Course: B.Sc. Life Sciences
Semester: IV
Paper: Ecology and Evolution (Theory & Practical) DSC

Topic	Reference	Approximate (schedule)
Unit 1: Introduction to Fundamental Concepts in Ecology Inter-relation between the living world and abiotic environment. Fundamental concepts: Abiotic and biotic components; Levels of ecological organization: species, population, community, ecosystems, biomes. **Unit 2: Ecological factors** Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types; Light, Temperature (Thermal stratification in water bodies and atmosphere) and Wind; Ecological amplitude; Leibig's law of minimum; Shelford law of tolerance. **Unit 3: Population Ecology** Population Characteristics (dispersion, natality, mortality, survivorship curve, age pyramids); growth rates (density-dependent/independent); Interactions: mutualism, symbiosis, commensalism, competition, parasitism, predation, ammensalism, antibiosis. **Unit 4: Plant communities** Characters; Ecotone and edge effect; Succession; Processes and types (autogenic, allogenic, autotrophic, heterotrophic, primary, and secondary) **Unit 5: Ecosystem** Structure; niche and habitats; Food chains and food webs, Ecological pyramids production	**1.** Douglas J. Futuyma (1998). Evolutionary Biology (3rd Edition), Sinauer Associates. **2.** Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition. **3.** Mark Ridley (2003) Evolution (3rd edition), Blackwell. **4.** Odum, E.P. (2005). Fundamentals of Ecology. New Delhi, India: Cengage Leaming India Pvt. Ltd., 5th edition. **5.** Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., Jackson, R. B. (2014). Campbell biology (Vol. 9). Boston: Pearson.	January 2026- April 2026

and productivity; energy flow (single channel and Y-shaped); trophic organisation; Biogeochemical cycling; Cycling of nitrogen and Phosphorous. **Unit 6: Introduction to Evolution** Origin and history of life; Macro and microevolution; Phylogeny and the tree of life. **Unit 7: Evolution of Species** Lamarckism and Neo-Lamarckism; Darwinism – selection (natural and artificial), Neo- Darwinism; Species concept and modes of speciation. **Unit 8: Phytogeography** Phytogeographical regions of India; Endemism (definition, factors, and types).		

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Practical component: 1. Principle and operation of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter. 2. Determination of pH and detection of carbonates, chlorides, nitrates, sulphates, organic ma1er and base deficiency from at least two soil samples by rapid field tests. 4. Study of ecological adaptations of hydrophytes and xerophytes (four each). 5. Study of biotic interactions of the following: Stem parasite (*Cuscuta*), Root parasite (*Orobanche*), Epiphytes (Orchids), Predation (Insectivorous plants). 6. Determination of minimal quadrat size and number for the study of herbaceous vegetation in the college campus, by species-area curve method (species to be listed). 7. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law. 8. Study of ecological speciation (allopatric and sympatric) with the help of examples . 9. Study phylogenetic relationships among taxa with the help of exercises. 10. Construct a phylogenetic tree using MEGA (Molecular Evolutionary Genetics Analysis) and interpret evolutionary relationships.	**1.** Douglas J. Futuyma (1998). Evolutionary Biology (3rd Edition), Sinauer Associates. **2.** Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition. **3.** Mark Ridley (2003) Evolution (3rd edition), Blackwell. **4.** Odum, E.P. (2005). Fundamentals of Ecology. New Delhi, India: Cengage Leaming India Pvt. Ltd., 5th edition. **5.** Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., Jackson, R. B. (2014). Campbell biology (Vol. 9). Boston: Pearson.	January 2026- April 2026