

PRINCIPAL SUBJECT AREA

BOTANY

100 LEVEL COURSES

BL 101 Basic Biology (2 credits)

Cell Biology - Chemical nature of life, origin of life, scientific method, prokaryotic and eukaryotic cells, cell types, structure and function of cell membranes and organelles, cell division, structure and function of genetic material.

Classification of organisms - Early and current systems of classification.

Genetics and evolution - Chromosome theory of inheritance, Mendelian genetics and deviation, linkage and recombination, mutations, Hardy-Weinburg principle, sources of variation, natural selection, origin of species. Laboratory exercises based on above topics.

Recommended Texts:

1. Campbell, N. A., Reece, J. B. and Mitchel, I. G. (1996). *Biology* 4th Edition. The Benjamin/Cummings Publishing Company, Inc.
2. Marder, S. S. (2001). *Biology* 7th edition. McGraw – Hill Book Company Inc., USA.
3. Raven, P. H. and Johnson, G.B. (1996). *Biology*. 4th Edition. Wm. C. Brown Publishers.
4. Tauro, P. Kapoor, K. K. and Yadav, K. S. (1986). *An Introduction to Microbiology*. Wiley Eastern Limited, New Delhi.
5. Winter, P. C., Hickey, G. T. and Fletcher, H. L. (2000). *Genetics*. 2nd Edition. Vivo Books Private Ltd., New Delhi.

BL 102 Plant and Animal Form and Function (2 credits)

Tissue types, internal structure of plants and organs, photosynthesis, transport systems, plant nutrition. Animal structure and function, nutrition and digestion, respiration and gas exchange, circulatory systems and blood, homeostasis, reproduction and hormones, nervous system and coordination.

Laboratory exercises based on the above topics.

Recommended Texts:

1. Roberts, M.B.V. (1997). *Biology – A functional Approach*. ELBS – Thomas Nelson & Sons Ltd., Nelson House, Surrey, U.K.
2. Phillips, W.D. and Chilton, T.J. (1997). *Biology*. Oxford University Press, U.K.
3. Cambell, N.A., Reeve, J.B. and Mitchel, I.G. (1996). *Biology*, 4th Edition. The Benjamin/Cummings Publishing Company, Inc.
4. Salisbury, F.B. and Ross, C.W. (1996). *Plant Physiology*, Wadsworth Publishers, London.
5. Taiz, L. and Zeiger, E. (1999). *Plant Physiology*. The Benjamin/Cummings Publishing Company, Inc.

BL 103 Basic Ecology (2 credits)

Ecological Levels (individuals, populations, communities, ecosystems, biomes, biosphere), components of the physical environment (energy, water, atmospheric gases and wind, fire, gravity, topography, geologic substratum and soil), energy flow in ecosystems (tropical levels, food webs, productivity), cycles of materials (hydrological cycle, carbon cycle, biogeochemical cycles).

Laboratory exercises based on above topics.

Recommended Texts:

1. Campbell, N. A., Reece, J. B. and Mitchel, I. G. (1996). *Biology*, 4th Edition. The Benjamin/Cummings Publishing Company, Inc.
2. Raven, P. H. and Johnson, G.B. (1996). *Biology*, 4th Edition. Wm. C. Brown Publishers.
3. Smith R. L. and Smith T. M. (2000). *Elements of Ecology*. Benjamin/Cummings Science Publishing, 567pp.
4. Archibold O.W. (1995). *Ecology of World Vegetation*. Chapman and Hall, 510pp.
5. Mabberley, D. J. (1992). *Tropical Rain Forest Ecology*. Blackie and Son Ltd., 300pp.

BL 107 Basic Microbiology (2 credits)

Introduction to microorganisms, history, discovery and diversity. Classification and major groups of microorganisms - Mollicutes, Bacteria and Protozoa. Viruses, Viroids, Prions. Distribution and role of microorganisms in different environments. Microbial cell structure and function. Microorganisms in biotechnology and disease. Microbiological equipment and safety procedures. Sterile techniques - culturing, isolation, purification, characterization and identification of microorganisms.

Laboratory exercises based on the above topics.

Recommended Texts:

1. Atlas, R.M. (1995). Principles of Microbiology. Mosby.
2. Madigan, M.T., Martinko, J.M. and Parker, J. (2002). Brock Biology of Microorganisms. 10th edition. Prentice Hall.

BL 115 Biomolecules (2 Credits)

Essential classes of biomolecules - nucleic acids, proteins, fatty acids & lipids and carbohydrates; structure and function; chemistry, properties and interactions of biomolecules; applications of biomolecules in agriculture, medicine, forensics and industry.

Laboratory exercises based on above topics.

Recommended Texts:

1. Buchanan, B.B., Guissem, W. and Jones, R.L. (2000). Biochemistry & Molecular Biology of plants. American Society of Plant Physiologists.
2. Callow, J.A., Ford – Lloyd, B.V. and Newbury, H.J. (1997). Biotechnology and Plant Genetic Recourses. Conservation and use. Biotechnology in Agriculture Series, No.19.
3. Meuser, F., Manners, D.J. and Seibel, W. (1993). Plant Polymeric Carbohydrates. The Royal Society of Chemistry.
4. Nelson, D. L. and Cox, M. M. (2009). Lehninger Principles of Biochemistry (5th Edition), W.H. Freeman and Company.
5. Stryer, L. (1995). Biochemistry (4th Edition). W.H. Freeman and Company.
6. Wilson, K. and Walker, J. (2005). Principles and techniques of Biochemistry and Molecular Biology (6th Edition). Cambridge University Press.

BL 116 Introductory Environmental Biology (2 Credits)

Introduction & Basic concepts in Environmental biology, Hydrosphere, Lithosphere, Atmosphere, Renewal & Nonrenewable resources and cycling of energy & matter, Biomes, Climate & life. Human population growth & problems of over population, Atmospheric pollution and Global changes, Impacts of atmospheric pollution on biota- plants, animals, humans, World food resources & green revolution, Effect of Agriculture on Environment, Global water resources; pollution and treatment methods, Solid and hazardous wastes, Environmental health & Toxicology, Sustaining terrestrial biodiversity & biodiversity in cities, Global resources & associated problems.

Recommended texts:

1. Tyler, G. and Miller Jr. (2004). *Living in the Environment: Principles, Connections and Solutions*. Thompson books.
2. Raven, P.H and Johnson, G.B. (1996) *Biology* 4th Edition Wm. C. Brown Publisher.

BL 117 Biotic Interactions (2 Credits)

verses interactions among plants, animals and microbes; kinds of biotic interactions with examples, interspecific interactions and intraspecific interactions – symbiotic relationships, protection and defense, competition & allelopathy. The role of trophic interactions in community initiation, maintenance and degradation. Biotic interactions affecting the sizes of species populations and diversity. Community consequences of biotic interactions and co-evolutionary dynamics. Biotic interactions in human dominated landscapes. Application aspects of biotic interactions. Laboratory exercises based on above topics.

Recommended Texts :

1. Begon, M., J.L. Harper, and C.R. Townsend (2000). *Ecology: Individuals, Populations and Communities*. 3rd Edition. Sinauer Associates, Sunderland, Mass.
2. Campbell, Neil A. and Jane B. Reece (2002). *Biology*. 6th Edition. Pearson Higher Education.
3. David F.R.P. Burslem, Michelle A. Pinard and Sue E. Hartley (Eds.) (2005). *Biotic interactions in the tropics: their role in the maintenance of species diversity*. Cambridge University Press, UK.

BL 118 Introductory Evolutionary Biology (2Credits)

General topics in Evolution: molecular evolution, adaptive radiation, speciation, plant and animal co-evolution, paleontology, phylogenetics, patterns of macroevolution, extinctions, invasion of terrestrial habitats by animals and plants, and reinvasion of water by animals.

Animal and Human evolution: human evolution, Evolution and human health, kin selection, sexual selection, altruism, selfish behaviour, mimicry and camouflage.

Plant Evolution: polyploidy, evolution of angiosperms, evolution of photosynthesis, evolution crop species

Recommended texts:

1. Campbell, Neil A., Reece, Jane B., Winickoff, Beth, Jackson, Robert B. and Wasserman, Steven (2007). *Biology with Mastering Biology*, 8th Edition, Benjamin Cummings
2. Scott Freeman and Jon C. Herron (2000). *Evolutionary Analysis* 2nd Edition, Prentice-Hall, Inc.
3. David Beerling (2007). *The Emerald Planet: How Plants Changed Earth's History* Oxford University press.
4. K. J. Willis and J. C. McElwain (2002). *The Evolution of Plants*. Oxford University press.