

KU1DSCMBG101: EXCITING WORLD OF MICROBES

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
I	DSC A1	100-199	KU1DSCMBG101	4	75

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	0	25L+10P	50L+15P	100	2

Course description:

This course provides a comprehensive outlook of the fundamentals of Microbiology such as the historical perspectives, developments and scope. The course emphasises on the working principles and applications of various types of microscopes for the visualisation of microorganisms. The course also illustrates the applications of various staining techniques for the study of the morphological features of microorganisms. Students will also study the structural features of bacteria and will gain hands-on experiments on handling and care of microscope and various staining techniques for the visualisation of microorganisms. In a nutshell, the course provides an overview of the fundamentals of microbiology and role in understanding the scope and applications of microorganisms.

Course prerequisite: Nil

Course outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the history, development, scope of microbiology and how microbiology has developed an important scientific discipline.	U
2	Familiarize the working principle, methodology and applications of various type of microscopes for the study of the morphological and structural features of microorganisms.	U
3	Apply various staining techniques for the visualization of microorganisms and study the structural components of bacterial cell.	A
4	Apply the fundamental concepts of microbiology and acquire the technical skills in basic protocols in Microbiology.	A

***Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	✓		✓		✓	✓		✓
CO 2		✓	✓		✓			
CO 3		✓	✓			✓		
CO 4			✓			✓		

COURSE CONTENTS

Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
1	Historical perspectives and scope of Microbiology		15
	1	History, development, and scope of Microbiology - Theories and concepts - Spontaneous generation versus biogenesis, Germ theory of disease.	
	2	Contributions of Anton Van Leeuwenhoek, Louis Pasteur, Robert Koch, Alexander Fleming, Edward Jenner, Paul Ehrlich, and Joseph Lister towards the development of Microbiology	
	3	Various branches of Microbiology, scope and applications of Microbiology	
	4	Scope of Microbiology principles in post-COVID era	
2	Microscope and visualization of microorganisms		15
	1	Microscopy – Basic principles of light microscopy – Structural components, working principles and applications of light microscopes- Bright field, Dark field, Phase contrast and Fluorescent Microscopes.	
	2	Specimen preparation, structure, working principles and applications of Scanning and Transmission electron microscopy. Cryo-electron Microscopy	
	3	Visualization of microorganisms -Morphological forms of bacteria, Staining –Basic principles, stains-components. Types of stains-acidic and basic- Staining techniques – Simple and Negative staining	
	4	Differential staining - Gram staining and acid-fast staining. Special staining for capsule, flagella and endospore. Fungal staining (LPCB), Wet mount for bacterial motility- Hanging drop technique	

3	Ultra structure of bacterial cell		10
	1	Ultra structure of bacterial cell - cell wall and its types- Gram positive and Gram negative	
	2	Cell membrane, Flagella, Pili, Capsule/glycocalyx/slime layer, Protoplasts and spheroplast.	
	3	Internal structures of bacteria- Ribosome, inclusion bodies, vacuoles, nuclear material (Nucleoid and plasmids) and mesosomes	
	4	Dormant resistant forms– endospore- structure and composition.	
4	Practical applications of Basic Microbiology		30
	1	General rules and regulations of Microbiology lab. Handling and care of Microscope, Demonstration of various types of microscopes and elucidation of the structural components of light microscope.	
	2	Simple staining and negative staining	
	3	Differential staining- Gram staining and acid-fast staining	
	4	Special staining- Capsule staining, endospore staining, fungal staining using LPCB	
	5	Bacterial motility using hanging drop technique	
5	Teacher Specific Module		5
	<i>Directions/Suggestions</i>		
	Activity		

Essential Readings:

1. Atlas RM (1997), Principles of Microbiology, Mosby Publishers.
2. Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (2002) Microbiology. 5th Edition, Tata McGraw-Hill, New Delhi.
3. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.
4. Ananthanarayan and Paniker's (2020) Textbook of Microbiology 11th edition, Universities Press publishes
5. Prescott/Harley/Klein's Microbiology by Joanne Willey, Linda Sherwood and Chris Wolverton
6. Dubey R.C. and Maheswary A K., (2018) A textbook of Microbiology, S. Chand Publications
7. Aneja K.R. 2020 Experiments in Microbiology, Plant Pathology and Biotechnology sixth edition, New Age International Publications Private Limited

Suggested Readings:

1. Daniel Lim, (1997), Microbiology Brown (William C.) Co, U.S.; 2nd edition.
2. Topley & Wilson's Microbiology and Microbial Infections (1998), 8 volumes, sixth edition, Hodder Arnold, London.

Assessment Rubrics:**Theory**

Evaluation Type		Marks
End Semester Evaluation L		50
Continuous Evaluation L		25
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Assignment	5
d)	Seminar	10
e)	Book/ Article Review	-
f)	Viva-Voce	5
g)	Field Report	-
Total L		75

Any components from the above table can be taken for CE not exceeding 25 Marks

Practicals

Evaluation Type		Marks
End Semester Evaluation P		15
Continuous Evaluation P		10
a)	Test Paper- 1	5
b)	Test Paper-2	5
c)	Record	5
d)	Lab skill	10
e)	Regularity	5
f)	Viva-Voce	5
g)	Report writing	5
Total		25

Any components from the above table can be taken for CE not exceeding 10 Marks