PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING (PBT-800) **Credit Hours 3(3-0)**

Educational Objectives:

The course is designed to give an overview of the Impact of biotechnology with special emphases on molecular aspects of biotechnology and genetics. To become familiar with the recombinant techniques used to manipulate and designed vectors and constructs. Also, it will help to know about basic and required traits in transgenic plant and how to introduce the specific traits to a transgenic plant. A theme is to know about the future of plant biotechnology.

Course Outcomes:

The students will be able to learn the basics of plant biotechnology and its genetics; they will understand the gene, transcription, translational modification in the genome, how to utilize a gene of interest in a particular vector, vector and construct designing. Students will be able to understand about the required traits in a transgenic plant and how to introduce required traits a transgenic plant. It will give an idea about the future of food.

Course Contents:

- **Plant Agriculture: The Impact of Biotechnology;**
- **Biotechnology Crop Planting**
  - **Why Farmers Use Biotech Crops**
  - **How the Adoption of Plant Biotechnology has Impacted Environment?**
- **Molecular Genetics of Gene expression**
  - **The gene**
  - **DNA Packaging into Eukaryotic Chromosomes**
  - **Transcription**
  - **Translation and Protein Posttranslational modifications.**
- **Recombinant DNA**

- **Vector Design and Construction**
- **DNA modification**
- **DNA Vector**
- **Vector Design**
- **Safety Features in Vector Design**

- **Genes and Trait of Interest for Transgenic Plants**
  - **Identification of Gene of Interest via Genomic Studies**
  - **Traits for Improved Crop Production and Traits for Improved Products and Food Quality.**
- **Transgenic Plant Production**
  - **Basic Concepts of successful Gene Transfer to Plant Cells**
  - **Agrobacterium,**
  - **Particle Bombardment.**
- **The Future of Plant Biotechnology**
  - **Site Specific Recombination Systems**
  - **Zinc-Finger Nucleases**
  - **The Future of Foods, Fuel and Pharmaceuticals.**

Recommended Books

1. Plant Biotechnology and Genetics; Principles, Techniques and Applications. Edited by C. Neal Stewart Jr.
2. Basic Biotechnology by Colin Ratledge, Bjorn Kristiansen. Cambridge University Press.
3. Introduction to Biotechnology by William J. Thieman, Michael A. Palladino, Benjamin Cummings.

Biotechnology: An Introduction by Susan R. Barnum. Brooks Cole.