

LS 404—MICROBIOLOGY

Serial number	Topics
1.	History of microbiology: Theory of spontaneous generation- Experiments of Pasteur and Tyndall, Koch's Postulates, Isolation of bacteria from natural sample column, Control of Microbial growth- methods a sterilization
2.	Role of bacteria in human welfare: Biological concepts – Immunization (Pasteur experiment Antibiosis), (penicillin story), Griffith's experiment Avery... and McCarty's experiment, Experiment with viruses
3.	The Microbial cell: General organization of cell, Prokaryotes Eukaryotes and <i>Archaea</i> , Cell wall organization on Prokaryotes, Eukaryotes and <i>Archaea</i> , Cell surface appendages- pilli, locomotion by flagella chemotactic Movement, Peptidoglycan synthesis-inhibitors in different steps
4.	Changing concepts in microbiology taxonomy, Earlier systems, Molecular taxonomy, Jackard's similarity coefficients
5.	Growth and nutrition : Growth kinetics, Batch and continuous cultures, Nutritional classification of microorganisms, Nutritional uptake by microorganisms (C.N.P)
6.	Metabolic Pathways: Metabolic versatility of microbes, Anaerobic Carbon metabolism: Anaerobic respiration-...respiration, Sulphate respiration, Reference to glycolysis, Fermentation- diverse fermentation products, Putrefaction, Methane oxidizing and Methanogenic bacteria, Aerobic Carbon metabolism : TCA cycle alternative metabolic pathways
7.	Nitrogen metabolism; Nitrogen Fixation, Assimilatory nitrate reduction, Ammonia assimilation and synthesis of amino acids, Regulation of 'nif'
8.	Energy Metabolism: Chemo autotrophs, Hydrogen bacteria, Phototrophic bacteria/Cyanobacteria
9.	Microbial Genetics: Modes of genetic exchange in microbes, Transformation, Transduction, Conjugation, Evolutionary Significance
10.	Microbes in Extreme Environment: The basis of extremophiles and their applications, Life of a thermophile (<i>Thermus</i> , <i>Pyrococcus</i>)
11.	Microbes and Agriculture: Symbiotic Nitrogen fixation- <i>Rhizobium</i> , <i>Cyanobacteria</i> (<i>Anabaena</i> , <i>Azolla</i> etc.), <i>Mycorrhiza</i> , Clinical Microbiology, Survey of disease causing microbes, Mechanisms of Pathogenesis, Antibiotics and their targets, Immune response elicited by microorganisms
12.	Industrial Microbiology: Major industrial products from microbes, Beverages, Antibiotics, Secondary metabolites, Recombinant products
13.	Environmental Microbiology: Nature of anthropogenic wastes, Municipal wastes and xenobiotics, Enrichment cultures, Xenobiotic degrading consortia, Bioremediation

Suggested reading:

1. Microbiology, J.G. Cappuccino, N. Sherman, Pearson Education Publications

2. Essential Microbiology, Stuart Hogg, John Wiley and Sons Limited
3. Microbiology: A Human Perspective, E.W. Nester, D.G. Anderson, C.E. Roberts, N.N. Pearsall, M. T. Nester Mc Graw Hill Higher Education
4. Culture of Animal Cells, A Manual of Basic Technique. R. I. Freshney, Wiley-Liss Publications
5. Manual of Environmental Microbiology, C. J. Hurst, R.L.Crawford, G.R.Knudsen, M.J. McInerney, L.D. Stetzenbach,, ASM Press.
6. Microbiology, L.M. Prescott, J. P. Harley, D.A., Klein, Mc Graw Hill International Edition
7. General Microbiology. H.G. Schlegel, Cambridge University Press