Genetic Epidemiology Training Course

Professional Development Training Course Outline

Category	Public Health	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Genetic Epidemiology is an advanced and rapidly evolving field that integrates genetics, biostatistics, bioinformatics, and population health sciences to understand the role of genetic factors in disease distribution and determinants in populations. Genetic Epidemiology Training Course is designed to equip learners with cutting-edge competencies in genome-wide association studies (GWAS), polygenic risk scoring, precision medicine, molecular epidemiology, and computational genomics. With the rise of big data in healthcare, AI-driven genomics, and personalized medicine, genetic epidemiology has become a cornerstone in modern biomedical research and public health decision-making.

This course provides a structured pathway for mastering both theoretical foundations and practical applications of genetic data analysis, disease mapping, heritability estimation, and causal inference in complex traits. Participants will engage with real-world datasets and advanced analytical tools used in global research institutions. The program emphasizes data-driven health innovation, translational genomics, and population-based genetic research, enabling learners to contribute to breakthroughs in disease prevention, drug discovery, and global health surveillance systems.

Programme Curriculum

Genetic Epidemiology Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of genetic epidemiology and molecular genetics in population health
2. Apply Genome-Wide Association Studies (GWAS) methodologies in research
3. Analyze polygenic risk scores (PRS) for complex diseases
4. Develop skills in bioinformatics pipelines and genomic data processing
5. Interpret heritability and gene-environment interactions
6. Use R, Python, and Bioconductor for genetic data analysis
7. Conduct causal inference using Mendelian Randomization
8. Evaluate precision medicine and personalized healthcare models
9. Understand epigenetics and gene regulation mechanisms
10. Apply statistical genetics and multivariate analysis techniques
11. Integrate omics data (genomics, transcriptomics, proteomics)
12. Design and interpret population-based genetic studies
13. Translate research findings into public health genomics interventions

Target Audience

1. Public health professionals
2. Medical doctors and clinical researchers
3. Epidemiologists and biostatisticians
4. Geneticists and molecular biologists
5. Bioinformatics analysts and data scientists
6. Pharmaceutical and biotech researchers
7. Graduate students in biomedical sciences
8. Health policy makers and global health practitioners

Course Modules

Module 1: Foundations of Genetic Epidemiology

- Basics of human genetics and inheritance patterns
- Introduction to population genetics and allele frequency
- Study designs in genetic epidemiology
- Hardy-Weinberg equilibrium applications
- Data sources in genomic research
- **Case Study:** Mapping genetic susceptibility of sickle cell disease in African populations

Module 2: Genome-Wide Association Studies (GWAS)

- GWAS principles and workflows
- SNP identification and genotyping techniques
- Quality control in genomic datasets
- Statistical significance and multiple testing correction
- Visualization of GWAS results (Manhattan plots)
- **Case Study:** GWAS analysis of Type 2 Diabetes risk variants

Module 3: Bioinformatics & Genomic Data Analysis

- Introduction to bioinformatics tools and databases
- Sequence alignment and annotation techniques
- Variant calling and filtering pipelines
- Use of R/Python in genomic analysis
- Data storage and cloud genomics
- **Case Study:** Cancer mutation profiling using TCGA datasets

Module 4: Statistical Genetics & Causal Inference

- Regression models in genetic studies
- Heritability estimation methods
- Mendelian Randomization techniques
- Confounding and bias control
- Bayesian approaches in genetics
- **Case Study:** Causal role of BMI genes in cardiovascular disease

Module 5: Polygenic Risk Scores & Predictive Genetics

- Construction of polygenic risk scores
- Risk prediction models
- Clinical applications of PRS
- Validation of predictive models
- Integration into healthcare systems
- **Case Study:** Predicting Alzheimer's disease risk using PRS

Module 6: Epigenetics & Gene Regulation

- DNA methylation and histone modification
- Environmental influence on gene expression
- Epigenome-wide association studies (EWAS)
- Developmental epigenetics
- Epigenetic biomarkers in disease
- **Case Study:** Impact of smoking on epigenetic changes in lung cancer

Module 7: Precision Medicine & Translational Genomics

- Principles of precision medicine
- Pharmacogenomics applications
- Drug-gene interaction mapping
- Clinical decision support systems
- Personalized treatment strategies
- **Case Study:** Targeted cancer therapy using genomic profiling

Module 8: Public Health Genomics & Big Data Integration

- Genomic surveillance systems
- Integration of multi-omics data
- AI and machine learning in genomics
- Ethical, legal, and social implications (ELSI)
- Global health genomics strategies
- **Case Study:** COVID-19 variant tracking using genomic surveillance

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
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:

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