Forensic DNA Analysis: Beyond the Basics Training Course

Professional Development Training Course Outline

Category	Criminology	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In the modern era of criminal justice and forensic science, Forensic DNA Analysis stands as a cornerstone of evidence-based investigation and advanced criminal profiling. As the science of genetics continues to evolve, forensic professionals must keep pace with cutting-edge developments in DNA sequencing technologies, STR analysis, biological evidence preservation, and bioinformatics applications in crime scene investigation. Training Course on Forensic DNA Analysis: Beyond the Basics is tailored to empower forensic scientists, law enforcement personnel, legal professionals, and researchers with deep, hands-on knowledge of forensic DNA methods and their application in real-world criminal cases.

This highly specialized program delivers an intensive curriculum covering next-generation sequencing (NGS), touch DNA, mixture interpretation, low copy number (LCN) analysis, population genetics, and DNA evidence interpretation. Participants will gain practical experience through real case studies and simulations that challenge their critical thinking and decision-making skills. By the end of this course, attendees will be equipped to analyze complex DNA evidence with confidence and contribute to fair and accurate judicial outcomes.

Programme Curriculum

Forensic DNA Analysis: Beyond the Basics Training Course

Introduction

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Course Objectives

1. Understand the principles of next-generation DNA sequencing (NGS) and its application in forensic investigations.
2. Apply advanced techniques in Short Tandem Repeat (STR) analysis for human identification.
3. Master DNA mixture deconvolution and probabilistic genotyping tools.
4. Analyze low template and degraded DNA samples effectively.
5. Explore touch DNA and trace evidence collection protocols.
6. Interpret Y-STR and mtDNA profiles for challenging forensic cases.
7. Evaluate the reliability of DNA databanks and population genetics in criminal cases.
8. Learn the legal standards for DNA evidence admissibility in court.
9. Integrate bioinformatics and software tools in forensic DNA analysis.
10. Investigate DNA phenotyping for predictive profiling and cold cases.
11. Apply chain of custody procedures and ethical considerations in DNA handling.
12. Conduct crime scene to courtroom simulations for DNA casework.
13. Implement quality assurance and validation standards in forensic DNA labs.

Target Audience

1. Forensic DNA analysts
2. Criminal investigators
3. Law enforcement officers
4. Crime laboratory technicians
5. Prosecutors and defense attorneys
6. Legal consultants in forensic science
7. Biomedical researchers
8. Criminal justice students and educators

Course Duration: 10 days

Course Modules

Module 1: Fundamentals of Forensic DNA Analysis

- History and evolution of forensic DNA profiling
- DNA structure and biological basics
- Extraction and quantification techniques
- Polymerase Chain Reaction (PCR) basics
- STR profiling fundamentals
- **Case Study**: First criminal conviction using DNA in the UK (Colin Pitchfork case)

Module 2: Advanced STR and Allele Frequency Analysis

- Capillary electrophoresis
- Allelic ladder interpretation
- Peak height ratios and artifacts
- Stutter analysis
- Off-ladder and null alleles
- **Case Study**: U.S. v. Davis – STR misinterpretation defense strategy

Module 3: DNA Mixture Interpretation

- Types of DNA mixtures
- Major/minor contributor distinction
- Statistical tools and likelihood ratios
- Probabilistic genotyping software
- Challenges in interpreting mixtures
- **Case Study**: The Amanda Knox trial – mixed DNA evidence

Module 4: Touch DNA and Trace Evidence

- Collection of epithelial cell samples
- Contamination prevention techniques
- Sensitivity of touch DNA
- Issues with sample transfer
- Use in sexual assault cases
- **Case Study**: The JonBenét Ramsey case – touch DNA breakthrough

Module 5: Low Copy Number (LCN) and Degraded Samples

- Understanding LCN and degraded DNA
- Increasing amplification cycles
- Risk of allele drop-in/drop-out
- Interpretation best practices
- Reporting guidelines for LCN
- **Case Study**: LCN DNA in the Phantom of Heilbronn case

Module 6: Y-STR and Mitochondrial DNA (mtDNA)

- Characteristics and inheritance patterns
- Advantages in certain case types
- Application in familial searching
- mtDNA sequencing challenges
- Use in historical investigations
- **Case Study**: Identification of Romanov family remains

Module 7: DNA Phenotyping and Forensic Genealogy

- Predictive DNA markers for appearance
- Phenotypic trait databases
- Familial searching techniques
- Ethical and privacy concerns
- Cold case investigations
- **Case Study**: The Golden State Killer capture using genealogy

Module 8: Next-Generation Sequencing (NGS)

- Advantages over traditional STR
- Sequencing workflows and platforms
- SNP panels and targeted sequencing
- Mixed DNA interpretation via NGS
- Integration into forensic workflows
- **Case Study**: NGS in the Mass Graves of Kosovo

Module 9: Bioinformatics in DNA Analysis

- DNA data processing and alignment

- Use of forensic databases (CODIS, GEDmatch)
- Software tools for DNA interpretation
- Data visualization and reporting
- Automation and artificial intelligence
- **Case Study**: Ancestry tracking in war crime investigations

Module 10: Legal and Ethical Aspects of DNA Evidence

- Daubert and Frye standards
- Chain of custody documentation
- Consent and DNA collection laws
- Rights and ethical boundaries
- Expert testimony preparation
- **Case Study**: Maryland v. King – legality of DNA collection

Module 11: Crime Scene Management and Sample Collection

- Scene security and contamination control
- Proper sample labeling
- Storage and transport protocols
- Cross-contamination risks
- Integration with other forensic evidence
- **Case Study**: Boston Strangler case and scene mishandling

Module 12: Quality Assurance and Laboratory Validation

- Accreditation standards (ISO/IEC 17025)
- Internal validation vs. developmental
- Proficiency testing
- Laboratory auditing
- Documentation and reproducibility
- **Case Study**: Houston crime lab scandal – QA lessons learned

Module 13: Cold Case and Missing Persons Investigations

- DNA databanks for missing persons
- Challenges in identifying aged samples
- Kinship analysis techniques
- Reopening cases with new methods
- Collaborations with NGOs
- **Case Study**: Identification of 9/11 victims using mtDNA

Module 14: DNA Evidence in Courtroom Practice

- Preparing expert witnesses
- Simplifying scientific testimony
- Dealing with cross-examination
- Visual aids for juries
- Handling prosecutorial bias
- **Case Study**: O.J. Simpson trial – impact of DNA testimony

Module 15: Simulation & Final Assessment

- Mock crime scene processing
- Lab analysis and reporting
- Mock courtroom trial

- Peer-review of casework
- Comprehensive feedback
- **Case Study**: Simulated case based on combined real-life scenarios

Training Methodology

- Interactive lectures and visual presentations
- Hands-on laboratory sessions with real DNA samples
- Case study analysis and group discussion
- Mock crime scene and courtroom simulations
- Assessment quizzes and final evaluation
- Access to forensic DNA software tools and databases

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

Start Date	End Date	Location	Price
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

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

Register Online Now

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