

Paper Code	NBOT-110	Cr. Hrs	03 (Class Credits: 02; Lab Credits: 01)
Paper Title	BOTANY		
Domain	Natural Sciences		

THEORY:

Introduction of the Course:

The course is organized to provide an adequate knowledge about different plant groups with their representatives along with their Taxonomy, Morphology, Anatomy, Biochemistry, Genetics, Physiology and Ecology. It is generally aimed to familiarize students with the morphological and systematic knowledge of different plant groups, their evolution and Economic importance.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts of different plant groups and their morphological/anatomical characteristics.
2. To give an insight into plant cell structure with an emphasis on their Biochemistry, Genetics and Evolution.

Contents:

1. Plant Diversity:

- 1.1. General account of plant structures including morphology, habitat and reproduction of different plant groups including Viruses (TMV), Bacteria (including Cyanobacteria), Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (Dicots and Monocots), their general characteristics with representative types/examples.

2. Plant Taxonomy:

- 2.1. Binomial Nomenclature with an Introduction to International Code of Botanical Nomenclature (ICBN).

3. Morphology/Anatomy:

- 3.1. Structure of plant cell
- 3.2. Simple Tissues (Parenchyma, Collenchyma, Sclerenchyma)
- 3.3. Complex Tissues (Xylem, Phloem)
- 3.4. Morphological and Anatomical Structure of Root, Stem, Leaf and Flower

4. Cell Biology:

- 4.1. Brief description of different Cellular Organelles with special emphasis on Chloroplast and Mitochondria.

5. Biochemistry & Genetics:

- 5.1. Brief description of Biomolecules (Carbohydrates, Lipids, Proteins, Structure and function of Nucleic Acids)
- 5.2. Mitosis and Meiosis
- 5.3. Mendelian inheritance
- 5.4. Linkage and crossing over
- 5.5. Sex linked inheritance

6. Plant Physiology & Ecology:

- 6.1. Mechanism of Transpiration
- 6.2. Mechanism of Photosynthesis
- 6.3. Mechanism of Respiration
- 6.4. Ecosystem and its components
- 6.5. Biogeochemical cycles
- 6.6. Food Chain and Food Web

7. Evolution

8. Economic importance of plants

Practicals:

1. Study and staining (where applicable) of some representative types (Bacteria/ Cyanobacteria/Algae/Fungi).
2. Identification of representative types of plant groups mentioned in the course from fresh / preserved specimens and prepared slides.
3. Study of cell structure using compound microscope and measurement of cell size.
4. Study of mitosis by smear/squash method and from prepared slides.
5. Study of Transverse Section of Stem/Root and Leaf of Angiosperms.
6. Extraction of Chlorophyll from the leaves and separation of Component Pigments on a Paper Chromatogram.
7. Measurement of Vegetation by Quadrat and Line Intercept Methods.
8. Extraction and estimation of Biomolecules (Carbohydrates/Proteins/Lipids).
9. Field surveys to study and observe/collect representative members of various plant groups mentioned in syllabus.

Teaching-learning Strategies

1. Lectures
2. Group Discussion

3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

1. Students are expected to get familiarized with the morphological and systematic knowledge about different plant groups.
2. They will be able to describe, apply and integrate the basic concepts of Cell Biology including Genetics and Evolution, Biochemistry, Physiology as well as Structure and Functions of different Organelles.
3. This will enable them qualify for basic to moderate level jobs involving knowledge of plants and their environment.
4. The obtained knowledge shall also enable the students to enter into various entrepreneurial activities involving general introduction to botany.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Bretscher, A. (2007). *Molecular Cell Biology*. W. H. Freeman and Company.
2. Campbell, N. A., Reece, J. B., Taylor, M. R and Simon, E. J. (2008). *Biology: Concepts and Connections*, (6th Ed.), Benjamin Cummings.
3. Esau, K. (1960). *Anatomy of Seed Plants*. John Wiley, New York.
4. Fahn, A. (1990). *Plant Anatomy*. Pergamon Press, Oxford.
5. Jones, R. L., Ougham, H., Thomas, H., Waaland, S. (2012) *The Molecular Life of Plants*, Wiley Blackwell, ISBN: 978-0-470-87011-2012.
6. Karp, G. (2002). *Cell and Molecular Biology. Concepts and Experiments*. John Wiley and Sons. New York.
7. Lee, E. R. (2007). *Phycology*. (4th Ed.) Cambridge University Press, U.K.
8. Mauseth. J. D. (2003). *Botany: An Introduction to Plant Biology*. (3rd Ed.) Jones & Bartlett Pub.,UK.
9. Niklas, K. J. (2016). *Plant Evolution: An introduction to the history of life*. Chicago; London: The University of Chicago Press, 566 pp.
10. Prescott, L. M., Harley, J. P. and Klein, A. D. (2004). *Microbiology*, (3rd Ed.) W. M. C. Brown Publishers.
11. Reece, J. B., Urry, L. A., Cain, M. L and Wasserman, S. A. (2010). *Campbell Biology*, (9th Edition), Benjamin Cummings.
12. Sambamurty, A. V. S. S. (2005). *A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany*. I.K. International Pvt. Ltd. New Delhi, Bangalore, Mumbai. 573 pp.
13. Schultz, E. (2005). *Plant Ecology*. 2nd Ed. Springer-Verlag, Berlin.

14. Smith, R. L. (2002). *Ecology and Field Biology*. Harper and Row Publishers, New York.
15. Strickberger, M. W. (1985). *Genetics*, (3rd Ed.), Macmillan publishers.
16. Taiz, L., Zeiger, E., Møller, I. M. and Murphy A. (2015). *Plant Physiology and Development*, (6th Ed.), Sinauer Associates Inc., Sunderland MA. ISBN: 0-87893-831-1,700pp.
17. Webster, J. and Weber, R. (2007). *Introduction to Fungi*. Cambridge University Press.
