Institute of Botany

Faculty of Life Sciences

University of the Punjab, Lahore

Course Outline

Semester – VIII

Programme	BS Botany	Course Code	Bot-406	Credit Hours	2
Course Title	**Plant Biotechnology (Theory)**				

Introduction

This course includes different biotechnology tools like recombinant DNA technology, Tissue culture and plant regeneration, Micropropagation, Embryo rescue, haploid culture, protoplast culture. This course is focus to develop understanding how transgenic plants are produced?

Learning Outcomes

On the completion of the course, the students will:

- Explain the basic principles and the core scientific issues in biotechnology.
- Determine the commercial value of biotechnology in the field of agriculture.
- To solve society problems by means of biotechnology.
- Understand the legal and ethical issues to biotechnology products with special emphasis to genetically modified organisms.

Course Contents

- **Introduction and history of Plant Biotechnology,** Importance of biotechnology in plant improvements.
- **Plant growth and development under in vitro conditions**, plant cell and tissue culture, cloning and somatic cell genetics, Embryo rescue, haploid culture, protoplast culture, Virus free plants developments, Soma clonal variations as breeding tool, conventional and biotechnology supported plant breeding,
- **Recombinant DNA technology**, Gene cloning, Plant transformation; *Agrobacterium*-mediated transformation, Gene gun method of transformation, Chloroplast transformation, Genes for yield and quality improvement,
- **Incorporation of novel gene for tolerance against biotic and abiotic stresses**; Gene for insect and disease resistance, herbicide resistant plants,
- **Biosafety concerns and bioethics on GM crops**. practical application of transgenic plant technology for plant health, human/animal health and nutrition, biosafety aspects of transgenic plants.

Programme	BS Botany	Course Code	Bot-407	Credit Hours	1
Course Title	**Plant Biotechnology (Lab)**				

Lab Course Contents

Stock preparations.

- Sterile techniques.
- Media preparations.
- Explant isolation and culture.
- Plasmid-DNA isolation and culture.
- Agrobacterium culture growth.
- Transformation by co-cultivation method.
- Selection of transformants.
- Screening of transformants.

- DNA and protein isolation.
- Biochemical analysis of transgenic plants.
- Molecular analysis of transgenic plants.

Textbooks and Reading Material

1. Gene Cloning and DNA Analysis: An Introduction. 5th Edition by T. A Brown. Blackwell Publishing. PU Library (Any introductory book on biotechnology).
2. Biotechnology. Fifth edition. John E. Smith Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK
3. Online resources on http://www.wiley.com/, Journal Articles/ Reports
4. Kumar U. Methods in Plant Tissue Culture.2nd Edition. Agro Bios, India.
5. Roberta S. Plant Tissue Culture. Techniques and Experiments. Academic Press.
6. Richard A. D. and Robert A. G. Plant Cell Culture: A Practical Approach. IRL Press.
7. Kyte L. and Kleyn J. Plants from Test tubes. An introduction to micropropagation. Timber Press.

Teaching Learning Strategies

- Lectures
- Group Discussion
- Laboratory work
- Seminar/ Workshop

Assignments: Types and Number with Calendar

- Lecture Based Examination (Objective and Subjective)
- Assignments
- Class discussion
- Quiz
- Tests

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