

Core X

Plant Systematics

Course Objectives

- A comprehensive presentation of the rules, regulations and codes of governing principles of the International Code of Nomenclature of Algae, Fungi and Plants (ICN)
- To provide knowledge on basic concepts of plant nomenclature and the tools used for naming the taxa.
- To impart knowledge on the traditional and advanced systems of classification of lower and higher plants.
- To acquaint the students with the modern approaches for developing systematic relationships in the plant kingdom.
- To enlighten the students about the phylogeny and the methods for building phylogeny among taxa of various angiosperms.
- To educate the students on the specific taxonomic characteristics of some angiosperm families and the method to make morphological studies of plant materials.

Course Outcomes:

- Knowledge on various levels of taxonomic hierarchy and the relationships among various hierarchical levels with respect to their similarities and variations of characters.
- The skill to use various taxonomic literature, Flora and herbaria, keys of both physical and digital types for plant identification and floristic studies.
- Critical thinking on the ancient, traditional and modern classification systems and evaluation of their applicability in taxonomic placement of taxa.
- Knowledge on the evolution of the concepts in classifying plants and weighing the potential of various tools.
- Ability to build the phylogeny among various taxa of different levels of hierarchy and identifying the apomorphy and plesiomorphy.
- Critical observations of the morphology of plant materials for taxonomic description and identification to the family, genus and species level.

Unit I:

Learning Outcome: The students shall gain knowledge on the importance of specimens, herbaria and flora for study of plant taxonomy.

Plant identification, Classification, Nomenclature; Biosystematics. Identification: Field inventory; Functions of Herbarium; Important herbaria and botanical gardens of the world

and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: Single access and Multi-access

Unit-II:

Learning Outcome: The learners shall have basic understanding on the application of rules of ICN for plant identification and nomenclature.

- Taxonomic hierarchy: Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary).
- Botanical nomenclature: Principles and rules (ICN); Ranks and names; Typification, author citation, valid publication, rejection of names, principle of priority and its limitations; Names of hybrids.

Unit-III:

Learning Outcome: The students shall be able to classify a plant as per the correct taxonomic hierarchy.

- Systematics- an interdisciplinary science: Evidence from palynology, cytology, phytochemistry and molecular data.
- Systems of classification: Major contributions of Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan and Cronquist; Classification systems of Bentham and Hooker (up to series) and Hutchinson (up to series); Brief reference of Angiosperm Phylogeny Group (APG III) classification.

Unit-IV:

Learning Outcome: The student shall have the skill to apply modern taxonomic tools in plant taxonomy.

- Phylogeny of Angiosperms: Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence, monophyly, Paraphyly, polyphyly and clades). Origin & evolution of angiosperms; co- evolution of angiosperms and animals; methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).
- Families of Angiosperms: Descriptive studies of *Magnoliaceae*, *Rosaceae*, *Rubiaceae*, *Poaceae*, *Orchidaceae*, *Musaceae*, *Acanthaceae*, *Apocynaceae*, *Asclepiadaceae*, *Lamiaceae*.

Practical:

1. Study of vegetative and floral characters of available materials of the families included in theory syllabus (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification).
2. Field visit, plant collection and herbarium preparation and submission. Mounting of properly dried and pressed specimen of at least fifteen wild plants with herbarium label (to be submitted in the record book)

Text Books:

- ✓ *harma O. P. (2009) Plant Taxonomy, Tata Mc Grow Hill, New Delhi*
- ✓ *Sharma A. K, Sharma R, Taxonomy of Angiosperms and Utilisation of plants, Pragati Prakasan, Meerut*

Reference Books:

- ✓ *Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.*
- ✓ *Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.*
- ✓ *Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.*
- ✓ *Saxena, H. O. and Brahman, M. The Flora of Orissa, CSIR Publication.*
- ✓ *Bose T. K. (2009). Trees of the World, Regional Plant Resource Centre, Bhubaneswar, Odisha, India*
- ✓ *Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York.*
- ✓ *Hanes, H. H. (2009). Botany of Bihar and Orissa,*
- ✓ *Mohanty, C. R. (2017). Text Book of Plant Systematics, Kalynai Publisher, New Delhi.*
- ✓ *Subrahmainayam, M. S. (2011) Modern Plant Taxonomy, Vikash Publishing House, New Delhi*