

**CERTIFICATE COURSE**  
**ON**  
**Tools and Techniques**  
**of**  
**Recombinant DNA Technology**  
**2021-22**



**DEPARTMENT OF ZOOLOGY**  
**GOVERNMENT DEGREE COLLEGE**  
**PALAKONDA**  
**PARVATHIPURAM MANYAM DISTRICT**

**B. RAJU**  
**COURSE COORDINATOR**

**Dr. G. JANARDHANA NAIDU**  
**PRINCIPAL**

# BROCHURE

## Certificate Course on Tools and Techniques in Recombinant DNA Technology 2021-22

### GENERAL INFORMATION AND COURSE STRUCTURE

Duration of module Training: 30 hrs.

Entry Qualification: UG students

Language: English/ Telugu

Teaching mode: Offline and online

#### INSTRUCTION METHOD

Lecture method

PDF Video lessons

Demonstration

Group discussion



#### Assessment

Assignments: 40%

Course End Examinations: 60%

**Course coordinator:**

**Sri. B. Raju, Lecturer in Zoology**

**Conducted by**

**Department of Zoology**

#### OBJECTIVES

Students will be able to define  
Recombinant DNA technology.

Students will be able to categorize  
types of restriction enzymes used in  
recombinant DNA technology.

Students will be able to accurately  
describe their observations in cloning  
vectors.

Students will be able to get  
knowledge on Gene delivery methods  
in modification of DNA.

Students will be able to get  
knowledge on hybridization  
techniques such as southern,  
northern, and western blotting.

**Dr. G. Janardhana Naidu**

**Principal**

## INTRODUCTION

Recombinant DNA Technology, the driving force behind biotechnology and genetic studies, is a must-know skill for every aspiring researcher. Recombinant DNA Technology is the construction of new DNA molecules by combining at least two different DNA molecules. This process was first discovered in the early 1970s and since then has proven to be an indispensable technology in every Biotech laboratory.

Recombinant DNA Technology has found its applications in many different fields. It is a common process in Biotech, medical research, and genetics studies. By manipulating the desired cells, we are now able to produce many medically important molecules, proteins, etc. This technology also plays an important role in agriculture and animal studies. Genetically modified crops or organisms are the results of this ever-expanding field.

## OBJECTIVES

- ❖ Students will be able to define Recombinant DNA technology
- ❖ Students will be able to explain tools of recombinant DNA technology
- ❖ Students will be able to categorize types of restriction enzymes used in recombinant DNA technology
- ❖ Students will be able to describe about different types of DNA modifying enzymes
- ❖ Students will be able to accurately describe their observations in cloning vectors
- ❖ Students will be able to identify the techniques of recombinant DNA technology
- ❖ Students will be able to get knowledge on Gene delivery methods in modification of DNA
- ❖ Students will be able to accurately describe the basic knowledge on PCR
- ❖ Students will be able to explain DNA sequencing methods
- ❖ Students will be able to get knowledge on hybridization techniques such as southern, northern, and western blotting
- ❖ Students will be able to describe about Genomic and cDNA libraries

## OUT COMES

At the end of this course, Students should be able to

- Define the Recombinant DNA technology
- Explain tools of recombinant DNA technology
- categorize types of restriction enzymes used in recombinant DNA technology
- accurately describe their observations in cloning vectors
- get knowledge on Gene delivery methods in modification of DNA
- accurately describe the basic knowledge on PCR
- explain DNA sequencing methods

- get knowledge on hybridization techniques such as southern, northern, and western blotting
- describe about Genomic and cDNA libraries

## GENERAL INFORMATION AND COURSE STRUCTURE

1. Duration of module Training: 4 Weeks
2. Entry Qualification: UG students
3. Language: English/ Telugu
4. Teaching mode: Offline and online

## SYLLABUS CONTENT Detailed syllabus

### WEEK 1:

#### I. Tools of Recombinant DNA technology

- Restriction modification systems: Types I, II and III.
- Mode of action, nomenclature
- Applications of Type II restriction enzymes in genetic engineering
- DNA modifying enzymes and their applications:
  - ❖ DNA polymerases.
  - ❖ Terminal deoxynucleotidyl transferase,
  - ❖ kinases and phosphatases, and
  - ❖ DNA ligases

### WEEK 2:

- Cloning Vectors:
  - ❖ Plasmid vectors: pBR and pUC series,
  - ❖ Bacteriophage lambda and
  - ❖ M13 based vectors,
  - ❖ Cosmids,
  - ❖ BACs, YACs.

### WEEK 3:

#### II. Techniques of Recombinant DNA technology

- Cloning: Use of linkers and adaptors
- Gene delivery:
  - ❖ Microinjection
  - ❖ Electroporation
  - ❖ Biolistic method (gene gun)
  - ❖ Liposome and
  - ❖ Viral-mediated delivery
- PCR: Basics of PCR.

### WEEK 4:

- DNA Sequencing:
  - ❖ Sanger's method of DNA sequencing- traditional and automated sequencing
- Hybridization techniques:
  - ❖ Southern blotting
  - ❖ Northern blotting and
  - ❖ Western blotting.
- Genomic and cDNA libraries:
  - ❖ Preparation and
  - ❖ uses

## **INSTRUCTION METHODS**

Some of the following method of delivery may be adopted

1. Lecture
2. PDF/ Video lesson
3. Demonstrations
4. Group discussions

## **ASSESSMENT**

1. Assignments: 40%
2. Course End Examination: 60%

Assessment Mode: Descriptive and multiple-choice answers

Examination conduction: Offline

Grading system:

| Marks range | Grade          |
|-------------|----------------|
| 90 to 100   | A <sup>+</sup> |
| 80 to 89    | A              |
| 70 to 79    | B <sup>+</sup> |
| 60 to 69    | B              |
| 50 to 59    | C              |
| 40 to 49    | D              |
| Below 40    | Fail           |

The syllabus for value added course / certificate course on vermicomposting is hereby approved for the session 2021-22

Course coordinator

Head of the Department

Principal

### Student Enrollment List

Name of the Certificate course: Tools and Techniques of Recombinant DNA Technology

Department: Zoology

Academic year: 2021-22

| S. No. | Name of the Student | Class                     | Date of Enrollment | Remarks |
|--------|---------------------|---------------------------|--------------------|---------|
| 1      | Ch. DRAKSHAYANI     | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 2      | G. SWAPNA           | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 3      | G. TULASI           | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 4      | K. ANIL             | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 5      | K. SRINU            | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 6      | K. KIRAN            | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 7      | L. ASWINI           | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 8      | M. RAMYA            | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 9      | P. JYOTHI           | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 10     | P. GANGA RAJU       | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 11     | P. RAMA DEVI        | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 12     | R. SAI BABU         | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 13     | S. SHARMILA         | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 14     | S. MAHESH           | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 15     | S. PARVATHI         | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 16     | S. SAMIYAL          | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 17     | S. SUJATHA          | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 18     | S. SAMEERA          | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 19     | S. SARASWATHI       | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |
| 20     | T. DAMODARA RAO     | 1 <sup>st</sup> B.Sc. BZC | 18-07-2022         |         |

Course coordinator

Head of the Department  
HOD of Zoology  
Govt. Degree College  
Palakonda, SKLM. (Dt.)

  
Principal




| S.NO | Name of the Student | 2)X | 3)X | 4)X | 5)X | 6)X | 7)X | 8)X | 9)X | 10)X | 11)X | 12)X | 13)X | 14)X | 15)X | 16)X | 17)X |
|------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 13   | S. Sarmila          | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 14   | S. Mahesh           | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 15   | S. Parvathi         | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 16   | S. Samiyal          | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 17   | S. Sujatha          | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 18   | S. Sameera          | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 19   | S. Saraswathi       | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |
| 20   | T. Damodhar         | P   | P   | P   | P   | P   | P   | P   | P   | P    | P    | P    | P    | P    | P    | P    | P    |


  
 H.D. of Zolokani  
 Govt. Degree College  
 Palakonda, SIKLM. (Dt.)





| S.NO | Name of the Student |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|------|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13   | S. Sarmila          | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 14   | S. Mahesh           | P | P | P | A | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 15   | S. Parvathi         | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 16   | S. Samiyal          | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 17   | S. Sujatha          | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 18   | S. Sameera          | P | P | P | P | A | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 19   | S. Saraswathi       | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 20   | T. Damodhar         | P | P | P | P | P | P | P | P | A | P | P | P | P | P | P | P | P | P | P |

  
 HOD of Zonal  
 Govt. Degree College  
 Palakonda, Mysore

### Student Examinations Marks List

Name of the Certificate course: Tools and Techniques of Recombinant DNA Technology

Department: Zoology

Academic year: 2021-22

| S. No. | Name of the Student | Class                       | Week 1 Assignment 10 M | Week 2 Assignment 10 M | Week 3 Assignment 10 M | Week 4 Assignment 10 M | Course End Examination 60M | Total Marks 100 M | Pass/Fail Grade |
|--------|---------------------|-----------------------------|------------------------|------------------------|------------------------|------------------------|----------------------------|-------------------|-----------------|
| 1      | Ch. DRAKSH AYANI    | 1 <sup>st</sup> B.S e. BZ C | 8                      | 7                      | 7                      | 8                      | 48                         | 78                | B+              |
| 2      | G. SWAPNA           | 1 <sup>st</sup> B.S e. BZ C | 7                      | 7                      | 8                      | 8                      | 46                         | 76                | B+              |
| 3      | G. TULASI           | 1 <sup>st</sup> B.S e. BZ C | 8                      | 8                      | 9                      | 9                      | 49                         | 83                | A               |
| 4      | K. ANIL             | 1 <sup>st</sup> B.S e. BZ C | 8                      | 8                      | 7                      | 8                      | 49                         | 80                | A               |
| 5      | K. SRINU            | 1 <sup>st</sup> B.S e. BZ C | 8                      | 8                      | 7                      | 8                      | 48                         | 79                | B+              |
| 6      | K. KIRAN            | 1 <sup>st</sup> B.S e. BZ C | 8                      | 7                      | 8                      | 8                      | 47                         | 78                | B+              |
| 7      | L. ASWINI           | 1 <sup>st</sup> B.S e. BZ C | 8                      | 7                      | 7                      | 8                      | 48                         | 78                | B+              |

|    |                    |   |   |   |   |   |    |    |    |
|----|--------------------|---|---|---|---|---|----|----|----|
|    |                    | BZ<br>C                                 |   |   |   |   |    |    |    |
| 8  | M.<br>RAMYA        | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 8 | 9 | 9 | 49 | 83 | A  |
| 9  | P.<br>JYOTHI       | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 8 | 9 | 9 | 48 | 82 | A  |
| 10 | P.GANGA<br>RAJU    | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 7 | 8 | 8 | 47 | 78 | B+ |
| 11 | P.RAMA<br>DEVI     | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 8 | 9 | 9 | 49 | 83 | A  |
| 12 | R.SAI<br>BABU      | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 7 | 8 | 7 | 48 | 78 | B+ |
| 13 | S.<br>SHARMIL<br>A | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 8 | 7 | 8 | 48 | 79 | B+ |
| 14 | S.<br>MAHESH       | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 8 | 8 | 9 | 9 | 48 | 82 | A  |
| 15 | S.<br>PARVAT<br>HI | 1 <sup>st</sup><br>B.S<br>c.<br>BZ<br>C | 7 | 7 | 8 | 8 | 46 | 76 | B+ |
| 16 | S.<br>SAMAYAL      | 1 <sup>st</sup><br>B.S<br>c.            | 8 | 7 | 8 | 8 | 48 | 79 | B+ |

|    |                    |   |   |   |   |   |    |    |     |
|----|--------------------|---|---|---|---|---|----|----|-----|
|    |                    | BZ<br>C                                 |   |   |   |   |    |    |     |
| 17 | S. SUATHA          | 1 <sup>st</sup><br>B.S<br>e.<br>BZ<br>C | 8 | 7 | 8 | 8 | 47 | 78 | 137 |
| 18 | S. SAMEER<br>A     | 1 <sup>st</sup><br>B.S<br>e.<br>BZ<br>C | 8 | 8 | 9 | 9 | 48 | 82 | A   |
| 19 | S. SARASW<br>ATHI  | 1 <sup>st</sup><br>B.S<br>e.<br>BZ<br>C | 8 | 7 | 8 | 8 | 47 | 78 | 137 |
| 20 | T. DAMODA<br>RARAO | 1 <sup>st</sup><br>B.S<br>e.<br>BZ<br>C | 8 | 7 | 8 | 8 | 48 | 79 | 137 |

Course coordinator

Head of the Department  
HOD of Zoology  
Govt. Degree College  
Palakonda, SKLM. (D)

Principal  
GOVT. DEGREE COLLEGE  
PALAKONDA  
Parvathipuram Manyan Dist



# GOVERNMENT DEGREE COLLEGE PALAKONDA

(Affiliated to Dr BR AMBEDKAR UNIVERSITY, SRIKAKULAM)

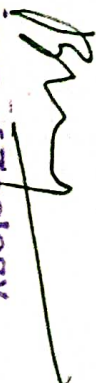


## Certificate of Appreciation


This is to certify that Sri/ Smt/ kum Ch. Dyakshayani, BSc-BZC,  
1st year has successfully completed Certificate course on  
"Tools and Techniques in Recombinant DNA Technology" conducted by

Department of Zoology from 19-07-2022 to 17-08-2022 with 78 %

certificate ID:

  
HOD of Zoology  
Govt. Degree College  
Palakonda, SKLM. (Dt)

  
IQAC  
GDC PALAKONDA  
Parvathipuram Manyam Dt

  
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PALAKONDA