

Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	1BSL02
Course Title	:	Clinical Microbiology
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Recall the technology of microbial productions.
Course Objective	:	Upon successful completion of the Clinical Microbiology course, students should be able to: Understand the fundamental concepts of clinical microbiology, including the classification, structure, and characteristics of microorganisms. Apply a variety of techniques for the identification and characterization of microorganisms, including microscopy, staining, molecular methods, biochemical tests, and serological assays. Analyze the mechanisms of microbial pathogenesis, including virulence factors, host-pathogen interactions, and the development of infectious diseases. Recognize and differentiate between common bacterial, viral, fungal, and parasitic infections based on their clinical presentations, modes of transmission, and associated health implications. Demonstrate proficiency in performing laboratory procedures for microbial identification, including culturing, staining, and interpretation of results.
Course Outcomes	:	At the end of this course students will be able to:
	CO1	Recognize the scope and significance of clinical microbiology in healthcare.
	CO2	Understand molecular techniques such as PCR and DNA sequencing for identification.
	CO3	Understand the structure, classification, and replication or multiplication of bacteria and viruses.
	CO4	Analysis and Identify common fungal infections and their impact on human health.
	CO5	Analyze bacterial pathogenesis, including virulence factors and infection mechanisms.
	CO6	Recall the clinical manifestations of parasitic infections and diagnostic methods.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	2	4	50	25	50	25	150

Legends: **L**-Lecture; **T**-Tutorial/Teacher Guided Theory Practice; **P** - Practical, **C** - Credit, **SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with COs
1	Introduction to Microbiology and Microorganisms Definition and scope of clinical microbiology. Classification of microorganisms: bacteria, viruses, fungi, parasites. Microbial structure, function, and diversity. Microbial growth and control factors.	10	22%	CO1
2	Microbial Identification and Techniques Microscopy techniques: brightfield, phase-contrast, fluorescence. Staining techniques: Gram staining, acid-fast staining. Molecular techniques: PCR, DNA sequencing. Biochemical and serological tests for microbial identification. Laboratory methods for bacterial, viral, and fungal identification	12	26.66%	CO2
3	Bacteriology and Virology Structure, classification, and identification of bacteria. Bacterial pathogenesis: virulence factors, infection mechanisms. Common bacterial infections and clinical manifestations. Viral structure, classification, and replication. Viral pathogenesis, host immune response, and infections.	13	28.88%	CO3 CO5
4	Mycology and Parasitology Structure, classification, and identification of fungi. Fungal pathogenesis, clinical presentations, and	10	22%	CO4 CO6

management. Common fungal infections. Classification and identification of parasitic organisms. Protozoan and helminthic parasites. Clinical presentations and diagnostic methods for parasitic infections.			
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Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	33.34	33.33	-	33.33	-	-

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments

Sr. No.	Name of Experiment	Teaching Hours
1	Microbiology Good Laboratory Practices	02
2	Perform Gram staining on bacterial cultures	02
3	Perform acid-fast staining on clinical samples to identify acid-fast bacteria like Mycobacterium tuberculosis.	02
4	Cultivate and identify fungal isolates obtained from clinical samples.	02
5	Isolate bacteria from clinical specimens using appropriate culture media and techniques.	02
6	Perform antibiotic susceptibility testing on bacterial isolates to determine their susceptibility/resistance profiles.	02
7	Cultivate and identify viruses from clinical samples using cell culture techniques.	02
8	Quantify viral titers using the plaque assay method.	02
9	Conduct serological tests, such as the agglutination test, to detect antibodies against specific pathogens.	02
10	Prepare and stain blood smears for the microscopic diagnosis of malaria.	02
11	Practice proper hand hygiene and aseptic techniques to prevent the spread of infections.	02
12	Examine stool samples using microscopy to detect and identify parasitic infections.	02
13	Learn how to safely don and doff PPE, such as gloves, gowns, and	02

	masks.	
14	Conduct infection control audits in a healthcare setting to identify potential sources of infection and recommend corrective measures.	02
15	Prepare KOH mounts of fungal specimens to observe fungal hyphae and spores.	02

Major Equipment /Instruments

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Analytical Balance
2	Autoclave
3	Micropipettes
4	Stains
5	Light Microscope
6	Anaerobic jar
7	UV Chamber
8	Hot Air Oven
9	Incubator
10	PPE kit Set

Suggested Learning Websites

Sr. No.	Name of Website
1	https://archive.nptel.ac.in/courses/102/103/102103015/

Reference Books

Sr. No.	Name of Reference Books
1	Clinical Microbiology Made Ridiculously Simple" by Mark Gladwin and William Trattler
2	Bailey & Scott's Diagnostic Microbiology" by Patricia Tille
3	Medical Microbiology" by Patrick R. Murray, Ken S. Rosenthal, and Michael A. Pfaller
4	Microbiology: A Laboratory Manual" by James G. Cappuccino and Chad T. Welsh
5	"Microbiology: An Introduction" by Gerard J. Tortora, Berdell R. Funke, and Christine L. Case
6	"Brock Biology of Microorganisms" by Michael T. Madigan, John M. Martinko, David A. Stahl, and David P. Clark
7	"Mims' Medical Microbiology" by Richard Goering, Hazel Dockrell, Mark Zuckerman, and Peter Chiodini
8	Principles of Virology" by S. J. Flint, L. W. Enquist, and V. R. Racaniello
9	Mims' Pathogenesis of Infectious Disease" by Cedric A. Mims, Hazel Dockrell, Richard Goering, Ivan M. Roitt, and David Wakelin
10	"Medical Mycology: A Self-Instructional Text" by Martha E. Kern, Michael T. Madigan,



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	and John O. Funke
11	"Infection Control and Management of Hazardous Materials for the Dental Team" by Chris H. Miller and Charles John Palenik
12	Control of Communicable Diseases Manual" by David L. Heymann