Course title: Principles of genetic engineering and recombinant DNA technology			
Course code: BBP 155	**No. of credits:** 3	**L-T-P:** 30-15-0	**Learning hours:** 45
Pre-requisite course code and title (if any):			
Department: Department of Biotechnology			
Course coordinator(s): Dr. Souren Paul	**Course instructor(s):** Dr. Souren Paul/ Prof Anandita Singh		
Contact details: souren.paul@terisas.ac.in			
Course type: Core	**Course offered in:** Semester 1		

Course description:

The ability to genetically manipulate and engineer genomic sequences by precise recombination of genetic elements across organismal boundaries lies at the core of biotechnology. This foundation level core course is designed for students interested in developing a conceptual framework and technical know-how on genetic engineering methodologies. Upon successful completion of the course, students will gain an in-depth knowledge in principles of genetic manipulation and will develop an appreciation on centrality of genetic engineering in driving R&D across multiple branches of biotechnology. Students will gain proficiency in creative deployment of techniques for isolation, manipulation, novel design of genomic sequences. An introduction to properties of general DNA modifying enzymes will be given along with their applications. For example, the conceptualization, innovation, evolution and application aspects of PCR will be discussed in context to thermo-stable polymerases. An introduction to versatile and atypical modifying enzymes including non-specific endonucleases implied in new-age mutation technologies and genome engineering research will be provided. Cloning strategies with be contextualized to vector categories and applications such as plant transformation, protein expression, genomic and cDNA library construction to name a few. Host specificities and design of selection and screening strategies will be illustrated. Approaches for site-directed mutagenesis of cloned genomic fragments will be taught. Basic and advanced analytical techniques of molecular biology will not be covered in this course. To ensure coverage and sufficient depth on contemporary tools, outmoded methods no longer used has been intentionally avoided. However, students will be oriented to historical information for illustrating evolution of procedures used in contemporary biological research. Finally, an exposure will be provided to software used for *in-silico* annotation and manipulation of DNA sequences for efficient design, tracking, and management of cloning experiments in the laboratory.

Course objectives:

1. To develop an appreciation for importance of fundamental knowledge in discovery and innovation of modern day tools and techniques of genetic engineering
2. To provide a theoretical and practical framework underlying recombinant DNA technology
3. To train and provide technical skills to students for devising broad research methodologies by creative deployment of genetic engineering techniques