Syllabus template

Semester: 1	
Course : MOLECULAR MEDICAL MICROBIOLOGY (PGD MMM)	
Paper Title: Basics of Microbiology and Infectious Diseases	
Paper code: DMMB5101	**Credits:** 4
Hours/week : 4	
Category: Core/MDC/SEC/VAC : Core	
Theory / Practical / Composite : Theory	
No of Modules : 2	

Course Overview: This theory course covers the fundamentals of **biosafety, microbiology, and infectious diseases**, including biosafety practices, classification of microorganisms, and laboratory safety. It explains host–pathogen interactions, pathogenicity, and immune responses. The course also introduces key epidemiological concepts such as modes of transmission, infection, and incubation period, providing a foundation for infection control and disease prevention.

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

1. Understand and apply principles of **biosafety and biosecurity**, including laboratory safety practices and waste management.
2. Classify **microorganisms of medical importance** such as bacteria, viruses, fungi, and parasites.
3. Explain **host–pathogen interactions** and key factors influencing pathogenicity like virulence, host specificity, and tissue tropism.
4. Describe the components of the **immune system**, including innate and acquired immunity, and their roles in infection.
5. Understand the **fundamentals of infectious diseases and epidemiology**, including transmission, infection processes, and key terms like infectious dose and incubation period.
6. Apply knowledge for **infection prevention and control** in healthcare and laboratory settings.

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CO1: Remember:

1. The principles of biosafety and biosecurity, including biosafety levels, hazard group classification of microorganisms, biosafety cabinets, and biomedical waste management;
2. Medically important microorganisms (bacteria, viruses, fungi, and parasites),
3. Pathogenicity, and factors such as virulence, host specificity, and tissue tropism;
4. The terms innate and acquired immunity
5. The modes of transmission,
6. The terms infection vs. colonization, infectious dose, and incubation period for effective infection prevention and control.

CO2: Understand:

1. Analyze and differentiate various microorganisms and their roles in disease causation,
2. Evaluate host–pathogen interactions and immune responses.

CO3: Apply:

1. Apply knowledge of biosafety practices, microbial classification, host–pathogen interactions, and immune mechanisms to assess infection risks,
2. Interpret disease processes, and implement appropriate infection prevention and control measures in clinical and laboratory environments.
3. Apply epidemiological concepts to identify, prevent, and control the spread of infectious diseases in laboratory and healthcare settings.

CO4: Analyze:

1. Evaluate and integrate concepts of biosafety, Microbiology, Immunology, and epidemiology to support decision-making in infection control,
2. Ensure laboratory safety, and contribute to public health practices.

CO5: Evaluate:

1. Evaluate biosafety practices, Microbial pathogenicity, host immune responses, and epidemiological factors to assess risks and improve strategies for infection prevention and control in laboratory and healthcare settings.

CO6: Create:

1. Create and design effective biosafety protocols, infection prevention strategies,
2. Control measures by integrating knowledge of microbiology, host–pathogen interactions, immunity, and epidemiology for safe laboratory and healthcare practices.

Prerequisites: ***Basic knowledge about any prior course***

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	Biosafety and Bio-Security: Biosafety	4	CO1,CO3,CO4,CO5,CO6	K1,K3,K4,K5,K6

	levels, Difference between Bio-Safety and Bio-Security, Classification of microbial agents based on hazard groups, Types of biosafety cabinets, Biomedical waste segregation and management, Pollution Control Board, Institutional Biosafety Committee.			
II.	Classification of microbes of medical importance: Bacteria: aerobes, anaerobes, Gram positive, Gram negative, intra cellular bacteria, Mycobacteria, Viruses: DNA and RNA viruses Fungi: yeasts and molds. Parasites: protozoans and helminths	**8**	**CO1,CO2,CO3,CO4,CO5,**	**K1,K2,K3,K4,K5**
III.	Host-Pathogen interaction Pathogenicity Virulence Host specificity, Tissue tropism Innate immunity Acquired immunity: cell mediated, antibody mediated Immune response to infection	**8**	**CO1,CO2,CO3,CO4,CO5**	**K1,K2,K3,K4,K5**
IV.	Fundamentals of infectious diseases and epidemiology a. Pathogen, commensal b. Infection and colonization c. Colonization versus contamination	**10**	**CO1,CO2,CO3,CO4,CO5,CO6**	**K1,K2,K3,K4,K5,K6**

	d. Modes of transmission of infection e. Virulence, pathogenicity f. Infectious dose, lethal dose g. Incubation period Period of infectivity i. Infectious disease syndromes j. Diagnosis and treatment of infectious diseases k. Prevention of infectious diseases: immuno- l. prophylaxis, chemo-prophylaxis			
V.	Infection Prevention and Control (IPC) a. Standard precautions b. Transmission based precautions: contact/enteric/droplet/ airborne/isolation precautions c. Laboratory acquired infections d. Hand Hygiene e. Personal Protective Equipment f. Biomedical waste management g. Environmental cleaning and disinfection h. Respiratory hygiene and cough etiquette i. Safe injection practices j. Sterilization and disinfection.	**10**	**CO1,CO3,CO4,CO5,CO6**	**K1,K3,K4,K5,K6**
Text Books				
Ananthanarayan and Paniker's Textbook of Microbiology, Twelfth Edition. 2022. Paniker's Textbook of Medical Parasitology				
Web Resources Suggested readings				
1. WHO. Laboratory biosafety manual, 3rd edition, 2004. https://www.who.int/publications/i/item/9241546506 WHO. 2. Laboratory Biosafety manual, 4th edition. 2020.				

https://www.who.int/publications/i/item/9789240011311 WHO. 3. Laboratory Biosecurity Guidance. 2023. https://www.who.int/publications/i/item/9789240095113
Evaluation Total Marks: 100 CIA: 20 Marks: (Each module: 10 marks) End semester Exam: 80 Marks (Each module: 40 marks)
Paper Structure for Theory Semester Exam Paper Structure: End semester Exam: 80 Marks Two Modules: 40 marks each Question Pattern: Each Module: MCQ-20 marks (2 marksX10 questions to be attempted out of 12 questions given) (5 marks X 4 Questions to be attempted out of 6questions given)attempted out of 6questions given)

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	1. **Remember:** The principles of biosafety and biosecurity, including biosafety levels, hazard group classification of microorganisms, biosafety cabinets, and biomedical waste management; 2. Medically important microorganisms (bacteria, viruses, fungi, and parasites), 3. Pathogenicity, and factors such as virulence, host specificity, and tissue tropism; 4. The terms innate and acquired immunity 5. The modes of transmission, 6. The terms infection vs. colonization, infectious dose, and incubation period for effective infection prevention and control.	K1
CO2	**1.** Understand: Analyze and differentiate various microorganisms and their roles in disease causation,Evaluate host–pathogen interactions and immune responses	K2
CO3	**Apply** 1. Apply knowledge of biosafety practices, microbial classification, host–pathogen interactions, and immune mechanisms to assess infection risks, 2. Interpret disease processes, and implement appropriate infection prevention and control measures in clinical and laboratory	K3

	environments. 3. Apply epidemiological concepts to identify, prevent, and control the spread of infectious diseases in laboratory and healthcare settings	
CO4	**Analyze** 1. Evaluate and integrate concepts of biosafety, Microbiology, Immunology, and epidemiology to support decision-making in infection control, 2. Ensure laboratory safety, and contribute to public health practices.	K4
CO5	**Evaluate** 1. Evaluate biosafety practices, Microbial pathogenicity, host immune responses, and epidemiological factors to assess risks and improve strategies for infection prevention and control in laboratory and healthcare settings.	K5
CO6	**Create** 1. Create and design effective biosafety protocols, infection prevention strategies, 2. Control measures by integrating knowledge of microbiology, host–pathogen interactions, immunity, and epidemiology for safe laboratory and healthcare practices.	K6