Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	1BSM01
Course Title	:	Microbial Diversity and Taxonomy
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Learn the basics of microbiology and know the microorganisms
Course Objective	:	To impart knowledge of the basic principles of bacteriology. Know the various microscopes. Understanding the structures and various sterilization techniques needed to maintain the sterile conditions. This includes the prerequisites of the lesson teaching students how to recall the main subcellular structures of prokaryotes and relate their structures to their function. Role of each of the structures and organelles listed
Course Outcomes	:	At the end of this course students will be able to:
	CO1	Understanding various microscopes
	CO	Able to study the structure of the bacteria and their organelles
	CO3	Understanding the various methods to culture the bacteria
	CO4	Application of sterilization techniques
	CO5	Analysing the diversity of microorganism using microscope

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	**The study of microbial structure** A. Light and the Bending of Light **B. The Light Microscope:** The Bright-Field Microscope and Microscope Resolution The Dark-Field Microscope The Phase-Contrast Microscope The Fluorescence Microscope **C. Electron Microscope** a) The Transmission Electron Microscope b)The Scanning Electron Microscope **D. Newer Techniques in Microscopy** Confocal Microscopy Scanning Probe Microscopy **E. Preparation and Staining of Specimens for Light Microscope and Electron Microscope** a) Fixation b) Dyes c) Simple Staining d)Differential Staining e) Staining Specific Structures f) Special Staining Techniques for electron microscope.	10	22%	CO1 CO5
2	**Prokaryotic Cell Structure and Function.** 1.An Overview of Prokaryotic Cell Structure, Shapes, Size Arrangement, and Its Diversity. **2. Prokaryotic Cell Surface Layers** 1. Plasma Membranes and Protein Secretion in Prokaryotes 2. Bacterial Cell Wall 3. Archaeal Cell Walls 4. Capsules, Glycocalyx, S Layer Slime Layer 5.Bacterial Endospore. The Cytoplasmic Matrix, The Nucleoid, Plasmids, Cytoplasmic Inclusions Structures, Organic and Inorganic Inclusions. Components External to The Cell Wall: Flagella, Pili, Fimbrie, Prosthica, Stalk.	10	22%	CO2
3	**Microbial Nutrition and Growth** A. Requirement of Bioelements, Growth Factors for Growth. B. Nutritional Types of Microbes. C. Growth Media: Types of Media. D. Methods of Obtaining Pure Culture-Streaking, Serial Dilution and Plating Methods. E. Growth Curves- Normal, Diauxic, Synchronous. F. Specific Growth Rate, Generation Time. G. Effect of environmental factors	12	27%	CO3

4	**The Study of Microbial Flora** **A. Conditions Influencing the Effectiveness of Antimicrobial Agents.** B. **Physical Methods of Microbial Control:** **1.**Heat: Dry and Moist Heat, Low Temperatures 2. Radiation 3. Ultrasonication 4. Filtration. **C. Chemical Methods of Microbial Control** 1. Phenolics And Determination of Phenol Coefficient of Disinfectant 2. Alcohols 3. Halogens 4. Heavy Metals 5. Acids and Alkalies 6. Quaternary Ammonium Compounds 7. Gaseous Agents 8. Aldehydes	13	29%	CO4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**40**	**20**	**20**	**20**	**0**	**0**

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.	Special Structure Staining Techniques Cell wall staining	02
2.	Capsule staining	02
3.	Endospore staining	02
4.	Granule staining	02
5.	Preparation of Nutrient Broth and Nutrient agar	02
6.	Preparation of Mac Conkey Agar, EMB Agar	02
7.	Study of Colony Forming Unit by Pour Plate Method, four flame method and Spread plate method	02
8.	Study of Effect of Chemical on Microbial Growth-Bacteria	02

9.	Study of Effect of Temperature on Microbial Growth	02
10.	Study of Effect of p H on Microbial Growth	02
11.	Measurement of Growth by Turbidometric Method	02
12.	Detection of Presence of Micro flora in Environment by Exposing Nutrient Agar Plates to Air	02
13.	Qualitative Analysis of Proteins	02
14.	Qualitative Analysis of Lipids	02
15.	Qualitative Analysis of Carbohydrates.	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	Centrifuge

Suggested Learning Websites

Sr. No.	Name of Website
1	https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_(Boundless)/01%3A_Introduction_to_Microbiology/1.01%3A_Introduction_to_Microbiology

Reference Books

Sr. No.	Name of Reference Books
1	Ananthanarayan and Paniker's Textbook of Microbiology, 2013 By Ananthanarayan and Paniker.
2	Microbiology Marjorie Kelly Cowan
3	Microbiology Gerard J. Tortora
4	Microbe Hunters: The Classic Book on The Major Discoveries Of The Microscopic World Paul De Kruif
5	Michael J. Pelczar Jr. Chan Ecs and Krieg Nr (2004) Microbiology, 5th Edition. Tata Mcgraw Hill.
6	Cappuccino J And Sherman N (2010) Microbiology: A Laboratory Manual, 9th Edition. Pearson Education Limited
7	Black Jg (2008), Microbiology: Principles and Explorations 7th Edition, Prentice Hall. DhanpatRai&Sons1998Prescott's Microbiology, Eighth Edition Reviewed by Joanne J. Dobbins

	Joanne M. Willey, Linda M. Sherwood, And Christopher J. Woolverton. 2011. Mcgraw-Hill Higher Education, New York, Ny.
8	Prescott's Microbiology, Eighth Edition Reviewed by Joanne J. Dobbins Joanne M. Willey, Linda M. Sherwood, And Christopher J. Woolverton. 2011. Mcgraw-Hill Higher Education, New York, Ny.
9	Medigan Mt And Martinko Jm (2014), Brock Biology of Microorganisms, 14th Edition. Parker J. Prentice Hall International Inc