

Taiz, L. and Zeiger, E. 2003. Plant Physiology. Sinauer Associates, Inc., Publishers, Massachusetts. USA.

Voet D. Voet J. G. and Pratt C.W., 2006. Fundamentals of Biochemistry 2nd Ed, John Wiley and Sons Inc.

Wilson, K. and Walker, J. 1994. Practical Biochemistry: Principles and Techniques. Cambridge University Press, Cambridge, UK.

Wilson, K. and Goulding, K.H. (Eds), 1996. A Biologists Guide to Principles and Techniques of Practical Biochemistry. Edward Arnold, London, U.K.

BOH403 (REV22) - MICROBIOLOGY

Teaching Hours: 10/Unit

Course outcome:

- Gives the basics of microbiology. There is a detailed study of the various major groups of microorganisms.
- Also, students study the processes like fermentation which has practical application in food industry and breweries
- The course also introduces students to the rich diversity of microorganisms like fungi which has a lot of research potential.

Unit I:

Scope of microbiology - Ancient Microbiology. Microorganisms, their special characters and habitat.

History: Historical development of various fields of microbiology; contributions of early microbiologists like Antony Van Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Alexander Flemming, Ivanowski, Lord Lister, Lazzaro Spallanzani, Paul Ehrlich, Emil Christian Hansen and A.E. Mayer.

Microscopy - Its principles and applications, Simple - Compound, Dark field, phase contrast, Fluorescent and Electron Microscopes - SEM, TEM.

Unit II:

Microbial Taxonomy : Definition and systematics, Nomenclatural rules and identification. Haeckel's three kingdom classification, Whittaker's five kingdom approach - Woese domain system. Major characteristics used in taxonomy - morphological, physiological, metabolic, reproduction and genetic and molecular taxonomy. Biology of Microorganisms: Differences between prokaryotic and eukaryotic cell.

Unit III:

Biology of bacteria - cell structure, size, shape, membrane structure, cell wall, cytoplasmic inclusions, mesosomes, flagella and motility, slime, capsule, pili, chemotaxis, endospore and exospores, carboxysomes, magnetosomes, phycobilisomes, parasporal crystals, reserved food materials (metachromatic granules, polysaccharide granules, poly β hydroxybutyrate granules, glycogen, oil droplets, cyanophycean granules and sulphur globules). Life-cycle of Bacteria, Bergey's classification of bacteria

Unit IV:

Biology of fungi- classification, structure, reproduction and parasexual cycle. Biology of yeast - reproduction. Virus (bacteriophages) structure, life cycle (lytic and lysogenic) Nature, structure, replication and classification of Mycoplasma, Actinomycetes, Rickettsiae, Protozoa. Concepts of Microbiome, synthetic biology.

Unit V:

Bacterial genetics: Mutation, Genetic recombination - Conjugation, transformation, transduction, gene mapping.

Suggested Reading:

Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 1996. Introductory Mycology. John Wiley & Sons Inc.

Costa, M.S. Da Ed Microbiology of extreme environment & its potential for biotechnology - 1989.

Collee J.G., Applied Medical Microbiology - 2 edit - 1981.

Freifelder David - 1987. Microbial genetics.

Jacquelyn G. Black, Microbiology (Principles & Explanations) - 4th edition - 1999.

Ananthanarayanan R., Jayaram Paniker C.K. (2017). Textbook of Microbiology, 10th edition. Orient Longman.

Larry McKane/Judy Kandel -1996. Microbiology (Essential & Appliances) - 2nd Edition.

Narendra, Microbes & Environment - 1994.

Powar & Dagainawater. General Microbiology - Vol - I - eight edition - 1992 (Reprint - 2000).

Purohit S.S., Microbiology; fundamentals & applications (1991) 4 ed.