

# Department of Botany, Govt. Degree College Baramulla (Autonomous)

(NAAC Re-accredited Grade A and CPE status)

## Syllabus 8<sup>th</sup> Semester (4 years Honours with Research Degree Course)

### Subject: Botany

**Title: Biosystematics, Evolution and Biodiversity (Credits: 4 theory)**

**(Paper Code: BOTR1822M)**

**No. of Contact hours: 64)**

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#### Course Learning Objectives (CLOs)

By the end of the course, students will be able to:

1. **Explain and apply** the principles, rules, and techniques of plant identification, nomenclature, and classification, including the use of modern tools such as virtual herbarium and e-floras.
2. **Compare and evaluate** major systems of classification and phylogenetic concepts, and **illustrate** evolutionary relationships using phylogenetic trees and cladograms.
3. **Analyze** patterns, values, and threats to biodiversity, with emphasis on plant genetic resources, hotspots, and conservation priorities at global and national levels.
4. **Assess and recommend** biodiversity conservation and management strategies, including legal frameworks, conventions, organizations, and the role of information networks in biodiversity protection.

#### Unit 1: Plant Identification and Nomenclature.

Principles and rules (ICN); Ranks and names; Typification, author citation, Effective and valid publication, principle of priority and its limitations; Names of hybrids. Virtual herbarium; E-floras.

Numerical taxonomy: Characters; Variations; OTUs, character weighting and coding; Cluster analysis; Phenograms, cladograms (definitions and differences).

Taxonomic evidences: Role of Embryology, Anatomy, Phytochemistry and Palynology in systematics.

#### Unit 2: Classification Systems and Phylogeny

Types of classifications (Artificial, Natural and Phylogenetic); outline of Bentham and Hooker's classification, (up to series), Angiosperm Phylogeny Group (APG-IV) classification.

Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, paraphyly, polyphyly and clades).

Origin and evolution of angiosperms; Co-evolution of angiosperms and animals;

Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).

#### Unit 3: Biodiversity

Kinds and Values of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values. Plant Genetic Resources for food and Agriculture (PGRFA)

Hot spots of biodiversity, Keystone species; concept of endemism

Threats to biodiversity (overexploitation, Habitat loss, habitat fragmentation, invasive species; climate change and pollution)

## Unit 4: Biodiversity Management

Conservation of biodiversity: *In-situ* and *ex-situ* conservation. Conservation genetics, Population Variability Analysis (PVA).

Biodiversity Management Strategies: Biodiversity Acts and Protection of Plant Varieties and Farmers Rights (PPVFR)

Convention on Biodiversity (CBD); National Biodiversity Action Plan, Convention on Wetlands (Ramsar Convention).

GBIF—the Global Biodiversity Information Facility.

Biodiversity status at global, national and local levels.

Organizations for Biodiversity Conservation: IUCN, CITES, WWF, TRAFFIC, UNDP, UNEP, IPBES, IPPC and IPCC.

### Suggested Readings

1. Douglas Soltis, Pamela Soltis, Peter Endress, Mark Chase, Steven Manchester, Walter Judd, Lucas Majure, Evgeny Mavrodiev (2018) *Phylogeny and Evolution of the Angiosperms..* University of Chicago Press.
2. Singh G. (1019) *Plant Systematics: An Integrated Approach*, Fourth Edition. By. CRC Press.
3. Clive A. Stace (1998) *Plant Taxonomy and Biosystematics*. Cambridge University Press
4. Walter S. Judd et al. (2002) *Plant Systematics: A Phylogenetic Approach*. Sinauer Associates
5. Kevin J. Gaston, John I. Spencer (2003) *Biodiversity: An Introduction*. Wiley Blackwell
6. Bradley Cardinale, Richard Primack, and James Murdoch (2019) *Conservation Biology*. Oxford University Press.
7. Krishnamurthy KV (2022). *An Advanced Text Book on Biodiversity: Principles and Practices*. CBS publishers and distributors.
8. Malcolm M Hunter, James P. Gibbs, Viorel D. Popsecu (2021). *Fundamentals of Conservation Biology*. Wiley Blackwell.
9. Kamaljit S Bawa, Richard B Primack, Meera Anna Oommen (2011). *Conservation Biology: A Primer for South Asia*. Orient Blackswan Pvt. Ltd.
10. Fred Van Dyke and Richard L. Lamb (2020). *Conservation Biology: Foundations, Concepts and Applications*. Springer