AMITY UNIVERSITY
UTTAR PRADESH

Annexure **'CD-01'**

**Course Title: Fundamentals of Recombinant DNA Technology**
**Course Code: GCMB314**
**Credit Units: 3**
**Level: UG**

| L | T | P/ S | FW/S W | TOTAL CREDIT UNITS |
|---|---|---|---|---|
| 2 | 0 | 2 | 0 | 3 |

**Course Objectives:**
The main objective of this course is to provide an introduction and understanding of principles and fundamentals of recombinant DNA technology including a preface to the recent advancements. The course aims to provide knowledge of, and practical skills of recombinant DNA technology which have greatly revolutionized the biotech industry and modern science. The course is also a prelude to advance courses such as Genomics

**Prerequisites:** Genetics and Molecular Biology

**Student Learning Outcomes:**

- Students will be able to describe various tools and methodologies used in recombinant DNA technology.
- Students will be able to distinguish experiments to address a question and apply their theoretical and practical knowledge to problem solving, and evaluate the experimental data to reach a conclusion.
- Actual experience in experiments will make them to comprehend the subject better.
- With developed skills students are expected to perform routine DNA analysis, perform cloning experiments and use logical understanding to design and execute an experiment.
- Students will be able to predict and apply recombinant DNA technology for improvement of crops and animals.

| **Course Contents / Syllabus:** | **Weightage** |
|---|---|
| **Module I : Enzymes** | **15%** |
| • Restriction endonucleases, ligase, polymerases, kinase, phosphatase, nuclease, terminal deoxynucleotidyl transferase, reverse transcriptase, topoisomerase<br>• linkers and adaptors. | |

| | |
|---|---|
| **Module II : Hybridization techniques used in Recombinant DNA Technology** | **10%** |
| • Southern, Northern and Western blotting techniques<br>• Radioactive and non-radioactive probes. | |
| **Module III : Cloning vectors** | **25%** |
| • Cloning vectors based on Plasmids<br>• bacteriophages (Lambda and M13)<br>• High capacity cloning vectors (YAC, BAC)<br>• Expression vectors. | |
| **Module IV : DNA libraries and screening** | **35%** |
| Gene cloning, construction of Genomic DNA and cDNA libraries. Methods of selection and screening for recombinant DNA, Principles and applications of PCR | |
| **Module V : Sequencing of DNA** | **15%** |
| • Maxam-Gilbert, Sanger's and automated DNA sequencing method<br>• Introduction to next-generation sequencing. | |
| **List of Experiments:**<br>• Analysis of DNA by gel electrophoresis<br>• Restriction digestion<br>• Ligation<br>• Preparation of competent cells<br>• Bacterial transformation<br>• Polymerase chain reaction<br>• Southern Blotting technique | |
| **Pedagogy for Course Delivery:**<br>Lectures : 29<br>Class test:01<br>Total : 30<br>**Pedagogy for Lab/ Practicals:**<br>Practical: 28<br>Class Test: 01<br>Viva: 01 | |

Total: 30

**Assessment/ Examination Scheme:**

| Theory L/T (%) | Lab/Practical/Studio (%) | Total |
|---|---|---|
| 67 | 33 | 100 |

**Theory Assessment (L&T):**

| Continuous Assessment/Internal Assessment | | | | | | |
|---|---|---|---|---|---|---|
| **Components (Drop down)** | Mid-Term Exam | Project | Viva | Attendance | End Term Examination | **Total** |
| **Weightage (%)** | 10 | 10 | 5 | 5 | 70 | 100 |

**Lab/ Practical/ Studio Assessment:**

| | Continuous Assessment/Internal Assessment | | | | End Term Examination | | | |
|---|---|---|---|---|---|---|---|---|
| **Components (Drop down)** | **Class test** | **Lab record** | **Viva** | **Attendance** | **Performance** | **Lab Record** | **Viva** | Total |
| **Weightage (%)** | 15 | 5 | 5 | 5 | 40 | 10 | 20 | 100 |

**Text:**

1. Gene Cloning and DNA Analysis: An Introduction, 6th Edition,T. A. Brown, 2010, Wiley-Blackwell.

2. Principles of Gene Manipulation: An Introduction to Genetic Engineering, 6th edition, Sandy Primrose, Richard Twyman, Bob Old 2001.Blackwell Science

3.Molecular Cloning: A Laboratory Manual,4th Edition, J. Sambrook, E.F. Fritsch and T. Maniatis, 2012 Cold Spring Harbor Laboratory Press.