

## DISCIPLINE SPECIFIC CORE COURSE – 6: Plant Systematics

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>Plant Systematics</b>	<b>04</b>	<b>2</b>	<b>0</b>	<b>2</b>	10+2 from any recognized Board with Biology	<b>Nil</b>

### Learning Objectives

The course will help students gain knowledge about:

- The basics of plant systematics and its inter-relationships with allied subject areas

### Learning outcomes

On completion of the course the students will be able to:

- understand technical terminology used in plant taxonomy
- apply the terminologies to describe, identify and classify flowering plants
- search and analyse taxonomic information from internet-based scientific databases and other resources
- interpret and evaluate the concept of species and evolutionary processes in angiosperms
- comprehend and compare various systems of classifications
- recognise diversity in local/regional flora
- appreciate the significance and application of systematics in science and welfare of society

### SYLLABUS OF DSC-6

#### Unit 1: Introduction

**02 Hours**

Identification, Classification (types) and Nomenclature, Phylogeny; Major contributions - Parasara, Charaka, Theophrastus, Bauhin, Tournefort, Linnaeus, Adanson, de Candolle, Bessey, Hutchinson, Takhtajan, Bremer, MW Chase

#### Unit 2: Resources in Plant Identification

**02 Hours**

Literature (Floras, Manuals, *Icones*, Monographs, Revisions, Journals, e-resources); Herbaria and Botanical gardens (in brief)

#### Unit 3: Systematics - An Interdisciplinary Science

**04 Hours**

Relevance of palynology, cytology, phytochemistry and molecular data (cite at least (streak, spread & pour), replica plating, serial dilution.

three examples from each with emphasis on application in resolving taxonomic problems - details of techniques to be excluded)

Unit 4: Botanical Nomenclature

**05 Hours**

Principles and rules (ICN); Ranks and names; Principle of priority and its limitations; Concept of 'Type', Author citation, Valid publication, Rejection of names; Nomenclature of hybrids

Unit 5: Systems of Classification

**06 Hours**

Taxonomic hierarchy; Concept of species (morphological, biological and evolutionary); Classifications - Bentham and Hooker's (up to series), Engler and Prantl's (upto sub-class) and Angiosperm Phylogeny Group (APG) classification (major clades).

Unit 6: Approaches in Systematics

**06 Hours**

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

**Phenetics** - Principles, Methodology, Characters; Selection of OTUs, Character weighing and Coding; Cluster analysis; Phenogram.

**Cladistics** - Principles, Methodology, Characters; Selection of EUs, Character weighing and Coding; Cluster analysis; Cladogram

Unit 7: Evolution of Angiosperms

**05 Hours**

Concept of a primitive flower (Euanthial theory and Pseudanthial theory); Basal Living Angiosperms; Herbaceous origin; Co-evolution of angiosperms with animals.

**Practicals:**

1. Field trip/ Visit to any herbaria/ Botanical Garden.

**04 Hours**

2. To prepare at least five herbarium specimens and identify them using available resources (Literature, herbaria, e-resources, taxonomic keys) and classify up to family level (according to Bentham and Hooker's classification and compare it with APG IV System in the field note book).

**08 Hours**

3. Description of taxa using semi-technical terms and identification of the families according to Bentham and Hooker's classification and compare the placement of family with APG IV System (Only placement of family according to APG IV system to be mentioned)

**48 Hours**

**Note:** Any **twelve** families from the following list to be studied with **at least two** specimens (**or one** where limitations exist).

**List of Suggested Families (\*mandatory)**

Acanthaceae, Amaranthaceae, \*Apiaceae, Apocynaceae, \*Asteraceae, \*Brassicaceae, \*Euphorbiaceae, \*Fabaceae, \*Lamiaceae, Liliaceae, \*Malvaceae, Moraceae, \*Poaceae, \*Ranunculaceae, \*Solanaceae

**Suggested Readings:**

1. Simpson, M. G. (2019). Plant systematics. 3<sup>rd</sup> Edition, Academic press.
2. Singh, G. (2019). Plant Systematics- An Integrated Approach. 4<sup>th</sup> edition. CRC Press, Taylor and Francis Group.
3. Stuessy, T.F. (2009). Plant Taxonomy: The Systematic Evaluation of Comparative Data, 2<sup>nd</sup> edition, Columbia University Press.
4. Taylor, D.V., Hickey, L.J. (1997) Flowering Plants: Origin, Evolution and Phylogeny.

- CBS Publishers & Distributors, New Delhi.
5. Pandey, A. K., Kasana, S. (2021). *Plant Systematics*. 2<sup>nd</sup> Edition. CRC Press Taylor and Francis Group
  6. <http://www.mobot.org/MOBOT/research/APweb/>
  7. Maheshwari, J. K. (1963). The flora of Delhi. Council of Scientific & Industrial Research.
  8. Maheshwari, J. K. (1966). Illustrations to the Flora of Delhi. Council of Scientific & Industrial Research.
  9. Harris, J. G., Harris, M. W. (2001). Plant Identification Terminology: An Illustrated Glossary. Spring Lake, Utah: Spring Lake Pub. Spring Lake, Utah.
  10. Radford, A. E. (1974). Vascular plant systematics. Harper & Row Publishers, New York, London.
  11. Judd, W.S., Campbell, L.S., Kellogg, E.A., Stevens, P.F., Donoghue, M.J. (2016) Plant Systematics: A Phylogenetic Approach. 4<sup>th</sup> edition. Sunderland, MA: Sinauer Associates

#### **Additional Resources:**

1. The Angiosperm Phylogeny Group, Chase, M. W., Christenhusz, M. J.M., Fay, M. F., Byng, J. W., Judd, W. S., Soltis, D.E. Mabberley, D. J., Sennikov, A. N., Soltis, P. S., Stevens, P. F. (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical journal of the Linnean Society 181 (1): 1–20.
2. Soltis, D. E., Bell, C. D., Kim, S., Soltis, P. S. (2008). Origin and early evolution of angiosperms. Annals of the New York Academy of Sciences 1133: 3-25.
3. Scutt, C. P. (2021). The origin of angiosperms. In Evolutionary developmental biology: a reference guide. Cham: Springer International Publishing.
4. <https://www.mobot.org/MOBOT/research/APweb/treeapweb2s.gif>
5. <https://www.digitalatlasofancientlife.org>
6. <http://apps.kew.org/herbcat/navigator.do>
7. <https://efloraofindia.com/>
8. <https://powo.science.kew.org/>
9. Page, R.D.M., Holmes, E.C. (1998). Molecular Evolution: A phylogenetic approach. Blackwell Publishing Ltd.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**