Core Course

LS 404—MICROBIOLOGY [2 credits]

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S No	Topic	Contact Hours
1.	History of microbiology: Theory of spontaneous generation Experiments of Pasteur and Tyndall, Koch's Postulates, Isolation of bacteria form 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 Archaea, Cell wall organization on Prokaryotes, Eukaryotes and Archaea, Cell surface appendagespilli, locomotion by flagella chemotactic Movement, Peptidoglycan synthesis-inhibitors in different steps	
4.	Changing concepts in microbiology taxonomy, Earlier systems, Molecular taxonomy, Jackard's similarly coefficients	
5.	Growth and nutrition: Growth kinetics, Batch an 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 (Thermus, Pyrococcus)	
11.	Microbes and Agriculture: Symbiotic Nitrogen fixationRhizobium, Cyanobacteria (Anabaena, Azolla etc.), Mycorrihiza, 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.
4. Roberts, N.N. Pearsall, M. T. Nester McGraw Hill Higher Education
5. Culture of Animal Cells, A Manual of Basic Technique. R. I. Freshney, Wiley-
6. Liss Publications
7. Manual of Environmental Microbiology, C. J. Hurst, R.L.Crawford,
8. G.R.Knudsen, M.J. McInerney, L.D. Stetzenbach,, ASM Press.
9. Microbiology, L.M. Prescott, J. P. Harley, D.A., Klein, McGraw Hill
10. International Edition
11. General Microbiology. H.G. Schlegel, Cambridge University Press