First semester 2016-2017 **Date: 02.08.2016**

COURSE HANDOUT (PART-II)

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : **BIO F311**
Course Title : **RECOMBINANT DNA TECHNOLOGY**
Instructor-in-charge : **ASHIS K. DAS (adas@pilani.bits-pilani.ac.in)**
Co- Instructor : **Shilpi Garg (shilpi@pilani.bits-pilani.ac.in)**

Course Description:

The course deals with theoretical aspects and selected experiments of recombinant DNA manipulation. Emphasis will be placed on procedures to create chimeric molecules using examples from actual experimental work. Vector designing, PCR, DNA sequencing, in-vitro mutagenesis, cloning in prokaryotic and eukaryotic systems and whole genome approaches will be covered.

Scope and Objective of the course:

Almost every field of modern experimental biology relies heavily on DNA manipulation techniques. This course will expose the student to the foundations and principles underlying such molecular biology methods, and give a brief yet broad overview of the recent trends and applications of recombinant DNA technology.

Text Book/Manual:

Howe, Christopher J. Gene Cloning and Manipulation (2nd edition). New Delhi: Cambridge University Press India Pvt. Ltd., 2015.

Reference Book:

- Brown, Terence A. Gene Cloning and DNA Analysis: An Introduction (6th edition). United Kingdom: Wiley-Blackwell, 2010. (Best suited for beginners, this book covers the basic concepts clearly and concisely.)
- Primrose, Sandy B. and Richard Twyman. Principles of Gene Manipulation and Genomics (7th edition). New York: Blackwell Science, 2006. (Considered an advanced beginner's text, this book provides a succinct coverage of a broad range of topics in the field.)
- Greene, James J. (ed.) and V.B. Rao (ed.). Recombinant DNA Principles and Methodologies. United Kingdom: CRC Press, 1998. (This book comprehensively explains the theoretical principles underlying various laboratory methods of recombinant DNA.)

Lecture No.	Learning Objectives	Topics to be covered	Reference (TB Chap No.)
1-2	Orientation to the course	Defining the scope and context of the course	-
3-8	Tools and techniques of recombinant DNA technology: overview	Recombinant DNA analysis workflow summary; gel electrophoresis of nucleic acids; Restriction mapping and analysis; Southern blotting and principles of hybridization	**1**
9-11	Enzymes for manipulating DNA	Restriction enzymes; other enzymes that modify DNA	**1**
12-13	Plasmid vectors and bacterial hosts	Plasmids, cosmids, bacteriophages (including molecular aspects of phages pertinent to vector design); DNA isolation procedure; bacterial host and its transformation	**3**
14-17	Polymerase Chain Reaction	Understanding PCR; different types of PCR – inverse PCR, multiplex PCR, quantitative real time PCR	**2**
18-20	Other cloning vectors for E. coli	High capacity cloning vectors (BAC, PAC, cosmids, etc.); phage vectors	**4**
21-22	Constructing DNA libraries	Genomic, cDNA & specialized libraries	**5**
23-25	Screening libraries	Various methods used for screening and selection of the clones; nucleic acid hybridization techniques	**6**
26-27	DNA sequencing	Sanger's chemistry; automated sequencing; latest advances	-
28-30	Mutagenesis	Methods for site-directed mutagenesis	**7**
31-34	Protein expression	Expression vectors, fusion tags; SDS PAGE and Western Blotting	**8**
35-38	Applications of and selected advances in recombinant DNA technology	Selected applications of recombinant methodologies to medicine, agriculture & biomedical science, e.g., gene therapy, RNAi, DNA profiling, transgenic animals	**9**

Evaluation Scheme:

S. No.	Evaluation component	Duration	Date, time and Venue	Weightage (%)	Nature of component
1.	Mid Semester Test	90 min	<TEST_1>	30%	CB
2.	Quiz/ Assignment	Variable	TBA	30%	CB/ OB
3.	Comprehensive Exam	3 hrs	<TEST_C>	40%	CB/ OB

Grading Policy: Award of grades would be guided in general by the histogram of marks. Decision for borderline cases would be based on the student's attendance and participation in classes and instructors' overall assessment of the individual's sincerity in the course.

8. Chamber Consultation Hour: To be announced in the class.

9. Make-up Policy: For a foreseen absence, make-up request should be made to the Instructor-in-Charge. Reasons for unanticipated absence that qualify one for make-up include medical emergencies or similar personal situations only.

10. Notices: Whenever necessary, course announcements shall be displayed in the notice board of Department of Biological Sciences only. Other information will be shared through Nalanda or electronic mail.

Instructor-in-Charge
BIO F311