Genomic Data Science and Analysis Training Course

Professional Development Training Course Outline

Category	Biotechnology and Pharmaceutical Development	**Duration**	10 Days
Base Fee	$4,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Genomic Data Science and Analysis Training Course provides an in-depth understanding of genomic data, its applications, and advanced analysis techniques used in modern healthcare, biotechnology, and research fields. As genomics continues to revolutionize medicine and personalized healthcare, the demand for skilled data scientists who can analyze complex genomic datasets is at an all-time high. This course is designed to equip professionals with the skills to handle genomic data effectively, using cutting-edge bioinformatics tools and statistical methods. From understanding DNA sequencing to performing large-scale genome-wide association studies (GWAS), this course offers a comprehensive approach to mastering genomic data analysis, bioinformatics workflows, and genomic data interpretation.

Throughout the training, learners will gain hands-on experience in analyzing high-throughput genomic datasets, integrating multi-omics data, and utilizing powerful computational tools. The course leverages the latest technologies and research trends, ensuring that participants stay ahead in the ever-evolving world of genomic data science. By the end of the course, students will have the ability to apply bioinformatics pipelines, interpret genomic findings, and contribute to research in fields such as precision medicine, genetics, and biotechnology. This training will empower data professionals to unlock the potential of genomics in solving real-world health challenges.

Programme Curriculum

Genomic Data Science and Analysis Training Course

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Course Objectives

1. Understand genomic data types such as DNA sequences, RNA-Seq, and epigenomic data.
2. Analyze high-throughput genomic data using bioinformatics tools and platforms.
3. Master bioinformatics software like Galaxy, Bioconductor, and GATK.
4. Develop skills in genomic data visualization using R and Python.
5. Learn advanced statistical techniques for genomic data analysis.
6. Gain proficiency in performing quality control of genomic data.
7. Understand the principles of variant calling and interpretation.
8. Develop expertise in functional genomics and its applications.
9. Master techniques for genome assembly and annotation.
10. Integrate multi-omics data for systems biology applications.
11. Learn machine learning techniques for analyzing genomic data.
12. Explore next-generation sequencing (NGS) technologies and their applications.
13. Understand the ethical considerations and data privacy issues in genomics.

Target Audience

1. Data Scientists in healthcare and biotechnology.
2. Bioinformaticians and computational biologists.
3. Clinical researchers and genetic counselors.
4. Academicians and students in genomics and bioinformatics.
5. Professionals in pharmaceutical and biotech industries.
6. Laboratory technicians working with genomic data.
7. Data analysts looking to specialize in genomic data science.
8. Healthcare IT professionals involved in medical data analytics.

Course Module

Introduction to Genomics and Bioinformatics

- Overview of genomics and its applications.
- Introduction to bioinformatics and its role in genomic analysis.
- Key concepts in genomic data science.
- Case studies on Ethical and regulatory considerations in genomics.
- Key genomic databases and resources.

High-Throughput Sequencing Technologies

- Overview of NGS (Next Generation Sequencing) technologies.
- Illumina and PacBio sequencing platforms.
- Sequencing data formats and their analysis.
- Quality control in NGS data.
- Case studies on Applications of NGS in research and diagnostics.

Bioinformatics Tools and Software

- Introduction to bioinformatics software: Galaxy, Bioconductor, and GATK.
- Data preprocessing and quality control tools.
- Data alignment and variant calling.
- Case studies on Visualizing genomic data in R and Python.
- Advanced bioinformatics pipelines for large datasets.

Genomic Data Visualization and Analysis

- Visualization techniques for genomic data.
- Integrating genomic data with clinical information.
- Genome-wide association studies (GWAS) and their analysis.
- Statistical tools for genomic analysis.
- Case studies on Use cases of data visualization in genomics.

Genomic Data Preprocessing and Quality Control

- Quality control strategies for genomic data.
- Handling missing data and noise.
- Case studies on Filtering and cleaning sequencing data.
- Performing quality assessment with tools like FastQC.
- Ensuring data integrity throughout the analysis.

Functional Genomics and Applications

- Introduction to functional genomics.
- Role of gene expression analysis in disease research.
- Techniques for transcriptome analysis (RNA-Seq).
- Case studies on Epigenetic data analysis.
- Integrating genomic and functional data for systems biology.

Variant Calling and Interpretation

- Understanding the process of variant discovery.
- Aligning sequences and identifying mutations.
- Annotating variants with functional impact.
- Interpreting the biological significance of variants.

- Case studies on Variant validation and interpretation in a clinical context.

Machine Learning in Genomic Data Science

- Introduction to machine learning in genomics.
- Supervised and unsupervised learning techniques.
- Feature selection and model building.
- Genomic data classification and clustering.
- Case studies of ML applications in genomics.

Genome Assembly and Annotation

- Overview of genome assembly techniques.
- De novo assembly versus reference-based assembly.
- Genome annotation techniques.
- Structural variant detection.
- Case studies in genome assembly.

Multi-Omics Data Integration

- Integrating genomic, transcriptomic, proteomic, and metabolomic data.
- Multi-omics data analysis techniques.
- Tools for data integration and visualization.
- Real-world applications in disease research.
- Case studies on multi-omics data integration.

GWAS: Genome-Wide Association Studies

- Overview of GWAS methodology.
- Identifying genetic variants linked to diseases.
- Statistical analysis in GWAS.
- Interpretation of GWAS results.
- Case studies of GWAS in disease research.

Ethics, Data Privacy, and Security in Genomics

- Ethical issues in genomic data research.
- Data privacy regulations (GDPR, HIPAA).
- Handling sensitive genetic data.
- Case studies on Public health implications and genomic data sharing.
- Ethical considerations in personalized medicine.

Clinical Applications of Genomic Data Science

- Genomics in precision medicine.
- Role of genomics in cancer research.
- Genetic counseling and clinical decision-making.
- Translational genomics in drug discovery.
- Clinical case studies in genomic medicine.

Genomic Data Science in Biotechnology

- Applications of genomics in biotechnology.

- Genomic data in agricultural biotech.
- Genomics and synthetic biology.
- Genomic engineering and CRISPR technology.
- Case studies in biotechnology-driven genomics.

Advanced Data Analysis with R and Python

- Advanced statistical techniques in genomic data analysis.
- Using R and Python for genomic data manipulation.
- Working with large genomic datasets.
- Case studies on Data integration and analysis pipelines.
- Final project and real-world data analysis.

Training Methodology

- Interactive Learning: Hands-on exercises and real-world case studies.
- Expert Instructors.
- Live Webinars: Weekly sessions for direct interaction and Q&A.
- Collaborative Environment: Group discussions and peer learning opportunities.
- Project-Based Approach.

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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