■ <u>Home About Course Facilities Available Login Register</u> Home About Course Facilities Available Login Register

About the RCB-UCSD Certificate Course

The RCB–UCSD Certificate Course on Data Analysis for Systems Biology is an advanced, collaborative program designed to develop expertise in computational biology, bioinformatics, and multi-omics integration. Jointly organized by the Regional Centre for Biotechnology (RCB) and the University of California, San Diego (UCSD), this program empowers participants to transform biological data into knowledge through modern analytical approaches.

Course Structure and Detailed Syllabus

The program runs for **5 Weeks** and is divided into two main modules — an **Online Preparatory Module** conducted by the IBDC Team and an **Onsite Data Analysis Module** delivered by UCSD experts at RCB, Faridabad. The **RCB–UCSD Certificate Course in Data Analysis for Systems Biology** is a intensive program designed to build foundational and advanced skills in computational biology, bioinformatics, and multi-omics data analysis.

Preparatory Training (Online – IBDC Team)

- Duration: 3 Weeks (January 19 February 6)
- Mode: Online Session conducted by IBDC Team
- Schedule: Afternoon 2:00 PM to 5:00 PM
- Focus Areas: Applied Statistics, Python and R Programming, Linux, and HPC

Data Analysis Training (Offline - UCSD Team)

- Duration: 2 Weeks (February 9 February 20)
- Mode: Onsite Session conducted by UCSD Team at RCB, Faridabad
- · Schedule:
 - Morning 9:30 AM to 12:30 PM
 - Afternoon 2:00 PM to 5:30 PM
- Focus Areas: Multi-omics Data Analysis, Transcriptomics, Epigenomics, and Systems Biology Integration

Course Structure & Detailed Syllabus

■ Module 1: Preparatory Training (Online – IBDC Team) ▼

Duration: 3 Weeks (January 19 – February 6) Timing: Afternoon 2:00 PM – 5:00 PM

Covers: Python, R Programming, Linux, Applied Statistics & HPC

Total Duration: 3 Weeks - 37.5 Hours

Python Programming – 5 Days (12.5 Hrs)

Goal: Learn Python for data analysis & bioinformatics.

- Python Fundamentals, Functions & Data Structures
- File Handling
- Pandas, NumPy, Matplotlib
- BioPython

Hands-on: Parse biological files, analyze data & visualize results.

Outcome: Work with biological datasets & build reproducible workflows.

R Programming - 5 Days (12.5 Hrs)

Goal: Use R for statistics, visualization & genomics analysis.

- · Data Types & R Basics
- Data Manipulation & Visualization
- · Statistical Analysis
- Genomic Data using ggplot2 & Bioconductor

Hands-on: Run statistical tests & visualize genomic data.

Outcome: Analyze genomics dataset using R effectively.

Linux - 2 Days (5 Hrs)

Goal: Work efficiently in Linux environment.

- Linux Architecture, Terminal & File Hierarchy
- Commands (Basic → Advanced)
- Bash Scripting

Hands-on: Automate tasks via shell scripts.

Applied Statistics - 2 Days (5 Hrs)

Goal: Build a foundation in statistical methods for biological data analysis.

- · Descriptive & Inferential Statistics
- · Hypothesis Testing
- Correlation & Regression
- Probability & Distributions
- · Dimensionality Reduction
- Clustering

Hands-on: Apply statistical methods on gene-expression dataset.

Outcome: Understand hypothesis testing, modeling & unsupervised learning.

HPC - 1 Day (2.5 Hrs)

Goal: Use HPC for large-scale biological data analysis.

- IBDC-HPC Infrastructure
- · Job Submission using PBS Scripts

Hands-on: Execute jobs & monitor on HPC cluster.

■ Module 2: Onsite Data Analysis Training (Offline – UCSD Team) ▼

Duration: 2 Weeks (February 9 – February 21)
Timing: 9:30 AM – 12:30 PM & 2:00 PM – 5:30 PM

Week 1

- Day 1: Biological Systems & Omics Overview + Group Exercise
- Day 2: Data Resources, QC & ML Models
- Day 3: Bulk & Single-Cell Transcriptomics + DEG Analysis
- Day 4: Spatial Transcriptomics + Hands-on
- Day 5: Networks, Cytoscape, WGCNA & GNN

Weekend Project: Group Presentation on Integrated Omics Study

Week 2

- Day 6: DNA Variant Analysis (GWAS, LD, PLINK)
- Day 7: ChIP-Seq (MACS2, IGV, UCSC)
- Day 8: ATACseq + Chromatin Topology + Multiome Integration
- Day 9: Metabolomics & Proteomics + Multi-omics Integration
- Day 10: Final Presentations and Seminar Symposium + Closing

Assessment: Daily homework, hands-on tasks & pop quizzes.

Guide Map

■ Click here to open Google Map location

Distance of RCB From:

• Airport: Indira Gandhi International Airport - 40.4 km

• Railway Station: Old Faridabad Railway Station – 7.8 km

How to get to Regional Centre for Biotechnology, Faridabad

By Metro

- Badkhal Mor Metro Station (Violet Line) 4 km
- Old Faridabad Metro Station (Violet Line) 4 km
- Neelam Chowk Ajronda Metro Station (Violet Line) 4 km
- Bata Chowk Metro Station (Violet Line) 4 km

Register & Apply Download as PDF

© Certificate Course Portal · Developed at IBDC-RCB, Faridabad