



Indian Institute of Science
Centre for Continuing Education
PROFICIENCY COURSES JANUARY–MAY 2026

Online Course on Principles and Advances in Genetic Engineering

Faculty

Dr. N. Ravi Sundaresan
Microbiology and Cell Biology, IISc

Eligibility

Students either studying or completed, BSc (research), MSc, B. Tech, B. Pharma, BVSc., MBBS, B.Pharm., MS (Biotech), or Equivalent
Pre-requisites: Basic knowledge in the Life Sciences

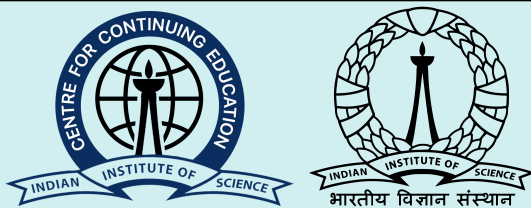
Objectives:

Genetic Engineering is the direct manipulation of an organism's genes using biotechnological tools. Genetic engineering has been applied in numerous fields, including research, medicine, industrial biotechnology, and agriculture. This course is proposed for those who wish to develop a strong background in principles of recombinant DNA technology, Genetic Engineering, Genome Editing, transgenic technology, and its applications in biotechnology. This course will also focus on the creation of genetically modified organisms, from bacteria to monkeys, for laboratory research and industrial application.

Syllabus

Growth and maintenance of recombinant bacterial strains. Transformation and transfection methods. Vectors used in molecular cloning and expression of genes. DNA, RNA, and protein isolation, purification, and fractionation methods. Enzymes used in genetic engineering. Radioactive and non-radioactive labeling of nucleic acids and proteins and their detection. Nucleic acid hybridization methods. Gene and cDNA cloning methods. Construction of genomic DNA and cDNA libraries. Nucleic acid sequencing methods, including Next-Generation Sequencing. Methods for protein analysis, protein-nucleic acid, and protein-protein interactions. Site-specific mutagenesis. Polymerase chain reaction, Real-time Quantitative PCR., and applications. Antisense technology

and RNA silencing techniques. Recombinant protein production in bacteria, yeast, and mammalian cells, Genome editing approaches such as Cas9/CRISPR technology. Exome Sequencing- ChIP Sequencing. Generation of Lentiviral, retroviral and Adenoviral vectors, and Gene therapy, Genetic Engineering of mammalian stem cells, Generation of induced pluripotent stem (iPS) cells, Somatic cell nuclear transfer, Generation of transgenic and mutant *Caenorhabditis elegans* –Generation of knock-out mice (isolation and culture of embryonic stem (ES) cells, Gene targeting construct design, Transfection, Homologous recombination in ES Cells, Positive and negative selection; Breeding of germ-line chimeras Cre/lox and Flp/FRT system for inducible transgenic mice – Chemically inducible transgene expression systems. Use of transgenic technology in modeling human diseases, including cardiovascular disease, diabetes, obesity, cancer, atherosclerosis, neurodegenerative diseases, muscle degeneration, and aging



Course Fee: Rs. 10,000/- + 18% GST

Schedule: Saturday (10.00AM to 1.00PM)

Contact us

Centre for Continuing Education

Indian Institute of Science

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To apply scan here



Last Date to Apply: 31 st December 2025

More Details :

<https://cce.iisc.ac.in/cce-proficiency/>

