

Course contents for Current Concepts in Plant Biotechnology

1. **Faculty:** FLSB
2. **Course Code:**
3. **Course Title:** Current Concepts in Plant Biotechnology
4. **Number of Credits:** Two
5. **Course objectives:**

This course focuses on the latest and the current trends in Plant Biotechnology. Various molecular techniques that are used currently to understand the plant system and also to improve crop productivity are discussed here. Plant mutant generation and analysis, gene cloning using gateway system, Tilling/Scotilling, plant protein-protein interaction, are some of the key areas that are covered in this course.

6. **Minimum prerequisites for taking this course, if any:**

Student should attend the 2nd semester Plant Biotechnology and Crop Improvement course.

7. **Course structure with units, if applicable:**

- a. **Plant Expression Vectors:** Conventional cloning vs site-specific recombinational cloning methods (Gateway Technology)

- b. **Silencing of the endogenous target genes:** T-DNA insertion mutants in Arabidopsis and Tos17-mutants in rice, RNAi as a tool to silence desired genes in the plant system, Plant Genome Editing (CRISPR/Cas9)

- c. **Isolation and Characterization of plant promoters:** Isolation of promoters from unknown and known genome, *In silico* analysis of the promoter to find out cis-acting elements, Promoter-reporter construct to validate promoters in vivo, gel shift assay, DNA-pull-down to fish out trans-acting elements, enhancer traps

- d. **Functional analysis of genes:** Activation tagging: A tool for plant gene discovery; Plant protein-protein interaction: Yeast two hybrid, pull down assay, BiFC; Tilling and eco-tilling, Yeast Complementation.

- e. **Plant transcriptomics, proteomics and metabolomics.**

- f. **High throughput plant phenotyping.**

- g. **Urban myths and real concern about genetically modified crops.**

8. **Suggested Readings:**

- a. Introduction to Plant Biotechnology: H. S. Chawla
- b. Plant Physiology, Plant Journal, Plant Molecular Biology Plant Cell (Journals).

9. **Evaluation:**

Theory: Mid-semester Written Examination	: 40% Marks
End-semester Written Examination	: 40% Marks
Quiz / Assignment/Presentation (oral / poster)/other	: 20% Marks