



# CATR

Centre for Advanced Training and Research



ONLINE HANDS-ON TRAINING

# R FOR BIOLOGISTS

## Master R Programming for Real-World Biological Data Analysis



19 – 23  
June 2026



7:15 PM IST  
Live Sessions

### WHY JOIN THIS PROGRAM?



LIVE INTERACTIVE SESSIONS

Learn directly from industry experts



HANDS-ON LEARNING

Practical exercises with real datasets



REAL BIOLOGICAL DATASETS

Work on genomics, transcriptomics & other biological data



E-CERTIFICATE

Certificate of completion for career advancement

### EARLY BIRD OFFER

₹ 1299  
Indian Participants

\$85  
International Participants



LIMITED SEATS!  
ENROLL NOW

### TRUSTED BY LEARNERS WORLDWIDE



3000+  
Learners Trained



20+  
Countries Reached



4.8/5  
Learner Rating



100+  
Workshops Conducted

UPGRADE YOUR SKILLS.  
**ADVANCE YOUR RESEARCH.**

Gain the skills to analyze, visualize and derive insights from biological data using R.

→ REGISTER NOW

### GET IN TOUCH



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LIVE INTERACTIVE SESSIONS



HANDS-ON LEARNING



REAL BIOLOGICAL DATASETS



E-CERTIFICATE



# CATR

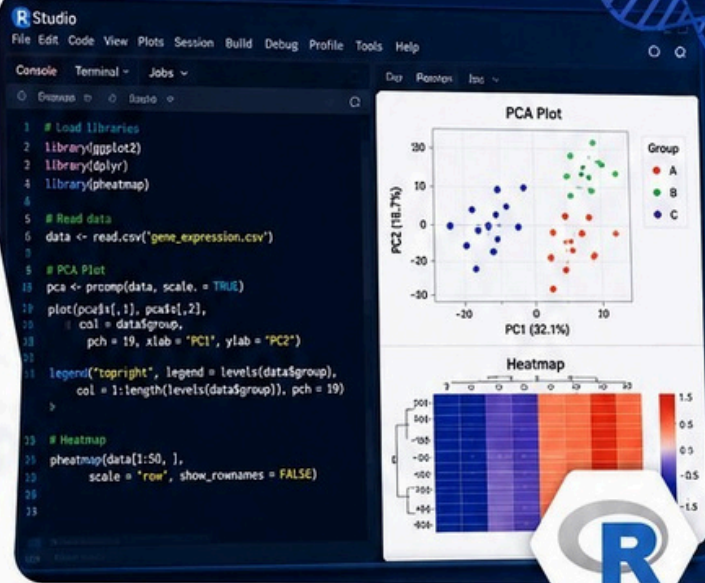
Centre for Advanced Training and Research

# COURSE CURRICULUM

## 5-Day Hands-on Learning Journey



### Master R Programming for Real-World Biological Data Analysis



## DAY 1 INTRODUCTION TO R AND BASIC PROGRAMMING



Objective: Build a strong foundation in R programming and environment setup.



### SESSION 1: GETTING STARTED

- Introduction to R and RStudio
- Installing R & RStudio
- Understanding the R interface
- Running basic commands



#### HANDS-ON:

Manipulate small biological datasets



### SESSION 2: PROGRAMMING BASICS

- Variables, lists, vectors, matrices, data frames
- Operators and calculations
- Indexing and subsetting data



#### HANDS-ON:

Manipulate small biological datasets



### SESSION 3: READING & WRITING DATA

- Importing data (read.csv, read.table)
- Exporting data



#### HANDS-ON:

Work with gene/protein datasets

## DAY 2 DATA MANIPULATION WITH DPLYR



Objective: Learn powerful tools for data wrangling using dplyr.



### SESSION 1: MANIPULATING DATA

- filter(), select(), mutate(), arrange(), summarize()
- Combining commands with pipes (%>%)



#### HANDS-ON:

Manipulate biological datasets



### SESSION 2: TIDY DATA & DATA FRAMES

- Transforming datasets
- Creating new variables
- Reshaping data



#### HANDS-ON:

Clean and organize real-life biological data

### What You Will Do



Import & Explore Biological Data



Clean & Organize Datasets



Analyze & Summarize Key Insights



Prepare Data for Visualization

### BY THE END OF THIS COURSE, YOU WILL BE ABLE TO:

- Import and manage biological datasets
- Clean and transform data efficiently
- Create publication-quality visualizations
- Perform statistical analysis in R
- Analyze real-world biological data
- Build confidence in R programming

### TOOLS & TECHNOLOGIES



R



RStudio



dplyr



ggplot2



readr



tidyr

### LEARNING EXPERIENCE



Live Interactive Sessions



Hands-On Exercises



Real Biological Datasets



E-Certificate



Session Recordings



Lecture PPTs



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Real Biological Data

Hands-On Coding

Publication-Quality Visuals

E-Certificate

### DAY 3

## DATA VISUALIZATION WITH GGPLOT2



**Objective:** Build high-quality plots using the ggplot2 system.

### Session 1: Introduction to ggplot2

- ✓ Aesthetic mappings & geoms
- ✓ Scatter, bar, box plots
- ✓ Themes, labels, colors

### Session 2: Customizing Plots

- ✓ Regression lines, faceting
- ✓ Publication-quality themes
- ✓ Advanced customizations



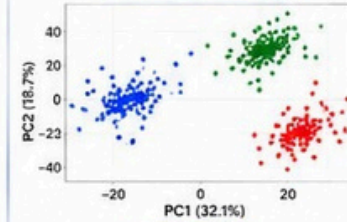
### HANDS-ON PROJECT

Create biological visualizations using ggplot2

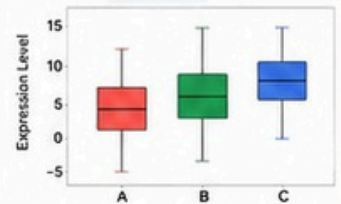


### VISUALIZE BEAUTIFUL BIOLOGICAL DATA

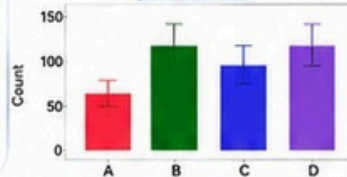
#### Scatter Plot (PCA)



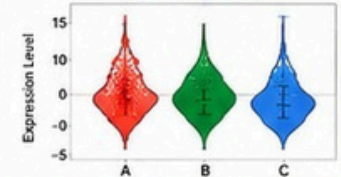
#### Box Plot



#### Bar Plot



#### Violin Plot



### DAY 4

## STATISTICAL ANALYSIS IN R



**Objective:** Apply statistical testing and integrate results into plots.

### Session 1: Statistical Tests

- ✓ t-tests, ANOVA
- ✓ Statistical workflows
- ✓ Multiple comparison tests

### Session 2: Stats with Visualization

- ✓ Adding p-values to plots
- ✓ Correlation & linear regression
- ✓ Effect size & confidence intervals

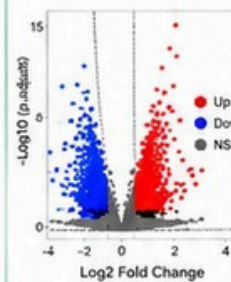


### HANDS-ON PROJECT

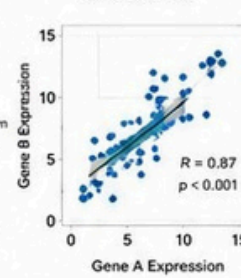
Apply tests to gene expression data and visualize results

### STATISTICAL ANALYSIS VISUALS

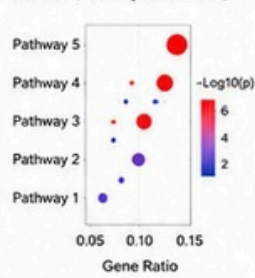
#### Volcano Plot



#### Correlation Plot



#### Dot Plot (Pathway Enrichment)



### DAY 5

## ADVANCED VISUALIZATION & HEATMAPS



**Objective:** Create complex biological data visualizations.

### Session 1: Heatmaps & Clustering

- ✓ Heatmap creation (pheatmap, ComplexHeatmap)
- ✓ Visualizing large expression matrices

### Session 2: Multi-Panel Plots

- ✓ Complex layouts
- ✓ Multi-panel & interactive plots
- ✓ Annotations & legends

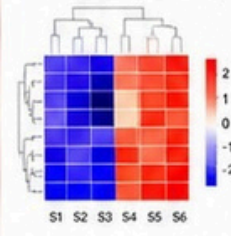


### HANDS-ON PROJECT

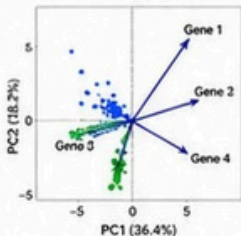
Build advanced visualizations using ggplot2

### ADVANCED BIOLOGICAL VISUALIZATIONS

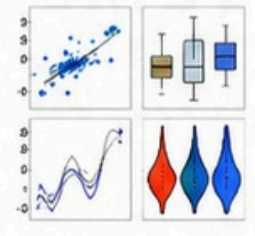
#### Heatmap with Clustering



#### PCA Biplot



#### Multi-Panel Plot Example



```
ggplot(data, aes(x = Group, y = Expression)) +
  geom_boxplot(fill = "#4C78A8") +
  theme_classic() +
  labs(title = "Gene Expression Analysis", y = "Expression Level")
```



BY THE END OF THIS COURSE, YOU WILL BE ABLE TO:



Create publication-quality visualizations



Analyze real-world biological datasets



Perform statistical tests with confidence



Generate heatmaps & cluster analysis



Build multi-panel & complex plots



Present research insights effectively



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