



**MC208 Aug 3:0**

## **Principles of Genetic Engineering**

### **Instructor**

P. Ajitkumar & N. Ravi Sundaresan  
Email: [ajit@iisc.ac.in](mailto:ajit@iisc.ac.in); [rsundaresan@iisc.ac.in](mailto:rsundaresan@iisc.ac.in)

### **Teaching Assistant**

None  
Email: None

### **Department: Microbiology and Cell Biology**

Course Time: Tue., Thu., 8.30 AM - 10 AM

Lecture venue: Microbiology and Cell Biology Dep't Lecture Hall

Detailed Course Page:

### **Announcements**

None

### **Brief description of the course**

The course gives the fundamental knowledge, in terms of theory and practical tips, on recombinant DNA techniques to enable students to perform experiments as part of their research programme.

### **Prerequisites**

3rd year UG students, BSc students, and MSc students.

### **Syllabus**

Growth and maintenance of bacteriophages and bacterial strains containing plasmids. Enzymes used in genetic engineering. Vectors used in molecular cloning and expression of genes, promoter analyses, and gene targeting in bacterial, mammalian, human, and plant systems. DNA, RNA, and protein isolation, purification, and fractionation methods. Radioactive and nonradioactive labelling of nucleic acids and proteins, and detection. Nucleic acids hybridisation methods. Transformation and transfection methods. Gene and cDNA cloning methods. In vitro genome packaging systems and construction of genomic DNA and cDNA libraries. Detection and characterisation methods for genes and chromosomes. Nucleic acids sequencing methods. Methods for protein analysis, protein-nucleic

acid, and protein-protein interactions. Site-specific mutagenesis in vitro and in vivo. Random mutagenesis methods in vitro and in vivo. Genome engineering methods. Polymerase chain reaction (qualitative and quantitative), methods, and applications. Antisense technology and RNA silencing techniques. DNA and Protein microarrays. Methods to generate transgenic animals. Applications of Genetic Engineering Methods in Medicine and Agriculture.

### **Course outcomes**

Theoretical and practical knowledge to use recombinant DNA techniques in research.

### **Grading policy**

50% for Mid-term and 50% for the Final Exam.

### **Assignments**

None

### **Resources**

1. J. Sambrook and D. W. Russell, Molecular Cloning: A Laboratory Manual, 3rd Edn: Vol. I, II, & III, Cold Spring Harbor Laboratory Press.
2. J. J. Greene and V. B. Rao. Recombinant DNA Principles and Methodologies. CRC Press.
3. S. B. Primrose and R. M. Twyman. Principles of Gene Manipulation and Genomics, 7th Edn, Blackwell Publishing.
4. Fred Ausubel and Others. Current Protocols in Molecular Biology. Wiley.
5. Original papers describing the principles and methods.