



MOTHERHOOD UNIVERSITY, Roorkee

ENLIGHTENING WORLD

Doctor of Philosophy (Ph.D.) COURSE WORK SYLLABUS

**BOTANY
FACULTY OF SCIENCE**

Implemented from June, 2024 onwards

**Roorkee-Dehradun Road, Village: Karoundi
Post: Bhagwanpur, Tehsil: Roorkee
District : Haridwar, Uttarakhand -247661**

Roorkee

**Ph.D. COURSE WORK THEORY SYLLABUS
BOTANY**

Total Credits: 06

Max. Marks 100

Total Hours: 90

PROGRAM SPECIFIC OUTCOMES

After completion of course work

1. It will help to develop research aptitude for higher education and scientific research.
2. It will be gaining practical knowledge implemented in the biodiversity assessment & conservation.
3. It will understand procedure for the basic concepts of intellectual property rights.
4. The knowledge will provide understanding of plant systematic & classification.
5. The study will help to understand cell structure, nucleic acids, organization of DNA in prokaryotes & Eukaryotes, DNA replication mechanism, genetic code and transcription process.
6. It will help to understand of reproduction and developmental changes in plants.
7. The detail study will help to understand of physiological and metabolic processes for plant growth and development.
8. The learning will provide understanding of plant systematic, developmental biology, ecology, statistics, physiology, biochemistry, anatomy, and plant genetics.
9. It will apply a significant range of advanced and specialized skills to act autonomously in the planning and implementation of plant science research.
10. After completing this course work successfully researcher will be able to contribute in the field of plant sciences.

UNIT I

(10 Hrs)

Biodiversity: Introduction, estimation, distribution, significance, causes of depletion and conservation strategies; Biodiversity hot spots; Impact of climate change on biodiversity; Biodiversity and biotechnology relationship; Biopiracy and Intellectual property rights; Organizations involved in biodiversity conservation; Indian Biodiversity Act (2002).

UNIT II

(15 Hrs)

Techniques in Field Botany: Plant identification: International code of Botanical Nomenclature: Salient features, important rules and recommendation; Identification keys; Herbarium Methodology: Collection, poisoning, drying and Preservation of herbarium specimens, Important National and International herbaria; Ethnobotanical survey techniques.



UNIT III

(20 Hrs)

Molecular Biology: Role of engineering in stress tolerance, Kinds of molecular markers- Proteins markers and DNA markers, advantages, disadvantages & applications of molecular markers in the field of molecular biology. *Bacillus thuringiensis* endotoxin and their mode of action, Advantages of molecular markers in transgenic crops.

UNIT IV

(15 Hrs)

Stress Physiology: Physiological Effects and Mechanism of action of Auxins, Gibberellins & Abscisic acid. Water deficit and its physiological consequences, drought tolerance mechanisms, salinity stress and plant responses, heat stress and heat shock proteins, pollution stress, biotic stress.

UNIT V

(20 Hrs)

Enzyme Technology: Introduction to enzymes, specificity of enzyme action, kinetic and chemical mechanisms of enzyme – catalyzed reactions, enzyme inhibition, active site structure, enzyme assay, application of enzymatic analysis. Stability, Denaturation and Renaturation of enzymes & biosensors. Recent advances in enzyme technology.

UNIT VI

(10 Hrs)

Bioinformatics: Biological Databases; Sequence alignment, phylogenetic analysis; Whole genome annotation taking examples of major plant genomes

References:

- Enzyme Technology by Martin Chaplin and Christopher Bucke (1990) Cambridge University Press.
- Biocatalysts and Enzyme Technology by Klaus Buchholz , Volker Kasche, Uwe Theo Bornscheuer (2005), 1 edition, Wiley-VCH.
- Enzyme Technology, edited by Ashok Pandey, Colin Webb and Carlos icardo Soccol(2006), Springer US.
- Introduction to plant physiology by W.G.Hopkins and NPA Huner, Wiley Int.3rd Ed. 2
- Old and Primrose (1984).Principles of gene manipulation. Blackwell.
- Patterson, 1996. Genome mapping in plants, Academic Press.330p.
- Molecular cloning A Laboratory Manual 3rd edition Vol. 1, 2, 3- Sambrook and Russell, Churchill press, 2007
- Principals and Techniques of Biochemistry and Molecular Biology, Edited by Keith Wilson and John Walker, Sixth Edition, Cambridge University Press.
- Weising, K. H. Nybom, K. Wolff, W. Meyere.1995. DNA Fingerprinting.CRL Press
- Claverie, J.M. and Notredame C. 2003 Bioinformatics for Dummies. Wiley Editor. 2.
- Letovsky, S.I. 1999 Bioinformatics. Kluwer Academic Publishers.
- Baldi, P. and Brunak, S. 2001 Bioinformatics: The machine learning approach, The MIT Press.
- Setubal, J. and Meidanis, J. 1996 Introduction to Computational Molecular Biology. PWS Publishing Co., Boston.
- Lesk, A.M. 2005, 2nd edition, Introduction to Bioinformatics. Oxford University Press.



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- Fogel, G.B. and Corne, D.W., 1997 Evolutionary Computation in Bioinformatics.
- Rastogi et al 2003. Bioinformatics: Concepts, Skills and Applications. CBS .
- Rashidi and Buchler 2000. Bioinformatics Basics. CRC Press.
- Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti (eds). 2012. The Jepson Manual: Vascular Plants of California. Second Edition. Berkeley: University of California Press.
- Lightner, James. 2011. San Diego County Native Plants, 3rd edition. San Diego Flora, San Diego.
- Simpson, M. G. 2019. Plant Systematics. 3rd edition. Elsevier-Academic Press.
- Dale, Nancy. 1986. Flowering Plants: the Santa Monica Mountains, Coastal & Chaparral Regions of Southern California. Capra Press, Santa Barbara. In cooperation with California Native Plant Society.
- Ornduff, R. 1974. Introduction to California Plant Life. University of California Press, Berkeley.
- Jones, Jr. S.B. and Luchsinger, A.E. 1986. Plant Systematics. 2nd edition. McGraw-Hill Book Co., New York.
- Lawrence, G.H.M. 1951. Taxonomy of Vascular Plants. MacMillan, New York.
- Naik, V.N. 1984. Taxonomy of Angiosperms. Tata McGraw Hill, New Delhi.
- Singh, G. 2012. Plant Systematics: Theory and Practice. 3 rd edition. Oxford & IBH Pvt. Ltd., New Delhi
- Maheshwari, J.K. 1963. Flora of Delhi. CSIR, New Delhi.

Course Outcomes

After completion of course work, the researchers will be able

- To understand of modern plant study.
- To herbaria help to understand plant taxonomic of study.
- To understanding of plant anatomy, embryology and cytogenetics..
- To understanding of physiological effects & mechanism of plant hormones.
- To understanding of internal structure of various plant parts, reproductive biology & genetics.
- To understanding of plant systematic, ecology, physiology, anatomy, and plant genetics.
- To understanding of conservation biology and reproduction biology.
- To understanding of plant systematic & classification.
- To understanding of enzyme & chemical mechanisms of enzyme – catalyzed reactions.
- To understanding of recent advances in enzyme technology.
- To understanding of ethnobotanical survey techniques.
- To understanding of biological databases, genome annotation & major plant genome.