Genetics & Genome Editing Basics Training Course

Professional Development Training Course Outline

Category	Veterinary and Animal Science	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Genetics & Genome Editing Basics Training Course is designed to empower researchers, biotechnologists, and life sciences professionals with foundational knowledge in genomics, gene editing technologies, CRISPR-Cas systems, and synthetic biology. This course integrates cutting-edge scientific principles, practical applications, and ethical considerations, providing participants with a comprehensive understanding of DNA manipulation, gene therapy, and genome engineering. By mastering these core concepts, attendees can contribute to innovative biomedical research, precision medicine, and agricultural biotechnology advancements.

Paragraph 2:
Participants will gain hands-on exposure to molecular biology techniques, genome sequencing, and bioinformatics tools that drive modern genome editing breakthroughs. This training emphasizes critical thinking, problem-solving, and experimental design to equip learners for real-world applications in genetic research, drug discovery, and therapeutic interventions. With a balance of theory, practical exercises, and case studies, this course fosters scientific literacy, laboratory competence, and data-driven decision-making in the rapidly evolving field of genetics and genome engineering.

Programme Curriculum

Genetics & Genome Editing Basics Training Course

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5 days

Course Objectives

1. Understand the fundamentals of genetics, genomics, and molecular biology.
2. Learn the principles and applications of CRISPR-Cas9, TALENs, and ZFNs.
3. Explore genome sequencing technologies and bioinformatics analysis.
4. Gain proficiency in gene therapy techniques and clinical applications.
5. Develop skills in genetic manipulation and genome editing workflows.
6. Understand epigenetics, gene regulation, and transcriptional control.
7. Explore synthetic biology approaches and designer genomes.
8. Evaluate ethical, legal, and societal implications (ELSI) of genome editing.
9. Analyze genome editing case studies in agriculture and medicine.
10. Integrate laboratory best practices and biosafety protocols.
11. Enhance data interpretation, statistical analysis, and experimental design.
12. Explore emerging trends: personalized medicine, gene drives, and bioinformatics AI tools.
13. Prepare for careers in genomics research, biotech, and therapeutic development.

Target Audience

1. Molecular biologists and geneticists
2. Biotechnologists and bioengineers
3. Life sciences researchers
4. Clinical researchers and healthcare professionals
5. Postgraduate and PhD students in biology or biotechnology
6. Laboratory technicians and research associates
7. Agricultural scientists and crop biologists
8. Professionals interested in **precision medicine and genome editing applications**

Course Modules

Module 1: Fundamentals of Genetics & Genomics

- DNA, RNA, and protein structure and function
- Mendelian and non-Mendelian inheritance patterns
- Chromosome structure and genome organization
- Gene expression and regulation basics
- Case Study: Human Genome Project insights

Module 2: Molecular Biology Techniques

- PCR, gel electrophoresis, and cloning techniques
- DNA/RNA extraction and quantification
- Gene expression analysis (RT-PCR, qPCR)
- Recombinant DNA technology fundamentals
- Case Study: CRISPR-based gene knockout experiments

Module 3: Introduction to Genome Editing Tools

- Overview of CRISPR-Cas9, TALENs, and ZFNs
- Mechanisms of targeted genome modifications
- Off-target effects and specificity
- Delivery systems: viral and non-viral vectors
- Case Study: CRISPR-mediated disease model creation

Module 4: Gene Therapy and Clinical Applications

- Principles of gene therapy and therapeutic design
- Viral and non-viral gene delivery systems
- Current FDA-approved gene therapies
- Challenges: immunogenicity and long-term expression
- Case Study: CRISPR therapy for sickle cell anemia

Module 5: Bioinformatics and Genome Analysis

- Genome sequencing technologies (NGS, WGS)
- Variant calling and genome annotation
- Gene expression profiling and pathway analysis
- Databases: GenBank, Ensembl, and UCSC Genome Browser
- Case Study: Bioinformatics pipeline for rare disease diagnosis

Module 6: Synthetic Biology and Designer Genomes

- Principles of synthetic biology
- Gene circuit design and synthetic promoters
- Genome engineering in microbes and plants
- Metabolic pathway optimization
- Case Study: Synthetic yeast genome project

Module 7: Ethical, Legal, and Societal Implications (ELSI)

- Ethical frameworks in genome editing
- Regulatory and biosafety considerations
- Public perception and science communication
- Risk assessment and responsible innovation
- Case Study: Germline genome editing controversies

Module 8: Advanced Applications & Emerging Trends

- Personalized medicine and precision therapies
- Gene drives and population genetics applications

- AI-driven genomics and predictive modeling
- Future prospects: organoids, xenotransplantation
- Case Study: CRISPR-based agriculture innovations

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
21 Sep 2026	25 Sep 2026	Online	$1,000

Start Date	End Date	Location	Price
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

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

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