San Diego Police Department

Training Program Manual

Forensic Biology

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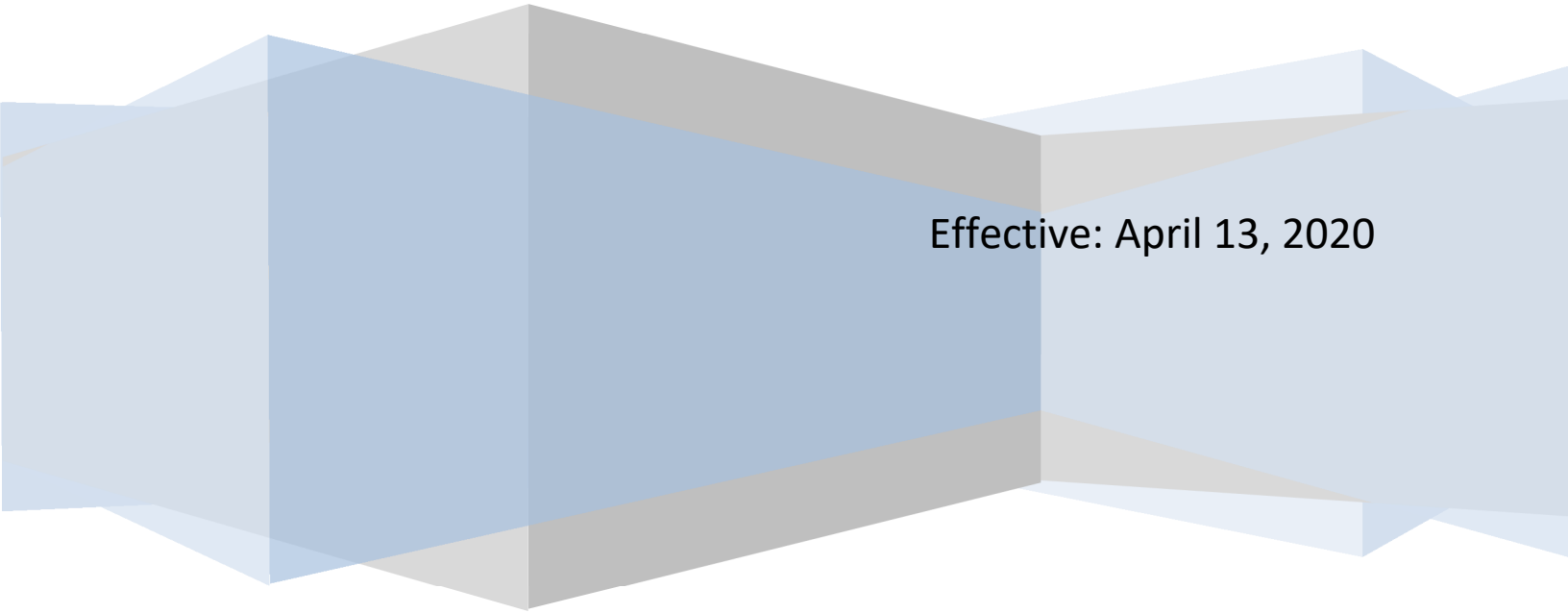

Effective: April 13, 2020

GENERAL

The San Diego Police Department Forensic Biology Training Program is based on training Guidelines published by the Scientific Working Group on DNA Analysis Methods (SWGDAM January 17, 2013). The training program is intended to supplement coursework in the fields of biochemistry, genetics, statistics, molecular biology, and further the understanding of the trainee in the underlying scientific principles of forensic biology and DNA testing. To successfully complete the training program, trainees are expected to have a solid understanding of the following foundational topics:

Basic principles of Biochemistry
Basic principles of Molecular Biology
Basic principles of Genetics
Basic principles of Statistics
Basic principles of Population Genetics
The basic components and structure of DNA
The roles of genes and chromosomes
Mitosis and meiosis
Homozygosity and heterozygosity
Differences between DNA and RNA
The basic structures of the nucleotide bases
DNA polymerases types and functions
PCR theory
Standard PCR reaction components and function
Factors affecting PCR specificity
Properties of Taq DNA Polymerase

The Training Program Manual contains the training program overview and the various training modules required to be considered qualified to perform analyses. The modules cover both conventional serology and DNA analyses.

Training assignments will be performed in accordance with the Crime Laboratory's Quality Manual and the Forensic Biology Unit's Policy and DNA Technical Manuals. Trainees will not perform any analyses related to casework until they have completed all training requirements and been approved and authorized to perform such testing.

COORDINATION OF THE TRAINING PROGRAM

The DNA Technical Manager has responsibilities under The FBI Director's *Quality Assurance Standards Audit for Forensic DNA Testing Laboratories* (QAS) for the oversight of DNA training program and the approval and documentation of analyst qualifications prior to independent casework. At the San Diego Police Department, this oversight also includes training in serological methods. The DNA Technical Manager may delegate certain duties and/or sections of training to other qualified examiners, but is ultimately responsible for the overall training assignment of the individual(s) within the laboratory.

PRIOR TRAINING OR EXPERIENCE

Analysts who have previous forensic experience may submit documentation of their prior training for evaluation by the DNA Technical Manager. If documentation of the analyst's prior training in specific areas is provided and approved, the analyst's training program may be adapted to reflect the prior training. Analysts that are approved for amended training programs will still be required to pass a competency test prior to their approval and authorization for independent casework. Approval for an adapted training program will be documented by the DNA Technical Manager and submitted to the Quality Manager with the completed training record.

TRAINING OF LABORATORY TECHNICIANS, INTERNS, OR VOLUNTEERS

Laboratory Technicians, interns, or volunteers will not perform any analyses related to casework (e.g., validations or quality control testing) until they have completed all training requirements determined by the DNA Technical Manager, and been approved and authorized to perform such testing.

The training program presented herein may be adapted to reflect a more narrow scope required to approve and authorize a laboratory technician, intern, or volunteer to perform testing. Approval for an adapted training program will be documented by the DNA Technical Manager and submitted to the Quality Manager with the completed training record.

ANALYST SHADOWING

Analyst shadowing will be accomplished on a module-by-module basis. For instance, the first required analyst shadowing occurs in module 3, which should include viewing of analysts using the File-on-Q software to request evidence from the Property Room, retrieval of evidence from the property Room, the documentation of the evidence in the FB SIMS, as well as any sampling. Subsequent module shadowing requirements will include the elements specific to those modules.

RESPONSIBILITIES OF THE TRAINEE

The trainee will be expected to follow all policies and requirements contained within the Quality Assurance, Safety, Unit Policy, and Technical manuals. By signing off in PowerDMS on the manuals, the trainee is acknowledging reading and understanding of the contents of the manuals and agreeing to abide by the provision within them. If the trainee has any questions regarding the manuals, those should be clarified prior to performing any training procedures. Despite having signed off on the Forensic Biology Technical Manual in PowerDMS, trainees will be required to review selected parts of this manual throughout the training program to reinforce the learning objectives throughout this manual.

No deviations from any procedure outlined in any manual will be accepted without prior approval from the DNA Technical Manager.

The trainee will address any questions which may arise with the trainee's assigned trainer, or the DNA Technical Manager. Any issues must be resolved prior to independent procedural action taken by the trainee.

The trainee will keep a hardcopy or electronic record summarizing all work and completed activities related to training received within the Forensic Biology Unit.

The record must be concise, compiled contemporaneously, accurately depict training activities, and be readily available for review throughout the training.

The trainee must submit the training record for review at the completion of the training program prior to approval and authorization for either supervised, or independent casework.

The trainee will shadow an experienced analyst throughout the entire duration of the process they are observing.

Where applicable, the trainee will complete a summary of the required readings. The summary will be a brief paragraph that highlights the main points of the required readings. While all items within the reading lists of each module are required, some are in the list for foundational, while others in the list will be used as reference material extensively in casework and court preparation.

RESPONSIBILITIES OF THE TRAINERS

Although assigned trainers may be specifically assigned training duties, all qualified analysts in the forensic biology unit will be available to assist trainees during their participation in the training program.

Trainers will behave with professionalism and treat trainees with respect at all times.

Trainers will be expected to provide meaningful and detailed instruction to the trainees.

Trainers will bring any issues discovered within the training to the attention of the DNA Technical Manager.

Trainers will be expected to have trainees observe the totality of any process assigned. As an example, if an analyst is having a trainee shadow the quantification step of analysis, it is expected that the analyst will have the trainee shadow every aspect of the analysis. This includes obtaining the reagents from the refrigerator and freezer, worksheet preparation, preparing the samples and required dilutions, sample setup (manual or robotic), data transfers, and data interpretation.

Trainers will provide the trainees with a comprehensive overview of any process being observed including providing guidance on documentation of the process, instruction on instrumentation, quality control, quality assurance, and interpretation of results.

SPECIALIZED MODULES

Y-Chromosome STR testing and legacy kit interpretation represents specialized testing that is not contained within the standard training program. Not every analyst will complete the training to perform these tasks. Trainees must successfully complete the training modules associated with a specialized module prior to being approved and authorized for that testing.

NEW MODULES

Current analysts undergo training and competency testing in all new methods. Training modules for newly validated methods are generally created prior to implementation, and will be added to the training program manual for new analysts as soon as practical.

CASE PACKET REVIEWS

Case packet reviews will be guided interactive training exercises where trainees and trainers step through the testing, interpretation, and documentation of case analyses. The review will focus on case approach, testing performed, searching of CODIS databases, and reporting of the results. The goal of case packet reviews is to provide trainees with an overview of a broad scope of case analyses performed by qualified analysts within the unit.

EVALUATION OF TRAINEES

The trainee will be tested on their knowledge of the theory underlying each methodology through written, oral, and/or practical examinations.

Satisfactory performance in the training program and authorization is required prior to a trainee being permitted to perform any laboratory function or analysis associated with biology casework.

Trainees are evaluated by their performance on the training assignments, quizzes, adjudicated or mock casework, as well as the results of the written or practical competency test(s).

The assessment of the trainee's readiness for independent analysis will consist of a review of their performance on supervised case assignments.

Successful completion of an oral board or moot court will be required for completion of the training program, but may occur subsequent to the commencement of supervised casework.

QUIZZES AND WRITTEN TESTS

Passing for all quizzes and written tests is 80%. The DNA Technical Manager, or designee, will be responsible for grading all tests. A scoring rubric will guide the grading of all written quizzes and tests.

MOOT COURT OR ORAL BOARDS

Passing for all moot court or oral boards is 80%. The final grade for the moot court or oral boards will be determined based on the average of a panel of evaluators designated by the DNA Technical Manager. A scoring rubric will guide the grading of all moot courts and oral boards.

TARGETED TRAINING

In the event that additional instruction on one or more topics is required, trainees or analysts will be provided targeted training. Targeted training is supplemental instruction, which may be in the form of additional required reading, lectures, or research assignment as determined by the DNA Technical Manager. Trainees undergoing targeted training may be required to pass some form of evaluation (i.e., written or oral examination) before moving on to subsequent modules within the training program.

TRAINING PROGRAM MODULES

MODULE 1: FORENSIC BIOLOGY QUALITY ASSURANCE

Learning objectives:

Quality assurance and quality control within the forensic biology unit.
Quality control of critical reagents and kits
Bias
Instrument calibrations and verifications
Clean technique.

- *Policies and procedures regarding clean technique*
- *Use of personal protective equipment*
- *Decontamination of general laboratory and individual work areas*
- *Cleaning and sterilization procedures for laboratory equipment*
- *Sample handling practices*

Reading List

1. Quality Assurance Standards Audit for Forensic DNA Typing Laboratory, July 2020
2. Forensic Biology Policy Manual (latest version)
3. Review of the Forensic Biology Logs
4. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 7. Academic Press. 2011.
5. The Evaluation of Forensic DNA Evidence, NRC II, National Academy Press, 1996.

Requirements to complete module:

Review of "Kit QC" folder in the QA-QC Files folder on Forensic Biology network (H:\QA-QC files)
Review of the Equipment and Quality Assurance section of the Forensic Biology Unit Policy Manual
QA/QC and accreditation related quiz.

MODULE 2: FORENSICS BIOLOGY SPECIFIC COURT TRAINING

Learning objectives:

Forensic Biology testimony
Kelly-Frye admissibility of evidence standard
Brady v Maryland disclosure requirements

Minimizing bias
Hierarchy of propositions

Reading List:

1. Saferstein. *Forensic Science Handbook, Volume I,* Chapter 1, Prentice Hall Publishing, 1982.
2. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 18. Academic Press. 2011.
3. Kelly-Frye Standards Summary from internet
4. Brady v Maryland Summary from internet
5. Evett IW, Gill PD, Jackson G, Whitaker J, Champod C. Interpreting small quantities of DNA: the hierarchy of propositions and the use of Bayesian networks. J Forensic Sci 2002;47(3):520–530.
6. Dror, IE. Subjectivity and bias in forensic DNA mixture interpretation. Science and Justice 51 (2011) 204–208
7. Dror, IE. Practical Solutions to Cognitive and Human Factor Challenges in Forensic Science. Forensic Science Policy & Management, 4(3–4):1–9, 2013
8. Dror, IE. The ambition to be scientific: Human expert performance and objectivity. Science and Justice 53 (2013) 81–82
9. vanOorschot, RG, et al. DNA transfer in forensic science: A review. Forensic Science International: Genetics 38 (2019) 140‑166
10. Moretti, T, et al. Erratum: Errors to FBI's STR Population Data Published in 1999 and 2001. J Forensic Sci 2015 Vol 6(4): 1114-1116
11. Steffen, C, et al. Corrigendum to 'U.S. Population Data for 29 Autosomal STR Loci' [Forensic Sci. Int. Genet. 7 (2013) e82–e83]. Forensic Science International: Genetics http://dx.doi.org/10.1016/j.fsigen.2017.08.011
12. Biedermann, A. et al. Evaluation of Forensic DNA Traces When Propositions of Interest Relate to Activities: Analysis and Discussion of Recurrent Concerns. Frontiers in Genetics: Review 12 December 2016 doi: 10.3389/fgene.2016.00215

Requirements to complete module:

Summary of readings
Responses to predicate questions for a DNA analyst
Create a list of questions that may come up in DNA testimony to be answered throughout the training
Shadowing of analyst testimony
Quiz

MODULE 3: EVIDENCE HANDLING

Learning objectives:

Firearms safety
Chain of Custody

Evidence-on-Q/SART-on-Q
FB SIMS
Forensic Biology Unit case acceptance policy
Chain of Custody: Intra- and Inter-laboratory transfer of evidence
Proper packaging and seals
Evidence storage procedures
Expectations for notetaking with Forensic Biology
Photography of evidentiary items or diagramming of evidence items (when applicable)
Trace evidence collection techniques
Biological Evidence Collection Techniques
Handling evidence, sample collection, and derivative evidence items
Factors affecting deterioration of evidence
Consumption and conservation of evidence
Distinction between evidence and work product

Reading List:

1. CA-DOJ Firearms Safety Certificate Guide January 2019, Chapters 1 and 3.
2. FB SIMS Training Powerpoint
3. Evidence-on-Q Training Document
4. Trace Evidence Recovery Guidelines, Scientific Working Group on Materials Analysis (SWGMAT) Evidence Committee, January 1998 Revision, Forensic Science Communications, October 1999.
5. Hedman J, et al. The double-swab technique versus single swabs for human DNA recovery from various surfaces. Forensic Science International: Genetics 46 (2020) 102253
6. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 1. Academic Press. 2011.

Requirements to complete module:

Summary of Readings
Answers to possible court question on evidence handling
FB SIMS notetaking
Analyst shadowing
Quiz

MODULE 4: SEROLOGY 1 - BLOOD

Learning objectives:

Foundational information for presumptive and confirmatory serological tests for blood

Blood composition, function, and presumptive test chemistry
Blood identification and collection methods
Immunology and immunological testing for species origin

ABAcard HemaTrace

Theory, application, limitations, and documentation of Luminol

Bloodstain Pattern Interpretation

QA procedures for blood testing

Basic bloodstain patter recognition for screening evidence

Case approach in blood screening

Reading List:

1. Richard Li. Forensic Biology. CRC Press 2008 Chapter 6 and 7
2. R.E. Gaensslen. *Sourcebook in Forensic Serology, Immunology, and Biochemistry*. Unit II. NIJ. 1983 Section 6.
3. Saferstein. *Forensic Science Handbook. Volume I*, Chapters 7 and 10. Prentice Hall Publishing. 1982.
4. GW Owen and KW Smalldon. Blood and semen stains on outer clothing and shoes not related to crime: report on a survey using presumptive tests, J. Forensic Sci., 20(2):391-403, 1975.
5. A. Ponce *et al*. Critical revision of presumptive tests for bloodstains, Forensic Sci. Comm., Vol. 1 No. 2, July 1999.
6. ABAcard HemaTrace package insert.
7. AM Gross, KA Harris, GL Kadlun. The effect of luminol on presumptive tests and DNA analysis using the polymerase chain reaction, J Forensic Sci., 44(4), pp. 837-840, 1999.
8. DellaManna, A, et al. A novel approach to obtaining reliable results from luminol treated bloodstains. J Forensic Sci 2000 v45(4): 886-890
9. Bevel and Gardner. Bloodstain Pattern Analysis 3rd Edition CRC Press 2008 Chapters 2, 10, 11, and 13

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to possible court question on blood testing

Shadowing of analyst blood testing

Presumptive test sensitivity and specificity studies including summary of findings

Suggested tests: Sensitivity (neat through 1/10,000 dilutions) dried bloodstains on fabric (including luminol) using both swabbing and cutting methods of collection. Specificity of the presumptive blood tests (including luminol).

Confirmatory test sensitivity and specificity studies including summary of findings

Suggested tests: Evaluate the sensitivity and specificity of the ABAcard HemaTrace® test by analyzing the dilution series from above as well as various animal sera and human body fluids other than blood.

Blood analysis documentation/screening exercise.Quiz

MODULE 5: SEROLOGY 2 - SEMEN

Learning objectives:

Foundational information for presumptive and confirmatory serological tests for semen

Male reproductive system
Composition and function of semen and its components
Alternate light source – theory and application
Presumptive testing - theory and application
Semen stain identification and collection methods
Sperm cell morphology and microscopy staining techniques
Bright field versus phase contrast microscopy
Introduction to p30
Azospermia, oligospermia, and vasectomized males
ABAcard p30 card

QA procedures for seminal fluid/semen testing

Reading List:

1. Richard Li. Forensic Biology. CRC Press 2008 Chapter 8
2. R.E. Gaensslen. *Sourcebook in Forensic Serology, Immunology, and Biochemistry*. Section 10. NIJ. 1983.
3. ABAcard p30 test product insert.
4. Proceedings of a Forensic Science Symposium on the Analysis of Sexual Assault Evidence, Section 1 (Anatomy and Physiology) July 6-8, 1983. Forensic Science Research and Training Center, Federal Bureau of Investigation.
5. Saferstein. *Forensic Science Handbook, Volume II*, Chapter 7, Prentice Hall Publishing. 1988.
6. GM Willott et al. Spermatozoa – Their persistence after sexual intercourse. Forensic Sci Int 1982, 19:134-154.
7. Noel, S, et al. DNA transfer during laundering may yield complete genetic profiles. Forensic Science International: Genetics 23 (2016) 240–247
8. Noel, S, et al. Repeatedly washed semen stains - Optimal screening and sampling strategies for DNA analysis. Forensic Science International: Genetics 38 (2019) 9–14

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to possible court question on semen testing

Shadowing of analyst semen testing

Presumptive test sensitivity and specificity studies including summary of findings

Suggested tests: presumptive testing on a dilution series (neat through 1/80 dilutions) of dried semen on fabric as well as dried mixtures of semen with different biological fluids on fabric. Sample using both swabbing and cutting methods. Conduct AP mapping exercise on at least one stain on fabric.

Confirmatory test sensitivity and specificity studies including summary of findings

Suggested tests: use the sample sets created for presumptive testing for confirmatory testing methods. Evaluate the specificity ABA card p30 test by examining the results for different body fluids. Examine stained sperm slides from different species.

Semen analysis documentation/screening exercise.

Quiz

MODULE 6: SEROLOGY 3 - ANALYSIS OF SALIVA AND OTHER BIOLOGICALS

Learning objectives:

Physiology, function, components, and identification of saliva, feces, and urine

Reading List:

1. Richard Li. Forensic Biology. CRC Press 2008 Chapter 8
2. R.E. Gaensslen. *Sourcebook in Forensic Serology, Immunology, and Biochemistry*. Sections 11. NIJ. 1983.
3. R.E. Gaensslen. *Sourcebook in Forensic Serology, Immunology, and Biochemistry*. Sections 12. NIJ. 1983.
4. M. Auvdel. Amylase levels in semen and saliva stains, J. Forensic Sci., 31:426-430, 1986.
5. Phadebas product insert
6. Phadebas internal validation summary

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to possible court question on saliva and other biological testing

Phadebas presumptive test for saliva including a summary of the results

Suggested tests: Evaluate the variability of amylase levels in saliva from different people and from the same individual from various times during a 24 hour period. Evaluate the specificity of the method using other body fluids and secretions. Evaluate the sensitivity of the method using liquid and dried saliva. Evaluate the stability of amylase by performing the test on saved standards as well as on older dried saliva stains and evidence type samples (e.g. cigarette butts and envelopes).

Quiz

MODULE 7: SEROLOGY INTERPRETATION GUIDELINES

Learning objectives:

Introduction to likelihood ratios
Hierarchy of Propositions
Source Level Propositions

Reading List:

1. Buckleton J.S., Bright J.-A., Taylor D., Evett I.W., Hicks T., Jackson G., Curran J.M. Helping formulate propositions in forensic DNA analysis. (2014) Science & Justice 54(4) 258-261
2. Cook, R., et al., A hierarchy of propositions: Deciding which level to address in casework. Science and Justice, 1998. 38(4): p. 231-240.
3. Duncan Taylor, Damien Abarno, Tacha Hicks, Christophe Champod. Evaluating forensic biology results given source level propositions. Forensic Science International: Genetics Volume 21, March 2016, Pages 54-67
4. SDPD Source Level Propositions Foundation Document

Requirements to complete module:

Summary of readings
Completion of source level proposition exercise
Quiz

MODULE 8: HISTORICAL PERSPECTIVE OF FORENSIC DNA ANALYSIS

Learning objectives:

History of DNA identification
Mitochondrial DNA
YSTRs

Reading List:

1. J. Butler. Fundamentals of Forensic DNA Typing. Chapters 1, 3, and 16. Academic Press. 2010.

Requirements to complete module:

Summary of readings
Quiz

MODULE 9: DNA EXTRACTION AND PURIFICATION

Learning objectives:

Composition of DNA within cells
DNA stability
DNA extraction and differential extraction methods including QiaCube and non-differential extraction with DTT
DNA concentration procedures
Commonly used methods of DNA purification and DNA extraction efficiency
Contamination considerations and quality control in the DNA isolation and purification process

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 2. Academic Press. 2011.
2. Montpetit SA, Fitch IT, O'Donnell PT. A simple automated instrument for DNA extraction in forensic casework, J Forensic Sci. 2005 May;50(3):555-63.
3. BioRobot EZ1 User's Manual.
4. BioRobot EZ1 XL Advanced User's Manual.
5. QIASymphony Validation Summary.
6. QIASymphony User's Manual.
7. QiaCube Validation Summary.
8. QiaCube User's Manual.
9. Kishore R *et al.* Optimization of DNA extraction from low-yield and degraded samples using the BioRobot EZ1 and BioRobot M48, J Forensic Sci 51(5), pp. 1055-1061, 2006.
10. Wiegand P, Schurenkamp M. and Schutte U. DNA extraction from mixtures of body fluid using mild preferential lysis, Int J Leg med (1992) 104: 359-360.
11. Montpetit S and O'Donnell P. An optimized procedure for obtaining DNA from fired and unfired ammunition. Forensic Science International: Genetics 17 (2015) 70–74

Requirements to complete module:

Summary of readings
Review relevant sections of the Forensic Biology Technical Manual (latest version)
Answers to possible court question on testing for extraction and purification
Analyst shadowing
Quiz

MODULE 10: DNA QUANTIFICATION

Learning objectives:

Methods of DNA quantification

Principles of quantitative PCR DNA quantification including detection of PCR inhibition

Interpretation of quantification results including ratio between human and male DNA targets

Discontinuation policy and YSTR testing thresholds

Instrumentation and troubleshooting

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 3. Academic Press. 2011.
2. Horsman, KM et al. Development of a human specific real time PCR assay for the simultaneous quantitation of total genomic and male DNA. Journal of Forensic Sciences 51 (2006), 758-765
3. Barbisin, M, et al. Developmental Validation of the Quantifiler Duo DNA Quantification Kit for Simultaneous Quantification of Total Human and Human Male DNA and Detection of PCR Inhibitors in Biological Samples. Journal of Forensic Sciences 54 (2009), 305-319
4. ABI Prism® 7500 Sequence Detection System User Guide.
5. SDPD Quantifiler Duo Validation Summary
6. Quantifiler Duo Users Manual
7. Grgicak, CM, et al. Investigation of reproducibility and error associated with qPCR methods using Quantifiler Duo quantification kit. Journal of Forensic Sciences 55 (2010), 1331-1339
8. SDPD NIST External Standard Curve Validation Summary.
9. Discontinuation Threshold Validation Study

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to court question on testing for DNA quantification

Analyst shadowing

Quiz

MODULE 11: PCR AMPLIFICATION OF DNA

Learning objectives:

PCR amplification (and inhibition)

Fluorescent tagging

Mobility modifiers

Multiplexing

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 4. Academic Press. 2011.

2. Bloch W. A biochemical perspective of the polymerase chain reaction. Biochemistry 30 (1991), 2735-2747
3. Gill, P. et al. An investigation into the rigor of interpretation rules for STRs derived from less than 100pg of DNA. Forensic Science International 112 (2000), 17-40.
4. Wilson, IG. Inhibition and Facilitation of Nucleic Acid Amplification. Applied and Environmental Microbiology (1997), 3741-3751
5. Pionzio, A. et al. Analysis of the Effect of a Variety of PCR inhibitors on the amplification of DNA NCRJS 2018

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to court question on testing for DNA amplification

Analyst shadowing

Exercise on determining amplification volume

Quiz

MODULE 12: SHORT TANDEM REPEATS (STRS)

Learning objectives:

Short Tandem Repeats (STR's) – autosomal and Y-chromosome

STR testing artifacts

Allelic Variations (off-ladder alleles, tri-alleles, null-alleles, duplications/triplications)

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 5. Academic Press. 2011.
2. Butler JM. Genetics and Genomics of Core Short Tandem Repeat Loci Used in Human Identity Testing. J Forensic Sci, 2006, Vol. 51, No. 2
3. Grossman, PD. High-density multiplex detection of nucleic acid sequences: oligonucleotide ligation assay and sequence coded separation. Nucleic Acids Research 22 (1994), 4527-4534.
4. Hares, D. Selection and implementation of expanded CODIS core loci in the United States. Forensic Science International: Genetics 17 (2015) 33–34
5. GlobalFiler Users Manual. Life Technologies
6. SDPD Forensic Biology GlobalFiler validation summaries.

Requirements to complete module:

Summary of readings

Answers to court question on testing for short tandem repeats

Quiz

MODULE 13: CAPILLARY ELECTROPHORESIS

Learning objectives:

DNA separation science
3500 Genetic Analyzer maintenance
Capillary electrophoresis
Resolution of alleles
Injection times
Laser induced fluorescence
Spectrals
Spatials
Instrumentation and troubleshooting

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 6. Academic Press. 2011.
2. 3500 Users Manual.

Requirements to complete module:

Summary of readings
Review relevant sections of the Forensic Biology Technical Manual (latest version)
Answers to court question on testing for capillary electrophoresis
Analyst shadowing
Quiz

MODULE 14: DATA ANALYSIS

Learning objectives:

GMID-X
Allelic Ladders
Internal Size Standards
Analytical threshold
GMID-X Analysis Methods
GMID-X Panels and Bins

Reading List:

1. J. Butler. Fundamentals of Forensic DNA Typing. Chapters 10. Academic Press. 2010.
2. GeneMapper ID-X Analysis Software user guide.

3. SDPD GeneMapper ID-X Validation summary.

Requirements to complete module:

Summary of readings
Review relevant sections of the Forensic Biology Technical Manual (latest version)
Answers to court question on testing for data analysis
Analyst shadowing
Case packet review
Quiz

MODULE 15: INTERPRETATION PART 1: SINGLE SOURCE SAMPLES

Learning objectives:

STR Interpretation
Stochastic thresholds
Artifacts (minus-A, stutter, pull-up, non-human DNA, spikes, other kit artifacts)
Expected stutter ratios
Dynamic Range of the 3500 instrument
Troubleshooting interpretation issues

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 10-11. Academic Press. 2011.
2. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapter 1-5, and 8. Academic Press. 2015.
3. Bright, J-A, et al. Investigation into the performance of different models for predicting stutter. Forensic Science International: Genetics 7 (2013), 433-437
4. SWGDAM Interpretation Guidelines for Autosomal STR Typing by Forensic Testing Laboratories (2015). Section 1. Available at http://www.fbi.gov/hq/lab/html/codis_swgdam.pdf

Requirements to complete module:

Summary of readings
Review relevant sections of the Forensic Biology Technical Manual (latest version)
Answers to court question on testing for interpretation
Interpreting acceptable genotype exercise
Quiz

Module 16: Blood Sample Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes (analytical batches)
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of fifteen single source bloodstains
Case packet review (focus on analytical batches and DNA worksheets)
Analytical Batch technical review

Module 17: Buccal Sample Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of five buccal samples

Module 18: Hair Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:

Analysis of three hairs

Module 19: Cigarette Butt Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of five cigarette butts

Module 20: Bone Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of bone powder extraction

Module 21: Interpretation Part 2: Mixtures

Learning objectives:
Number of contributor estimations and assumptions

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapter 6-7. Academic Press. 2015.
2. Gill, P., et al. (2006). DNA commission of the International Society of Forensic Genetics: Recommendations on the interpretation of mixtures. *Forensic Science International, 160*, 90-101. Available at http://www.isfg.org/Publication;Gill2006.
3. SWGDAM (2015). SWGDAM interpretation guidelines for autosomal STR typing by forensic DNA testing laboratories. Section 2. Available at http://www.fbi.gov/hq/lab/html/codis_swgdam.pdf.
4. Budowle, B., et al. (2009). Mixture interpretation: defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. *Journal of Forensic Sciences, 54*, 810-821.
5. Coble, Michael & Bright, Jo-Anne & S Buckleton, John & Curran, James. (2015). Uncertainty in the number of contributors in the proposed new CODIS set. Forensic science international. Genetics. 19. 207-211. 10.1016/j.fsigen.2015.07.005.
6. Benschop, CC, et al. The effect of varying the number of contributors on likelihood ratios for complex mixtures. Forensic Science International: Genetics 19 (2015) 92–99
7. Bright, JA, et al. The effect of the uncertainty in the number of contributors to mixed DNA profiles on profile interpretation. Forensic Science International: Genetics 12 (2014) 208–214

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to court question on testing for interpretation

Interpreting acceptable genotype exercise

Quiz

Module 22: Mixed Sample Analysis

Learning objectives:

FB SIMS

Sample processing

Documenting analytical processes

Data transfers between the FB SIMS and instruments

Requirements to complete module:

Analysis of twelve mixed samples (note: mixed samples can be made from purified single source DNA samples)

Module 23: Differential Extraction

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of ten semen/vaginal stains

Module 24: Touch/Wearer Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of five habitual wearer or handler type samples (including at least one firearm)

Module 25: Casing Analysis

Learning objectives:
FB SIMS
Sample processing
Documenting analytical processes
Data transfers between the FB SIMS and instruments

Requirements to complete module:
Analysis of at least five casings

Module 26: Population Genetics

Learning objectives:

Population genetics
Population allele frequencies
Population substructure

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapters 9 and 10. Academic Press. 2015.
2. Steffen, C, et al. U.S. population data for 29 autosomal STR loci, Forensic Science International: Genetics 7 (2013) e82-83
3. Steffen, et al. Corrigendum to 'U.S. population data for 29 autosomal STR loci. [Forensic Science International: Genetics 7 (2013) e82-83], Forensic Science International: Genetics 31 (2017) e36-40 *(Note: this publication is also included in the readings for module 2.)*
4. Buckleton, J, et al. Population-specific F_{ST} values for forensic STR markers: A worldwide survey. Forensic Science International: Genetics 23 (2016) 91–100

Requirements to complete module:

Summary of readings
Answers to court question on testing for population genetics
Quiz

MODULE 27: STATISTICS IN FORENSIC DNA ANALYSIS

Learning objectives:

Review of basic statistics (mean, mode, distributions, variance)
Profile probability versus match probability
Random match probabilities
Combined probability of inclusion (CPI)
Combined probability of exclusion (CPE)
Likelihood Ratios
Population substructure corrections (theta, F_{ST})

Reading List:

1. J. Butler. Fundamentals of Forensic DNA Typing. Chapters 11. Academic Press. 2010.
2. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapter 11-12. Academic Press. 2015.
3. STRmix Users Manual (current version) Section 4.3, pages 202-206. ESR
4. The Evaluation of Forensic DNA Evidence, Chapters 4-5, NRC II, National Academy Press, 1996.

5. Balding, D and Nichols, RA. DNA profile match probability calculation: how to allow for population stratification, relatedness, database selection and single bands. Forensic Science International 64 (1994), 125-140.
    a. Balding D and Nichols, RA. Erratum: A method for quantifying differentiation between populations at multi-allelic loci and its implications for investigating identity and paternity. Genetica (2008) 133:107
6. Bright, JA, et al. The variability in likelihood ratios due to different mechanisms. *Forensic Science International: Genetics* (2014), http://dx.doi.org/10.1016/j.fsigen.2014.10.013
7. SWGDAM Interpretation Guidelines for Autosomal STR Typing by Forensic Testing Laboratories (2015). Sections 3 and 4. Available at http://www.fbi.gov/hq/lab/html/codis_swgdam.pdf
8. Bright, J-A, et al. The variability in likelihood ratios due to different mechanisms. Forensic Science International: Genetics (2014), http://dx.doi.org/10.1016/j.fsigen.2014.10.013

Requirements to complete module:

Summary of readings
Answers to court question on Statistics in Forensic Science
Exercises in RMP, CPI, and LRs
Quiz

MODULE 28: STRMIX

Learning objectives:

Review of statistics concepts (e.g., mean, mode, standard deviation, variance)
Distributions in statistics (e.g., normal, beta, gamma)
Probability densities
Binary versus continuous models for DNA interpretation
STRmix biological model
Probability of drop-out
Monte Carlo Markov Chain (MCMC) and Metropolis-Hastings
Formulating propositions
STRmix likelihood ratios
Model Maker
STRmix diagnostics
Informed Priors
Variable Number of Contributors
H_d-True Testing
File saving structure

Reading List:

1. STRmix Users Manual, latest version

2. STRmix Operations Manual, latest version
3. STRmix Implementation and Validation Guide, latest version
4. Bright, JA, et al. Developmental validation of STRmix™, expert software for the interpretation of forensic DNA profiles. Forensic Science International: Genetics 23 (2016) 226–239
5. Duncan Taylor, Jo-Anne Bright, John Buckleton, The interpretation of single source and mixed DNA profiles. Forensic Science International: Genetics 7 (2013) 516–528
6. Jo-Anne Bright, Duncan Taylor, James M. Curran, John S. Buckleton. Developing allelic and stutter peak height models for a continuous method of DNA interpretation. Forensic Science International: Genetics 7 (2013) 296–304
7. Jo-Anne Bright, Duncan Taylor, James M. Curran, John S. Buckleton. Degradation of forensic DNA profiles, Australian Journal of Forensic Sciences, 45:4, 445-449
8. Duke, KR, Myers, SP. Systematic evaluation of STRmix™ performance on degraded DNA profile data. Forensic Science International: Genetics 44 (2020) 102174
9. Duncan Taylor. Using continuous DNA interpretation methods to revisit likelihood ratio behavior. Forensic Science International: Genetics 11 (2014) 144–153
10. John Buckleton, Hannah Kelly, Jo-Anne Bright, Duncan Taylor, Torben Tvedebrink, James M. Curran. Utilising allelic dropout probabilities estimated by logistic regression in casework. Forensic Science International: Genetics 9 (2014) 9–11
11. Hannah Kelly, Jo-Anne Bright, James Curran, John Buckleton. The interpretation of low level DNA mixtures. Forensic Science International: Genetics 6 (2012) 191–197
12. R.G. Cowell, S.L. Lauritzen, J. Mortera. Probabilistic modelling for DNA mixture analysis. Forensic Science International: Genetics Supplement Series 1 (2008) 640–642
13. D. Taylor a,*, J-A. Bright b, J. Buckleton b, J. Curran. An illustration of the effect of various sources of uncertainty on DNA likelihood ratio calculations. Forensic Science International: Genetics 11 (2014) 56–63
14. Taylor, D et al. Interpreting forensic DNA profiling evidence without specifying the number of contributors. Forensic Science International: Genetics 13 (2014) 269–280
15. Taylor, D, et al. Importance sampling allows H_d true tests of highly discriminating DNA profiles. Forensic Science International: Genetics 27 (2017) 74–81
16. Executive Office of the President President's Council of Advisors on Science and Technology. Report to the President: Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods. September 2016
17. Executive Office of the President President's Council of Advisors on Science and Technology. An addendum to the PCAST report on forensic science in criminal courts. January 2017
18. Bright, J-A, et al. Internal validation of STRmix™ – A multi laboratory response to PCAST. Forensic Science International: Genetics 34 (2018) 11–24

Requirements to complete module:

Summary of readings

Review relevant sections of the Forensic Biology Technical Manual (latest version)

Answers to court question on STRmix

Total allelic product calculations

Profile likelihood calculations

STRmix Likelihood Ratio Calculations

Running training samples though STRmix

Quiz

MODULE 29: KINSHIP

Learning objectives:

Mendelian inheritance
Punnett squares and inheritance patterns
Kinship Statistics (paternity index, combined paternity index, probability of paternity, and probability of exclusion)
Basic paternity formulas
Popstats parentage and kinship modules
Reverse paternity, motherless paternity, and other kinship (i.e., relatedness) calculations
Coefficients of relatedness (Θ)
Interpreting and reporting parentage testing results
Mutations and mutation rates
Non-autosomal markers and kinship

Reading List:

1. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapter 14. Academic Press. 2015.
2. J. Buckleton, CM Triggs, and S Walsh. Forensic DNA Interpretation. CRC Press Chapters 4 and 10.
3. CODIS (current version) Training Material section 6. Available on the CJIS-WAN at: https://10.64.223.136/CODIS-Programs/CODIS-Training.aspx

Requirements to complete module:

Summary of readings
Answers to court question on kinship analysis
Kinship exercises
Quiz

MODULE 30: CODIS

Learning objectives:

Structure of CODIS
Quality assurance requirements for participation in NDIS
DNA records accepted at NDIS, SDIS, and LDIS
Searches at LDIS, SDIS, and NDIS
Search stringency and match criteria

Hit confirmation, dispositioning, and follow-up communications
COSTaR
Match estimator and profile discrimination
Manually searching DNA profiles

Reading List:

1. NDIS Operations Procedures Manual. FBI Laboratory (current version) Sections 1, 2.1, 2.2, 3.1, 3.2, 3.4, 5, 6, and Appendix D. Available on the CJIS-WAN at: https://10.64.223.136/CMS%20Documents/Policies%20And%20Procedures/NDIS%20Procedures/NDIS%20Procedures%20Manual%20Version%208%20(2019)%20APPROVED%2004082019%20Final.pdf
2. CODIS (current version) Training Material sections 1, 2, 4, and 7. Available on the CJIS-WAN at: https://10.64.223.136/CODIS-Programs/CODIS-Training.aspx
3. CA-DOJ State CODIS Operations Manual
4. COSTaR validation and modification summaries up to current version

Requirements to complete module:

Summary of readings
Review relevant sections of the Forensic Biology Policy Manual (latest version)
Answers to court question on CODIS
Searching exercise
COSTaR exercise
Quiz

MODULE 31: REPORT WRITING

Learning objectives:

Report writing at the SDPD
Populating reports in the FB SIMS
Requirements for reporting quantitative versus qualitative support for associations

Reading List:

1. FB Style Guide
2. Report wording
3. Rare report wording

Requirements to complete module:

Case packet review
Report writing exercise

MODULE 32: TECHNICAL REVIEW

Learning objectives:
Technical and administrative review requirements

Reading List:
Analytical batch technical review checklist
Case file technical review checklist
Administrative review checklist

Requirements to complete module:
Technical review mock case exercise
Supervised technical reviews

MODULE 33: YSTRS

Learning objectives:
Evolution of the Y-chromosome in humans
Y-chromosome genetics and inheritance
Y-chromosome recombination
Forensic value of the Y-chromosome
Y-chromosome mutations (deletions, duplications, and triplications)
Y-chromosome mutation rates
Y-chromosome resources
Yfiler Plus kit and loci and internal validation
YSTR Interpretation
YSTR Statistics
YHRD (Y-Chromosome Haplotype Reference Database) and CA-DOJ Y-Mix Tool (current version)

Reading List:
1. J. Butler. Fundamentals of Forensic DNA Typing. Chapters 16. Academic Press. 2010.
2. J. Butler. Advanced Topics in Forensic DNA Typing: Methodology. Chapter 13. Academic Press. 2012.
3. J. Butler. Advanced Topics in Forensic DNA Typing: Interpretation. Chapter 15. Academic Press. 2015.
4. Yfiler Plus Users Manual
5. Yfiler Plus Validation Summary.
6. D Cornacchia and I Fitch. Introducing Y-STR DNA Testing in the Courts, Profiles in DNA, 9(2): 10-13, 2006.

7. Scientific Working Group on DNA Analysis Methods Guidelines for Y-Chromosome STR Typing 2014
8. Notice to US YSTR Database Users 2018
9. SWGDAM Compliant YHRD User's Guide 2018
10. J Ballantyne *et al.* Creating and managing Effective Y-STR Databases, Profiles in DNA, 9(2): 10-13, 2006.
11. Willuweit, S and Roewer, L. Y chromosome haplotype reference database (YHRD) – Update. Forensic Science International: Genetics 1 (2007) 83–87
12. Gopinath, S. et al. Developmental validation of the Yfiler Plus PCR Amplification Kit: An enhanced Y-STR multiplex for casework and database applications. Forensic Science International: Genetics 24 (2016) 164–175

Requirements to complete module:

Summary of readings

Answers to court question on YSTRs

Case packet review

YSTR Training Samples

Mixture Interpretation Practice Set

Report writing exercise

Written test

Practical competency test

Oral test

MODULE 34: LEGACY KIT INTERPRETATION

Learning objectives:

Binary interpretation requirements for Profiler Plus, COfiler, and MiniFiler data from the 3130

STRmix interpretation for Identifiler and Identifiler Plus

Reading List:

1. Validation summary for Profiler Plus and COfiler interpretation thresholds
2. Validation Summary for the Identifiler and Identifiler Plus STRmix parameters
3. Legacy Kit Interpretation Manual (latest version)

Requirements to complete module:

Written test

Practical competency test

ASSESSMENT OF TRAINEES

MODULE 35: FORENSIC DNA FINAL EVALUATION WRITTEN EXAM

Trainees will be expected to successfully complete written examinations in serology, DNA, and STRmix, and YSTRs (if applicable) prior to starting supervised casework.

Obtaining 80% or higher will be designated as passing.

MODULE 36: MOCK OR ADJUDICATED CASEWORK

Trainees will be expected to conduct analyses and write reports on a series of mock or adjudicated cases that cover a range of cases and sample types that will be encountered in routine casework.

Trainees performing analysis on adjudicated cases will only perform testing on samples that have previously been tested by a qualified analyst. No analysis will be performed on samples or evidence that have not previously been tested by a qualified analyst.

MODULE 37: PRACTICAL COMPETENCY TEST

Trainees will be expected to successfully complete the examination of a set of samples that cover a range of sample types and extractions that will be encountered in routine casework prior to starting supervised casework.

Selecting the correct analytical methods for each sample type, using the correct quality assurance procedures (e.g., extracting samples separately that require separate time and/or space) and obtaining the expected genotypes for all tested samples will be designated as passing.

MODULE 38: MOOT COURT OR MOCK TRIAL

Trainees will be expected to successfully complete a mock or moot court scenario prior to independent casework analysis.

The final grade for the moot court or oral boards will be determined based on the average of a panel of evaluators designated by the DNA Technical Manager. Obtaining 80% or higher will be designated as passing.

MODULE 39: SUPERVISED CASEWORK

Trainees will be expected to perform analyses on several batches of actual casework under the guidance of a qualified analyst as a mentor. Trainees will be expected to consult with the mentor throughout the analytical, report writing, and technical review processes. Trainees will also be expected to perform supervised technical reviews of other analyst's casework.

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
1 FB Quality Assurance			
Required Reading			
Analyst Transcripts			
Lectures			
Trainee Responsibility			
Quiz			
2 FB Specific Court Training			
Required Reading			
FB specific court issues lecture			
Trainee Responsibility			
Summary of readings			
Compose responses to predicate court questions provided			
Create a list of questions for each topic in the training			
Shadowing			
(please indicate case number for testimony observed)			
Quiz			
3 Evidence Handling			
Required Reading			
Lecture			
Firearms Safety			
File-on-Q/SART-on-Q Training			
Trainee Responsibility			
Summary of readings			
FB SIMS Training			
Note taking practice			
Derivative evidence in File-on-Q			
Analyst shadowing			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
4 Serology 1: Blood			
Required Reading			
Lectures			
Demonstration of methods			
Trainee Responsibility			
Summary of readings			
Answer court questions on blood ID and BSP ID			
Analyst shadowing			
Presumptive blood test sensitivity/specificity			
Blood confirmation sensitivity/specificity			
Bloodstain documentation/screening exercise			
Summary of training exercises			
Case packet review 1			
(please indicate case number for case packet reviewed)			
Quiz			
5 Serology 2: Semen			
Required Reading			
Lecture			
Demonstration of methods			
Trainee Responsibility			
Summary of readings			
Analyst shadowing			
ALS sensitivity/specificity			
Presumptive semen test sensitivity/specificity			
p30 and Microscopic examination sensitivity/specificity			
Semen documentation/screening excercise			
Answer court questions on Semen ID			
Summary of training exercises			
Case packet review 2			
(please indicate case number for case packet reviewed)			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
6 Serology 3: Saliva and other biologicals			
Required Reading			
Lecture			
Demonstration of methods			
Trainee Responsibility			
Summary of readings			
Phadebas sensitivity/specificity			
Answer court questions on saliva testing			
Summary of training exercises			
Quiz			
7 Fluid Identification Guidelines			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Fluid ID Exercises			
Quiz			
8 Historical perspectives			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
9 DNA extraction/purification			
Required Reading			
Lecture			
Demonstration of methods			
Trainee Responsibility			
Summary of readings			
Answer court questions on extraction/purification			
Analyst shadowing - EZ1			
Analyst shadowing - QiaSymphony			
Analyst shadowing - QiaCube			
Quiz			
10 DNA quantification			
Required Reading			
Lecture			
Demonstration of methods			
Trainee Responsibility			
Summary of readings			
Answer court questions on quantification			
Analyst shadowing - Manual			
Analyst shadowing - Nimbus			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
11 PCR amplification			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on amplification			
Analyst shadowing - Manual			
Analyst shadowing - Nimbus			
Analyst shadowing - Concentration/Dilutions			
Exercise on determining amplification volume			
Quiz			
12 Short Tandem Repeats (STR's)			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on STRs			
Quiz			
13 Capillary electrophoresis			
Required Reading			
Lecture			
Demonstration of method			
Trainee Responsibility			
Summary of readings			
Answer court questions on CE			
Analyst shadowing			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
14 Data Analysis			
Required Reading			
Lecture			
Demonstration of method			
Trainee Responsibility			
Summary of readings			
Answer court questions on data analysis			
Analyst shadowing			
Case packet review 3			
(please indicate case number for case packet reviewed)			
Quiz			
15 Interpretation Part 1: SS Samples			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on SS sample interpretation			
Exercise on interpreting acceptable genortypes			
Quiz			
16 Practical 1: Blood Sample Analysis			
IMPORTANT NOTE: During analysis of training samples, trainees must ensure that when multiple instruments are available or methods can be completed manually or robotically, that each available intrument or process is performed at some point during the training. Analysts should indicate on the checklist what instrumentation or whether manual or robotic setup of was used.			
Trainee Responsibility			
Analysis of blood samples (ext through GMID-X)			
Case packet review 4			
Analytical Batch technical review exercise			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
17 Practical 2: Buccal Sample Analysis			
Trainee Responsibility			
Analysis of buccal samples (ext through GMID-X)			
18 Practical 3: Hair Analysis			
Trainee Responsibility			
Analysis of hair samples (ext though GMID-X)			
19 Practical 4: Cigarette butt Analysis			
Trainee Responsibility			
Analysis of cigarette butts (ext through GMID-X)			
20 Practical 5: Bone Analysis			
Trainee Responsibility			
Analysis of hair samples (ext through GMID-X)			
21 Interpretation Part 2: Mixtures			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on mixture analysis			
Exercise on interpreting acceptable genortypes			
Quiz			
22 Practical 6: Mixed Samples			
Trainee Responsibility			
Analysis of mixed samples (quantification through GMID-X)			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
23 Practical 7: Differential Extraction			
Demonstration of method			
include non-diff with DTT			
Trainee Responsibility			
Analysis of differentials (ext through GMID-X)			
Manual and QiaCube			
24 Practical 8: Touch/Wearer Sample			
Demonstration of method			
Trainee Responsibility			
Analysis of touch/wearer (ext through GMID-X)			
25 Practical 9: Casing extraction			
Demonstration of method			
Trainee Responsibility			
Analysis of casings (ext through GMID-X)			
26 Population genetics			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on population genetics			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
27 Statistics in Forensic DNA			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on statistics			
Exercises in RMP, CPI, and LR			
Quiz			
28 STRmix			
Required Reading			
Lectures			
Trainee Responsibility			
Summary of readings			
Answer court questions on STRmix			
Total allelic product calculations			
Profile likelihood calculations			
LR calculations			
Running training samples (module 14-24) through STRmix			
Quiz			
29 Kinship			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answer court questions on kinship			
Kinship exercises			
Quiz			

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
30 CODIS			
Required Reading			
Lectures			
Trainee Responsibility			
Summary of readings			
Searching exercise			
COSTaR exercise with training samples			
Quiz			
31 Report Writing			
Required Reading			
Case Packet Review 5-7			
(please indicate case numbers for case packet reviewed)			
Trainee Responsibility			
Report writing exercise			
34 Technical Review			
Lecture			
Trainee Responsibility			
Technical review mock case exercise			
Supervised technical review			

Technical Manager Review Initials and Date: _____

Quality Assurance Manager Review Initials and Date: _____

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials

Assessment

35 Written Examinations

Serology			
DNA			
STRmix			

36 Mock/Adjudicated Cases

Batch 1:			
Batch 2:			
Batch 3:			

37 Practical Competency test

Practical Examination			

38 Mock Trial/Moot Court

Moot Court			

39 Supervised casework and technical review

Analytical Batch ID			

(see memo to Quality Manager for case identifiers)

Technical Manager Review Initials and Date: _____

Quality Assurance Manager Review Initials and Date: _____

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
32 YSTRs			
Required Reading			
Lecture			
Trainee Responsibility			
Summary of readings			
Answers to court questions on YSTRs			
Case packet review			
Yfiler Plus training samples			
YSTR mixture interpretation practice set			
Report writing exercise			
Written Examination			
Written examination			
Practical Competency			
Practical examination			
Oral Examination			
Oral examination			

Technical Manager Review Initials and Date: _____

Quality Assurance Manager Review Initials and Date: _____

Forensic Biology Unit Training Check List

Module	Date Completed	Trainee Initials	Assigned Trainer Initials
33 Legacy Kit Interpretation			
Required Reading			
Lecture			
Trainee Responsibility			
Legacy kit training samples			
Written Examination			
Written examination			
Practical Competency			
Practical examination			

Technical Manager Review Initials and Date: _____

Quality Assurance Manager Review Initials and Date: _____