflammatory diarrhea
 - Cholera
 - Halophilic vibrios
4. Inflammatory diarrhea
 - Shigella
 - Campylobacter
 - Non typhoidal salmonella
5. Miscellaneous Bacterial Infections of GIT
 - *Helicobacter pylori*
 - *Clostridioides difficile*
6. Food poisoning
 - *Staphylococcus aureus*
 - *Bacillus cereus*
 - *Clostridium botulinum*
 - *Clostridium perfringens*
7. Parasitic infection : Protozoa
 - Intestinal & Extraintestinal amoebiasis
 - Giardiasis
 - Intestinal coccidian parasitic infections
8. Parasitic infection : Helminth
 - Nematodes : Ascariasis, Hookworm infection, Enterobiosis, Strongyloidiasis, Trichuris infection
 - Cystodes : *Taenia*, *H.nana*, *Echinicoccus*
 - Trematosdes : *Clonorchis*, *Fasciola hepatica*
9. Viral infection
 - Viral Hepatitis
 - Yellow fever
 - Cytomegalovirus

F. Skin, Soft tissue and Musculoskeletal infections

1. Infective syndrome of Skin, Soft tissue and Musculoskeletal system
2. Staphylococcal & B-hemolytic streptococcal infections
3. Anthrax
4. Leprosy
5. *Burkholderia*
6. Non Tuberculous Mycobacteria (Cutaneous)
7. Gas gangrene and infections due to non-sporing anaerobes
8. Actinomycetes infections
9. Parasitic infection
 - Cutaneous larva migrans
 - Cutaneous leishmaniasis
 - *T. Spiralis*
 - *D.medinensis*
10. Fungal infections
 - Superficial fungal infections : Dermatophytosis
 - Cutaneous & Mucosal Candidiasis
 - Mycetoma
11. Viral Exanthems

G. Central Nervous System

1. Infective syndrome of CNS
2. Acute pyogenic meningitis
 - *Streptococcus pneumonia*
 - *Neisseria meningitides*
 - *Haemophilus influenza*
 - *Streptococcus agalactiae*
 - *Listeria*
3. Chronic meningitis
 - *Mycobacterium tuberculosis*
4. Tetanus
5. Botulism
6. Viral infections
 - Poliomyelitis
 - Rabies
 - Viral meningitis & Encephalitis
7. Parasitic infections

- Free living amoeba infections
- Neurocysticercosis
- Toxoplasmosis

H. Urogenital System

1. Infective syndromes of Genito urinary tract
2. Urinary tract infections (UTI)
3. Sexually Transmitted Infections

I. Miscellaneous

1. Ocular & Ear infections
2. Congenital infections
3. Zoonotic infections : Plague. Tularaemia
4. Emerging & Re-emerging infections
5. Bioterrorism
6. Organisms with oncogenic potential
7. Health care associated infections

Third Semester

Total duration- 15 weeks

Teaching hours- 59hrs

Third Semester

Total duration- 15 weeks

Teaching hours- 58hrs

General Microbiology			
Week	Lecture - 1	Lecture - 2	Practical
1	Introduction &History; Bacterial Taxonomy & Medically important bacteria	Morphology of Bacteria; Bacterial cell wall, cytoplasmic matrix, appendages and spores	Introduction to Microbiology Laboratory; Biosafety& Standard Precaution; Microscopy
2	Physiology of Bacteria-growth, nutrition and metabolism	Normal Microbiota and Epidemiology of Infectious diseases	General principles of Laboratory diagnosis of Bacterial infections - Sample collection , Transport & Storage
3	Overview of Bacterial infections - Gram positive organisms	Overview of Bacterial infections - Gram negative organisms	Direct Methods of Bacterial detection : Wet mount, Hanging drop, Gram stain, ZN stain
4	Overview of Bacterial infections - Anaerobic & Miscellaneous	Microbial Genetics	Bacterial culture: Culture media , Culture methods including Anaerobic culture (Gram stain)
5	Antimicrobial agents	Antimicrobial resistance	Identification of Bacteria (Biochemical reactions) & ABST(ZN stain)
6	Sterilization	Disinfection	Molecular diagnostic tests
7	Basic Concepts of Virology	Basic Concepts of Medical Parasitology	Sterilization & Disinfection
8	Basic Concepts of Mycology	MID SEMESTER EXAM	Laboratory diagnosis of viral infections

Immunology			
Week	Lecture - 1	Lecture - 2	Practical
9	Immunological Mechanisms in Health	Antigen	Laboratory diagnosis of parasitic infections Stool examination
10	Antibody	Antigen antibody reaction – 1/2	Laboratory diagnosis of fungal infections

11	Antigen antibodyreaction – 2/2	Complement system	Immunological diagnostic tests
12	Components of Immune system	Immune response – ½	Infection Control in Healthcare Settings Hand Hygiene & PPE
13	Immune response – 2/2	Autoimmunity	BMW management
14	Hypersensitivity 1/2- Type I & II	Hypersensitivity 2/2- Type III & IV	Environment surveillane (water, air and food) Needle stick injury& PEP
15	Immunodeficiency disorders	Transplant & Cancer immunity	Immunoematology Immuno-prophylaxis (SGD)

Didactic Lectures	29	29 hrs
SGD	01	2 hrs
Practical Sessions	14	28 hrs

Fourth Semester

Total duration- 20 weeks

Teaching hours- 90 hrs

Respiratory System			
Week	Lecture - 1	Lecture - 2	Practical
1	Normal Flora & Infective syndromes of Respiratory Tract	URTIs Bacterial agents of URTI- <i>Streptococcus pyogenes</i> and misc bacteria	Lab Diagnosis of URTI (Agents causing pharyngitis)
2	<i>Corynebacterium diphtheriae</i>	Bacterial agents of typical Pneumonia : <i>Strpneumoniae, Staph aureus, H.influenzae</i>	Lab Diagnosis of Pneumonia (Typical & Atypical) Gram stain
3	Misc Bacterial agents of LRTI: Bordetella, Enterobacteriaceae, Klebsiella & Non fermenters	Bacterial Atypical Pneumonia : Mycoplasma, Chlamydia and Legionella	Lab diagnosis of Tuberculosis ZN stain
4	Non tuberculous mycobacteria	Viral infections of Respiratory tract	Viral RTI : Orthomyxovirus, Paramyxoviruses, Adenovirus, Rhinovirus, EBV(SGD)
5	Parasitic infections of respiratory tract : Paragonimiasis & Pneumocystosis	Fungal infections of respiratory tract : Aspergillosis, Zygomycosis	Lab Diagnosis of Covid-19 PPE & Hand hygiene

CVS and Blood			
Week	Lecture - 1	Lecture - 2	Practical
6	Blood stream infections- Sepsis and CRBSI	Infections involving the heart- Infective Endocarditis & Acute Rheumatic Fever	Lab Diagnosis of Sepsis & CRBSI Gram stain
7	Enteric fever	Brucellosis & Yersinia	Lab diagnosis of Infective Endocarditis & Acute Rheumatic Fever
8	Leptospirosis & Borreliosis	Rickettsial Infections	Lab diagnosis of Enteric fever

9	Malaria 1/2	Malaria 2/2	Lab diagnosis of Brucellosis, Leptospirosis & Scrub typhus
10	Leishmania, Trypanosoma	Parasitic infection of blood stream: Filaria & Blood flukes	Lab diagnosis of Malaria
11	Dengue and Chikungunya	Systemic Candidiasis & Systemic mycoses	Lab diagnosis of Leishmania and Filaria
12	Human Immunodeficiency virus	Opportunistic Infections	MID SEMESTER EXAM

GIT			
Week	Lecture - 1	Lecture - 2	Practical
13	Introduction, Normal Commensal and Infective syndrome of GIT	Enterobacteriaceae & Diarrheagenic <i>E. coli</i>	Lab diagnosis of Viral Haemorrhagic Fever
14	Non inflammatory diarrhoea : Cholera & Halophilic vibrios	Inflammatory diarrhoea: Shigella, Campylobacter and Non typhoidal Salmonella	Lab Diagnosis of HIV
15	Miscellaneous Bacterial Infections of GIT : Helicobacter, Yersiniosis, <i>C. difficile</i>	Amoebiasis : Intestinal & Extra intestinal	Lab diagnosis of Diarrheal diseases Hanging drop
16	Viral Gastroenteritis: Rotavirus and Others	Food Poisoning: <i>S. aureus</i> , <i>B. cereus</i> , <i>Cl. Botulinum</i> & Others	Lab diagnosis of Dysentery (Bacillary & Amoebic)
17	Intestinal Nematodes 1/2: <i>Ascaris</i> & Hookworm	Intestinal Nematodes 2/2: Strongyloidiasis, <i>Enterobius</i> & <i>Trichuris</i>	Lab diagnosis of food poisoning, Gram staining
18	Intestinal Cestodes - <i>Taenia</i> & <i>H. nana</i>	Infective syndrome of Hepatobiliary system- Yellow Fever, CMV, EBV	Intestinal Coccidian parasitic infection & Giardiasis (SGD & Practical),
19	Agents of Viral Hepatitis : Viral Hepatitis A and E	Viral Hepatitis- Hepatitis B and D	Stool examination

20	Hepatitis C virus	Parasitic infections of Hepatobiliary system: <i>Echinococcus</i> , <i>Clonorchis</i> and <i>Fasciola hepatica</i>	Lab diagnosis of viral hepatitis
-----------	-------------------	--	----------------------------------

Integrated lectures

1.	Tuberculosis
2.	Covid 19
3.	Viral Haemorrhagic Fever
4.	HIV and AIDS
5.	PUO

Didactic Lectures	40	40 hrs
SGD	02	4 hrs
Integrated Lectures	05	10 hrs
Practical Sessions	18	36 hrs

Fifth Semester

Total duration- 14 weeks

Teaching hours- 72hrs

Skin, Soft tissue & Musculoskeletal Infections			
Week	Lecture - 1	Lecture - 2	Practical
1	Normal Flora and Infective syndrome of Skin, Soft tissue & Musculoskeletal system	Staphylococcal & β -hemolytic Streptococcal infections	Lab diagnosis of skin infections- Furuncle, cellulitis, Surgical site infection, Burn wound infection
2	Miscellaneous skin pathogens: Anthrax, <i>Burkholderia</i> , NTM (cutaneous)	Gas gangrene and Infections due to non-sporing anaerobes	Lab diagnosis of Musculoskeletal infections (Arthritis and osteomyelitis)
3	Measles, Parvovirus	Rubella, Coxsackieviruses, Poxviruses	Lab diagnosis of Gas gangrene and other anaerobic infections
4	Parasitic infections : Filarial tissue infections, Cutaneous Larva Migrans, Cutaneous Leishmaniasis, <i>D. medinensis</i> , <i>T. spiralis</i>	Superficial fungal infections (Dermatophytosis) & Candidiasis (cutaneous & Mucosal)	Viral Exanthems : Herpesviruses (HSV, VZV, HHV-6,7) & Others (SGD)
5	Actinomycetes infections (Actinomyces & Nocardia)	Subcutaneous fungal infections : Mycetoma	Lab diagnosis of Leprosy ZN stain

CNS			
Week	Lecture - 1	Lecture - 2	Practical
6	Infective syndromes of CNS, Brain abscess	Acute pyogenic meningitis -1/2: <i>S pneumoniae</i> , and <i>N meningitidis</i>	Lab diagnosis of Cutaneous & Subcutaneous fungal infection
7	Acute pyogenic meningitis -2/2 : <i>H influenzae</i> , <i>Sagalactiae</i> and <i>Listeria</i>	Chronic Meningitis : Tubercular & Fungal	Lab diagnosis of Meningitis India ink stain ZN stain (Revision)

8	Poliomyelitis	Tetanus & Botulism	Viral meningitis and encephalitis (SGD)
9	Rabies	Parasitic infections : Free living Amoeba infections, Toxoplasmosis, Neurocysticercosis	Lab diagnosis of Rabies & Parasitic CNS infections Stool examination (Revision)

Urogenital			
Week	Lecture - 1	Lecture - 2	Practical
10	Normal commensals; Infective syndromes of Genito urinary tract & CAUTI	Urinary tract infections (UTI)	Lab diagnosis of UTI Gram stain
11	Genitourinary and Sexually Transmitted Infections ½- bacterial causes	Genitourinary and Sexually Transmitted Infections 2/2- viral and parasitic	Lab diagnosis of STD & Syphilis

Miscellaneous			
Week	Lecture - 1	Lecture - 2	Practical
12	Ocular & Ear Infections	Congenital infections	Vector borne infections (SGD) PPE and Hand hygiene
13	Zoonotic infections (Plague, Tularemia)	Emerging and re-emerging infections	Choosing laboratory tests for diagnosis of infectious diseases
14	Organisms with Oncogenic potential	Bioterrorism	Interpretation of microbiology reports

Integrated lectures and tutorials (V semester)

S No	Integrated	Tutorial
1.	Leprosy	AETCOM
2.	Healthcare associated infections	Hospital Infection Control and Bundle care approach
3.	STD and syphilis	Antimicrobial stewardship
4.	National Health Programmes, Disease Detection and Reporting	Biomedical waste management

Integrated lectures and tutorials (V semester)

S No	Integrated	Tutorial
1.	Leprosy	AETCOM
2.	Healthcare associated infections	Hospital Infection Control and Bundle care approach
3.	STD and syphilis	Antimicrobial stewardship
4.	National Health Programmes, Disease Detection and Reporting	Biomedical waste management

Didactic Lectures	28	28 hrs
SGD	03	6 hrs
Integrated Lectures	04	8 hrs
Practical Sessions	11	22 hrs
Tutorials	04	8 hrs