



First Semester 2016-17

COURSE HANDOUT (PART-II)

In addition to part-I (General Handout for all courses) printed on page 1 of the timetable book, this portion gives further specific details regarding the course.

Course Number : BIO G561
Course Title : ADVANCES IN RECOMBINANT DNA TECHNOLOGY
Instructor-in-Charge : Sandhya Mehrotra (sandhya@pilani.bits-pilani.ac.in)
Instructor : A.K. Das

1. Scope and Objectives of the Course:

The course will provide glimpses of recent advances in techniques and concepts related to high throughput genomics, proteomics and large-scale mutagenesis. Genomics techniques like transcriptome arrays and arrays for whole genome analysis will be dealt with, as will be proteomics analysis techniques like 2D-PAGE and MS. Understanding genome and protein structures and protein interactions through Yeast/Bacterial two-hybrid systems will be discussed. Topics dealing with large scale mutagenesis and interference will also be presented. These concepts and techniques are already necessary both in research and research-based industries. This course, along with the first course on recombinant DNA, will prepare an advanced student of biology for an understanding of techniques very relevant to the immediate present and future.

2. Text Book:

- Primrose, Sandy B. and Richard M. Twyman. Principles of Gene manipulation and Genomics (7th edition). USA: Wiley-Blackwell, 2006.

3. Reference Books:

- Twyman, Richard M. Principles of Proteomics (2nd edition). UK: Garland Science, 2013.
- Bartel, Paul L. and Stanley Fields. The Yeast Two-Hybrid System. USA: OUP, 1997.

4. Lecture Plan

Lecture No. (# of lectures)	Learning Objectives	Content	Textbook Reading
1-4 (4)	Introduction	Overview of cloning in <i>E. coli</i> , PCR, phage display	Chapters 1-8
5-8 (4)	Specialized	Cloning and Expression in	Chapter 11 +





	single gene approaches	<i>Saccharomyces</i> sp.	Reading material
9-11 (3)	Basic bioinformatics	Nucleic acid, protein and protein structure databases with relevant algorithms	Chapter 9 + Reading material
12-13 (2)	Understanding genomes	Different types of nucleic acid microarray techniques	Chapters 16, 18, 20 + Reading material
14-16 (3)	Genome Organization	Basic units and complexity	Chapter 16
17-20 (4)	Genome sequencing and mapping	A few approaches starting with RFLP and shotgun to NGS	Chapter 17 + Reading material
21-24 (4)	Introductory comparative genomics	Orthologues, paralogues, gene evolution, horizontal transfer in prokaryotes and eukaryotes.	Chapter 18
25-28 (4)	Transcriptome analysis	Traditional approaches to SAGE, uses of microarrays, global profiling in microbes; applications of expression profiling.	Chapter 20
29-32 (4)	Proteomics	Expression analysis and characterization 2D mass spectrometry etc	Chapter 21 + Reading material
33-34 (2)	Analysis of protein structures	Annotation by structure comparison, tentative functions etc	Chapter 22 + Reading material
35-38 (4)	Protein interactions	Library screening; yeast two-hybrid systems	Chapter 23 + Reading material
39-41 (3)	Mutagenesis and interference	Genome wide insertional mutagenesis; artificial transposon systems	Chapter 17

4. Evaluation scheme

Component	Duration	Weight	Date and Time	Remarks
Mid-semester Test	1½ hours	30%	<TEST_1>	Closed-book type
Comprehensive Examination	3 hours	40%	<TEST_C>	Partly closed book/partly Open-book type
Take home assignment		15%	Announced in class	Literature Survey and Research Summaries related to the topics covered
Seminar		15%	Announced in class	Research articles related to the topics covered



6. Make-up Policy:

For a foreseen absence, make-up request should be made in person to the Instructor-in-Charge, well before the scheduled evaluation component. Reasons for unanticipated absence that qualify a student to apply for make-up include medical or similar personal emergencies only; in such an event, the student should contact the Instructor-in-Charge as soon as practically possible.

7. Course Notices:

All notices related with the course shall be displayed in the notice board of only the Department of Biological Sciences.

Instructor-in-Charge
BIO G561

