



Code	Subject Title	Cr. Hrs	Semester
BOT-313	Gene Cloning (Advance Course)	3	VI
Year	Discipline		
3	Botany		

**Syllabus Outline:** Principles and Strategies for Gene Cloning including Conjugation, Transformation and Transduction.

**Course Outline:**

**The Principles of Cloning DNA:**

- i) General Principles of Cloning
- ii) Strategies for gene cloning

**Vehicles: Plasmid and Bacteriophages:**

**Plasmids**

- i) Basic Features of Plasmids
- ii) Size and Copy Number
- iii) Conjugation and Compatibility
- iv) Plasmid Classification

**Bacteriophages:**

- i) Basic Features of Bacteriophages
- ii) Lysogenic Phages
- ii) Viruses as Cloning Vehicles

**Purification of DNA:**

- i) Preparation of total Cell DNA
- ii) Preparation of Plasmid DNA
- iii) Preparation of Bacteriophage DNA

**Manipulation of Purified DNA:**

- i) The range of DNA Manipulative Enzymes
- ii) Enzymes for Cutting DNA- Restriction Endonucleases
- iii) Ligation- Joining DNA Molecule together

**Introduction of DNA into Living Cells:**

- i) Transformation
- ii) Selection for Recombinants
- iii) Introduction of phage DNA into Bacterial Cells
- iv) Selection for Recombinant Phage

**The Applications of Cloning in Gene Analysis:**

- i) Cloning of Specific Gene
- ii) Studying Gene Location and Structure
- iii) Studying of Gene Expression

**Gene Cloning in Research and Biotechnology:**

- i) Production of Protein from Cloned Gene
- ii) Gene Cloning in Medicine
- iii) Gene Cloning in Agriculture

**Module Aims:** The course work is designed to highlight importance of Gene Cloning in Research and Biotechnology, learning about the Concept of Cloning Agents, their Behavior, Structure and Manipulations.



**Learning Strategies:**

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

**Learning Outcome:** Students are expected to have an understanding about the importance of cloning, techniques to construct genomic libraries and a broad view about cloning vector types and strategies.

**Assessment Strategies:**

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

**Books Recommended:**

1. **Primrose, S.B., and Twyman, R. M. (2006).** *Principles of Gene Manipulation and Genomics*. Blackwell Scientific Publications.
2. **Pierca, B.A. (2005).** *Genetics; A Conceptual Approach*. W. H. Freeman and Company, New York.
3. **Snustad, D.P. and Simmons, M. J., (2005).** *Principles of Genetics*, (4<sup>th</sup> Ed.). John Wiley and Son, Inc. New York.
4. **Gardner, E.J. (2004).** *Principles of Genetics*. John Willey and Sons, New York.
5. **Primrose, S.B., Twyman, R.M. and Old, R.W. (2004).** *Principles of Gene Manipulation, an Introduction to Genetic Engineering*. (6<sup>th</sup> Ed.), Blackwell Scientific Publications.
6. **Synder, L. and Champness, W. (2004).** *Molecular Genetics of Bacteria*. ASM Press, Washington D.C.
7. **Wilson, J. and Hunt, T. (2004).** *Molecular Biology of the Cell – The Problems book*, Garland Publishing Inc.
8. **Old, R.W. and Primrose, S.B. (2003).** *Principals of Gene Manipulation*. University of California Press.
9. **Glover, D.M. (2001).** *Gene Cloning. The Mechanics of DNA Manipulation*. Chapman and Hall.
10. **Brown, T.A. (2000).** *Gene Cloning and DNA Analysis; An Introduction*. Chapman and Hall Publishers.