



COURSE CURRICULUM

Course Title: Basic Microbiology

Course Code: LS112

Credit Units: 04

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3	0	2	0	04

Course Objectives:

Theory: To introduce the students to the basic aspects of microbiology.

Practical: To develop basic microbiological laboratory skills.

Pre-requisites: Life Sciences

Student Learning Outcomes: students will be able to:

- define basic principles of microbiology.
- develop knowledge of microbial cell structure, growth and metabolism
- explain the role of microorganisms in diseases.
- develop proficiency in laboratory skills and safety protocols.
- describe microbial systematics and genetics

Course Contents/Syllabus- Theory:

	Weightage (%)
Module I: Introduction and Historical Perspective	15
Descriptors/Topics: Discovery of microbial world, controversy over spontaneous generation, contributions of Louis Pasteur, Leeuwenhoek, John Tyndall, Joseph Lister, Robert Koch, Sergei N. Winogradsky and Beijerinck. Principles of microbial nutrition. Culture media. Pure culture techniques. Theory and practice of sterilization. Staining methods. Microscopy.	

Module II: Microbial Cell Structure and Diversity	20
Descriptors/Topics: Diversity of Microbes: Overview of viruses (T4 and ? Phage), bacteria, archaea, fungi, protozoa, algae. Structure and Function of Prokaryotic Cells: Cell walls, cell membranes, flagella and pili, capsules, cell inclusions, endospores, ribosomes, nucleoid, plasmids, archaeal cell walls and cell membranes	
Module III: Microbial Growth and Metabolic Diversity	25
Descriptors/Topics: Microbial Growth: Definition of growth, growth curve, measurement of growth, mathematics of growth, diauxic and synchronous growth, continuous culture; effect of environmental factors on growth. Metabolic Diversity: Phototrophy, chemolithotrophy, nitrogen fixation, fermentations, methanogenesis, anaerobic respiration.	
Module IV: Microbial Ecology	25
Descriptors/Topics: Normal microbiota of skin, oral cavity, gastrointestinal tract. Microbial virulence and pathogenesis. Exotoxins and Endotoxins. Infectious disease transmission. Microbial diseases: Bacterial Diseases (Typhoid, Cholera, Diphtheria, Tuberculosis, Tetanus). Viral diseases (Influenza, Poliomyelitis, Hepatitis, AIDS). Protozoal Diseases (Malaria). Fungal diseases (dermatomycosis). Antimicrobial agents.	
Module V: Applied Microbiology	15
Descriptors/Topics: Role of microbes in biodegradation and bioremediation, Biofertilizers, Waste water treatment. Production of antibiotics (penicillin), dairy products (fermented milks and cheese), fermented beverages (beer and wine).	

Pedagogy for Course Delivery:

Lectures: 39

Tutorial: 0

Presentation/ Seminar: 4

Class Test: 2

Total: 45

Lab/ Practical details, if applicable:

Tutorial: 00

Practical: 26

Class Test: 4

Total: 30

List of Experiments:

1. Microbiology Laboratory rules and precautions, instrumentation
2. Instruments used in Microbiology Laboratory
3. Preparation of solid and liquid media.
4. Pure Culture Techniques: Streak Plate Method, Serial dilution and Pour plate method, Spread plate method.
5. Staining techniques: Simple staining, Endospore staining, Gram staining, Lactophenol cotton blue staining for fungi.
6. Biochemical activities of microorganisms: Starch hydrolysis test, IMViC test
7. Growth curve measurement of bacterial population by turbidometry.
8. Water microbiology-Presumptive, confirmed and completed test to detect fecal coliforms.
9. Antibiotic Sensitivity Test.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Class Test	Home Assignment	Presentation/ Seminar	Attendance	
Weightage (%)	15	5	5	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination			
Components (Drop down)	Performance	Lab record	viva	Attendance	Lab record	Performance	Viva	Total
Weightage (%)	10	5	10	5	10	40	20	100

Text & References:

- Prescott, Harley and Klien's Microbiology, Willey, Sherwood, Woolverton, 7th edition, 2011, McGraw Hill Higher Education, ISBN-13: **978-0073302089**
- Brock Biology of Microorganisms, Madigan, Martinko, Stahl, Clark, 13th edition, 2011, Benjamin Cummings, ISBN-13: **978-0321649638**
- Microbiology An Introduction, Tortora, Funke and Chase, 9th edition, 2006, Benjamin Cummings, ISBN 13: **9780321733603**
- General Microbiology, Stanier, Ingraham, Wheelis, 5th edition, 1987, MacMillan, ISBN-13: **978-0333417683**
- Ananthanarayan and Paniker's Textbook of Microbiology, Ananthanarayan and Paniker, 8th edition, 2009, Universities Press ISBN 13: **9788173716744**
- Biotechnology A textbook of Industrial Microbiology, Crueger and Crueger, 2nd edition, 1990 Sinauer Associates Inc.,U.S., ISBN 13: **9780878931316**
- Experiments in Microbiology, Plant Pathology and Biotechnology, Aneja KR, 4th edition, 2003, New Age International, ISBN: **9788122414943**
- Microbiology: A laboratory Manual, Cappuccino and Sherman, 7th Edition, 2004, Benjamin Cummings, ISBN 13: **9780805328363**

Any other Study Material:

- Research Papers