BioConductor for Genomic Data Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Bioconductor is a powerful open-source ecosystem for genomic data science, widely adopted for high-throughput sequencing (HTS), RNA-Seq, single-cell genomics, epigenomics, and multi-omics data integration. Built on the R programming language, Bioconductor provides robust, scalable, and reproducible workflows for genome-wide analysis, statistical modeling, data visualization, and biological interpretation. BioConductor for Genomic Data Training Course is a cornerstone technology for precision medicine, computational biology, and AI-driven genomics, enabling researchers to transform complex biological data into actionable insights.

This training course delivers hands-on, industry-aligned expertise in analyzing real-world genomic datasets using Bioconductor. Participants will master end-to-end genomic pipelines, including data preprocessing, quality control, differential expression analysis, pathway enrichment, and integrative multi-omics analysis. Emphasizing reproducible research, cloud-ready workflows, and real clinical and research case studies, the course prepares learners for careers in bioinformatics, genomics research, biotech R&D, and healthcare analytics.

Programme Curriculum

BioConductor for Genomic Data Training Course

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Course Duration

5 days

Course Objectives

1. Master Bioconductor ecosystem architecture
2. Perform RNA-Seq data analysis at scale
3. Apply single-cell RNA-Seq (scRNA-Seq) workflows
4. Implement genomic data preprocessing & QC
5. Conduct differential gene expression analysis
6. Execute functional annotation & pathway analysis
7. Analyze epigenomic and ChIP-Seq datasets
8. Integrate multi-omics data pipelines
9. Build reproducible research workflows
10. Visualize genomic data using advanced R graphics
11. Apply statistical genomics and modeling
12. Interpret results for precision medicine
13. Deploy cloud-enabled genomic analysis pipelines

Target Audience

1. Bioinformatics professionals
2. Genomics and molecular biology researchers
3. Data scientists entering life sciences
4. PhD scholars and postdoctoral researchers
5. Biotech and pharmaceutical R&D teams
6. Clinical genomics analysts
7. Computational biology students
8. Healthcare AI and precision medicine professionals

Course Modules

Module 1: Introduction to Bioconductor & R for Genomics

- Bioconductor architecture and core packages
- Genomic data types and formats
- R programming essentials for bioinformatics
- Package management and version control
- **Case Study:** Exploring TCGA cancer genomics data

Module 2: Genomic Data Preprocessing & Quality Control

- Raw sequencing data assessment

- Read alignment and normalization strategies
- Batch effect detection and correction
- Quality metrics and visualization
- **Case Study:** RNA-Seq QC in cancer transcriptomics

Module 3: Differential Gene Expression Analysis

- Statistical models for RNA-Seq
- DESeq2 and edgeR workflows
- Experimental design and contrasts
- Volcano plots and result interpretation
- **Case Study:** Disease vs control expression profiling

Module 4: Functional Annotation & Pathway Analysis

- Gene ontology (GO) enrichment
- KEGG and Reactome pathway analysis
- Biological interpretation of gene sets
- Visualization of functional networks
- **Case Study:** Identifying disease-associated pathways

Module 5: Single-Cell Genomics with Bioconductor

- scRNA-Seq data structures
- Cell clustering and dimensionality reduction
- Marker gene identification
- Cell type annotation
- **Case Study:** Tumor microenvironment single-cell analysis

Module 6: Epigenomics & Regulatory Genomics

- ChIP-Seq and ATAC-Seq analysis
- Peak calling and annotation
- Chromatin accessibility profiling
- Regulatory element discovery
- **Case Study:** Transcription factor binding analysis

Module 7: Multi-Omics Data Integration

- Integrating transcriptomics and epigenomics
- Cross-platform data harmonization
- Network-based multi-omics analysis
- Machine learning-ready features
- **Case Study:** Multi-omics cancer biomarker discovery

Module 8: Reproducible, Scalable & Cloud Genomics

- RMarkdown and workflow automation
- Containerized genomic pipelines
- Cloud-based genomic analysis
- Best practices in reproducible research
- **Case Study:** Scalable genomics pipeline deployment

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com