# Semester I

## DISCIPLINE SPECIFIC CORE COURSES (DSC)
## SEMESTER-I

**Course Code BOT-DSC-1**
**Course Title: Plant Diversity and Systematics**
**Total Credits: 04 (Credits: Theory 02, Practical 02)**
**Total Hours: Lectures- 30, Practical- 15 classes of 4 hours each**

### Objective:

**To make students aware about the diversity of plants and microbes present on the planet and their evolutionary relationships.**

### Learning Outcomes:

This course will be able to impart basic knowledge and understanding of:

- the diversity of plants and microbes
- the possible relationships between each group
- their general characteristics
- approaches used for identification and classification of various groups of plants

### Unit 1: Diversity of Life — Lectures: 01

Classifying the diversity of life: Domains of Life –Eubacteria, Archaea and Eukaryotes

### Unit 2: Microbes — Lectures: 04

Viruses: General account; Replication, Lytic and Lysogenic cycle; Bacteria: structure, wall-less forms (L-forms, Mycoplasma), asexual reproduction and genetic recombination

### Unit 3: Algae — Lectures: 03

Brief introduction of major classes: Blue-green, Green, Brown and Red algae. Diagnostic features of identification; morphology, reproduction and classification with special reference to *Nostoc*, *Volvox* and *Spirogyra*.

### Unit 4: Fungi — Lectures: 03

Diagnostic features of identification; morphology, reproduction and classification with special reference to *Rhizopus, Penicillium and Agaricus*; Lichens (a general account).

**Unit 5: Bryophytes, Pteridophytes and Gymnosperms** **Lectures: 06**

Characteristic features of identification; morphology and reproduction of Bryophytes, Pteridophytes and Gymnosperms with special reference to *Marchantia, Funaria*, *Pteris* and *Pinus* (only morphology).

**Unit 6: Angiosperms** **Lectures: 02**

Diagnostic features, Structure of flower, types of inflorescence

**Unit 7: Systematics** **Lectures: 01**

Aims, fundamental components of systematics, description, identification, nomenclature, phylogeny, biosystematics**.**

**Unit 8: Systematics in Practices** **Lectures: 07**

Taxonomic Hierarchy- Concept of taxa and categories, Botanical Nomenclature- principles and rules; Type method; Author citation; Valid publication; Rejection of names, Principle of priority and its limitations, names of hybrids and cultivars.

**Unit 9: Systems of classification** **Lectures: 03**

Classification: Artificial, Natural and Phylogenetic. An outline of Bentham and Hooker's (up to series only) and Engler and Prantl's (up to Subclasses) systems of classification and their merits and Demerits. APG System.

**Practicals: (60 hours)**

1. **Viruses:** Electron Micrographs of TMV and Bacteriophage, Specimens of virus infected plants (any two).
2. **Bacteria:** Electron Micrographs of a bacterium, types through permanent slides/photographs, specimens of infected plants (any two).
3. **Algae:** Study of vegetative and reproductive structures of (a) *Nostoc* (b) *Volvox* (c) *Spirogyra* through temporary preparations and permanent slides.
4. **Fungi:** Study of vegetative and reproductive structures of (a) *Rhizopus,* (b) *Penicillium* and (c) *Agaricus* through temporary preparations and permanent slides/specimens/photographs.
5. **Lichens:** Crustose, Foliose and Fruticose (specimens/ digital resources)
6. **Bryophytes:** Study of (a) *Marchantia:* morphology of thallus, W.M. rhizoids and scales, V.S. thallus through gemma cup, W.M. gemmae (all temporary slides), V.S. antheridiophore, archegoniophore, L.S. sporophyte (all permanent slides), (b) *Funaria*: detailed study and classification from W.M. rhizoids, operculum, peristome, spores and permanent slides of archegonia, antheridia and capsule.
7. **Pteridophytes:** Study of *Pteris:* T. S. of Rachis, V.S. of Sporophyll and W.M. of sporangium.
8. **Gymnosperms:** Study of *Pinus* morphology of long & dwarf shoot, male and female cones (specimens) and T.S. of needle (permanent slides only).

9. **Herbarium technique:** Mounting of a properly dried and pressed specimen of any wild plant on the herbarium sheet with complete herbarium label.
10. Taxonomic study of characters of one plant from each of the following families (any four): Malvaceae, Solanaceae, Asteraceae, Fabaceace, Liliaceae.

**Suggested Readings:**


1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, 4th edition. Singapore, John Wiley and Sons (Asia).
2. Kumar, H.D. (1999). Introductory Phycology, 2nd edition. Delhi, Delhi: Affiliated East-West. Press Pvt. Ltd.
3. Bhatnagar, S.P., Moitra, A. (1996). Gymnosperms. New Delhi, Delhi: New Age International (P) Ltd. Publishers.
4. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Prayagraj: U.P.: Central Book Depot.
5. Pelczar, M.J. (2001). Microbiology, 5th edition. New Delhi, Delhi: Tata McGraw-Hill Co.
6. Tortora, G.J., Funke, B.R., Case. C.L. (2007). Microbiology. San Francisco, U.S.A: Pearson Benjamin Cummings.
7. Raven, P.H., Evert, RF., Eichhorn, S.E. (2013). Biology of Plants, 8th edition, New York, NY: W.H. Freeman and Company.
8. Sethi, I.K., Walia, S.K. (2018). Text book of Fungi and Their Allies. (2nd Edition), Medtech Publishers, Delhi.
9. Vashishta, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. New Delhi, Delhi: S. Chand & Co Ltd.
10. Singh, G. (2020). Plant Systematics: Theory and Practice, 4th edition. CBS Publishersand Distributers, New Delhi.
11. Simpson, M.G. (2020). Plant Systematics, 3rd edition, Elsevier Academic Press, San Diego, CA, U.S.A.
12. Gupta R. 2011. Plant Taxonomy: past, present, and future. New Delhi: The Energy and resources Institute (TERI).
13. Judd W.S., Campbell C.S., Kellogg, E. A., Stevens, P.F., Donoghue M.J. (2015). Plant Systematics: A Phylogenetic Approach 4th Edition Sinauer Associates, Oxford University Press. USA.
14. http://www.mobot.org/MOBOT/research/APweb/. (for APG IV classification).



**Keywords: Bacteria, Viruses, Bryophytes, Pteridophytes, Gymnosperms, Angiopserms, Classification**