



Washington State Patrol



Crime Laboratory Division

Materials Analysis Foundation Training Manual

June 2023

Contents

1	INTRODUCTION	3
1.1	PURPOSE AND SCOPE	3
1.2	TRAINING PLANS	3
1.3	EXPECTATIONS	4
1.4	ORGANIZATION OF THE TRAINING MANUAL	4
2	LAB SAFETY	6
2.1	OBJECTIVES	6
2.2	TOPIC AREAS	6
2.3	READINGS	6
2.4	STUDY QUESTIONS	7
2.5	PRACTICAL EXERCISES	7
3	GENERAL FORENSIC CASE CONSIDERATIONS	9
3.1	OBJECTIVES	9
3.2	TOPIC AREAS	9
3.3	READINGS	10
3.4	STUDY QUESTIONS	10
3.5	PRACTICAL EXERCISES	10
4	CRIMINALISTICS 101	11
4.1	OBJECTIVES	11
4.2	TOPIC AREAS	11
4.3	READINGS	12
4.4	STUDY QUESTIONS	12
4.5	PRACTICAL EXERCISES	12
5	ETHICS	13
5.1	OBJECTIVES	13
5.2	TOPIC AREAS	13
5.3	READINGS	13
5.4	STUDY QUESTIONS	13
5.5	PRACTICAL EXERCISES	14
6	COGNITIVE BIAS	15
6.1	OBJECTIVES	15
6.2	TOPIC AREAS	15
6.3	READINGS	15
6.4	STUDY QUESTIONS	16
6.5	PRACTICAL EXERCISES	16
7	LAW BASICS AND COURT TESTIMONY	17
7.1	OBJECTIVES	17
7.2	TOPIC AREAS	17
7.3	READINGS	21
7.4	STUDY QUESTIONS	22
7.5	PRACTICAL EXERCISES	22

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

Materials Analysis has three types of training manuals: the Foundation Training Manual (FTM), the Instrumentation and Techniques Training Manual (ITTM), and the various subdiscipline training manuals. Trainees new to the Crime Laboratory Division (CLD) cover all the common concepts from the FTM. Trainees cover the specific chapters in the ITTM that are prerequisites for their target subdiscipline. Trainees new to the CLD may cover chapters from the FTM and the ITTM simultaneously. The ITTM prerequisite chapters are preferably passed before a trainee begins the target subdiscipline training manual; however, a trainee may cover the ITTM prerequisite chapters and the target subdiscipline training manual at the same time depending on the training needs of the section.

This manual, the FTM, contains an outline for training a forensic scientist in the core concepts as they apply to Materials Analysis. This manual is designed for open ended discussions and providing experience. There are no written exams, as the content will be revisited as applicable in the other two training manuals (the ITTM and the subdiscipline specific training manual). The sequence in which the various sections are presented should not necessarily be considered as a mandatory order of training. Exposure to legal aspects, testimony, and many other facets of forensic science will be continuous throughout the training.

This manual endeavors to promote and maintain consistency and quality among scientists performing materials analyses across the Crime Laboratory Division. Certain inherent aspects of materials analysis prohibit the establishment of a rigid set of standard procedures to cover every case. Sufficient latitude should be given to allow for independent thought and individual freedom in selecting alternative courses of action.

1.2 TRAINING PLANS

The supervisor in consultation with the employee will determine what subdiscipline(s) an employee will receive training in. A comprehensive training plan to accomplish training in a subdiscipline will follow the requirements in the current QOM. Training plans may include remedial readings, remedial training modules, and written tests deemed necessary. Training will be customized to meet the needs of the trainee. For training plans that include many chapters, the technical lead may be listed as the trainer and assign instructors for different chapters.

The supervisor in coordination with the technical lead(s) or their designee will review and assess a new trainee's strengths and deficiencies in the following areas:

- Knowledge of:
 - Analytical chemistry
 - Organic chemistry
 - Inorganic chemistry
 - Physical chemistry
 - Microscopy
 - Instrumentation
 - Physics
- Laboratory experience
- Aptitude for:
 - Color comparisons
 - 2D pattern recognition
 - 3D pattern recognition

Trainees who have prior related training and experience may need modifications to the chapter requirements and/or chapter testing. Preapproval of such modifications must be obtained from the technical lead. The required documentation of such related training and/or experience shall be left to the supervisor in coordination with the technical lead(s) or their designees.

1.3 EXPECTATIONS

The instructor shall discuss with the trainee the training and reference materials (if any) available on the FLSB Portal and Isilon Drive. The instructor is expected to review the study questions and practical exercises with the trainee. Reviews may be performed in written or oral form, but documentation of the contents of that review must be maintained. The review should include discussion of the results of the practical exercises.

Although the trainee's primary interaction shall be with the assigned instructor, this program promotes and encourages discussions with other experienced examiners. When possible, the trainee should also take outside courses related to that instrument/technique.

The trainee shall record and retain notes and observations for each study segment. The trainee notes should be neatly maintained in either written or electronic form (or a combination thereof), kept up to date throughout training, and should be present during conversations with the trainer. Upon completion of training, the trainee should maintain all training documentation including notes for the duration of their career.

The instructor has the option to recommend modifications or additions to a specific chapter. The recommended modifications or additions must be pre-approved by the technical lead prior to implementing those changes. Documentation of that approval should be included with the trainee's records (e.g. a copy of an email).

The trainee should be continuously evaluated throughout the training for comprehension and competency in theoretical knowledge, basic practical skills, and critical thinking skills. Training is progressive and continuously builds on and reinforces prior learning. Deficiencies on any of the training steps may occur during the course of the training and should be rectified before training continues. It is important that these deficiencies be openly and promptly discussed among the trainee, instructor(s), technical lead(s), and/or supervisor, as appropriate. Repeating training steps and testing may be necessary to satisfactorily complete this training program.

The trainer is responsible for writing an interoffice communication (IOC) to the trainee's supervisor when the trainee has successfully completed a chapter. IOCs for completion of a specific instrument or technique chapter may be delayed in order to group multiple chapters together. The trainee's supervisor shall maintain copies of training IOCs and authorizations.

1.4 ORGANIZATION OF THE TRAINING MANUAL

The Foundation Training Manual consists of the following chapters:

- Lab Safety
- General Forensic Case Considerations
- Criminalistics 101
- Ethics
- Cognitive Bias
- Law Basics and Court Testimony

Each chapter is organized into the following five parts:

- Objectives – a list of the goals for each chapter.
- Topic Areas – a list of subjects and vocabulary that will be covered during training
- Readings – the list of minimum required readings to complete the training.
- Study Questions – a series of questions to ensure comprehension and encourage discussion
- Practical Exercises – a set of hand-on activities to develop first-hand experience

Please note that some chapters have a subset of readings listed under Resources. Such readings are typically books or other readings that are not required to be read in full, but should be skimmed as they may aid in the completion of study questions and/or practical exercises. The required readings are designed to cover the topic without being overly duplicative or extensive.

Documentation of completion of each chapter will include the written answers for the study questions, the notes for each practical exercise, and a statement from the trainer that the chapter was successfully completed (e.g. an email).

2 LAB SAFETY

2.1 OBJECTIVES

- To familiarize the trainee with potential safety hazards in the laboratory.
- To instruct the trainee on how to properly deal with chemical spills.
- To make the trainee aware of safety equipment available in the laboratory.
- To familiarize the trainee with proper handling and disposal of chemicals.

2.2 TOPIC AREAS

1. Safety tour
2. Safety Data Sheets (SDS)
3. Proper gas cylinder handling
4. Work station set up
5. Specific cautions
6. Fume hood use
7. Glass and sharps disposal
8. Chemical waste plan
9. Injury reports
10. Safety committee
11. Personal Protective Equipment (PPE)
 - a. Gloves
 - b. Goggles
 - c. Lab coats
 - d. Other
12. Chemical spills
13. Scalpel use and syringe techniques
14. Biohazards and disposal
15. Specific precautions
 - a. Some seized drugs, like LSD (Lysergic Acid Diethylamide), can be absorbed into the skin.
16. Biohazards: Not all requests are labeled if this is the case. Evidence can be from a body cavity.
17. Sharps hazard: Though not normally accepted as evidence, syringes, broken glass, or razor blades can be found in evidence. Do not blindly place your hand into an evidence container. Repackaging may be necessary to reduce the risk of injury to others who may handle the evidence in the future.
18. Chemical hazards: The majority of chemicals used in this unit have one or more hazardous properties.

2.3 READINGS

1. Crime Laboratory Division's Quality Operations Manual (QOM)
2. Crime Laboratory Division's Safety Manual
3. Forensic Laboratory Services Bureau (FLSB) Forensic Services Guide (FSG)
4. WSP Safety and Wellness Manual
5. WSP Bloodborne Pathogens Training for Civil Service Employees PowerPoint
6. WSP Narcan Naloxone HCl Online PowerPoint

2.4 STUDY QUESTIONS

1. What is the FLSB policy regarding the acceptance of hypodermic needles, razor blades and other sharps?
2. What is the FLSB policy regarding the acceptance of evidence retrieved from body cavities?
3. Research gloves. Which ones are best for chemical analysis and why?
4. How would you assist a colleague who has been exposed to fentanyl or other opiates/opioids?
5. Find the following SDS and answer the questions below: Chloroform, Methanol, Methylene Chloride, Pentane, Hydrochloric Acid, and Sodium Bicarbonate.
 - a. What is the target organ?
 - b. What is the first aid measure for eye exposure? Dermal exposure?
 - c. What are Quickkits? Where can they be found?
 - d. What is the recommended PPE?
 - e. What are the signs and symptoms of exposure?
 - f. What is the HMIS (Hazardous Materials Identification System) flammability rating?

2.5 PRACTICAL EXERCISES

1. Complete a facility safety tour. At a minimum the following should be covered in this tour:
 - a. Operation and location of emergency showers.
 - b. Operation and location of emergency eyewashes.
 - c. Operation and location of the spill clean-up kits.
 - d. Location of fire alarms, emergency exits, and evacuation plan.
 - e. Location and understanding of Safety Data Sheets.
 - f. The rules concerning eating and drinking in the laboratory.
 - g. Location and appropriate use of safety glasses.
 - h. Appropriate use and disposal of laboratory coats.
 - i. Location and appropriate use of hood(s) in your area.
 - j. Location and explanation of the fire extinguishers.
 - k. Location and contents of first aid stations and kits.
 - l. Location and use of fire blankets.
 - m. Location of Narcan.
 - n. Proper disposal of scalpel blades, syringes, broken glass, and biohazards.
 - o. How to deal with bomb threats.
 - p. Explanation of the alarm and security system.
 - q. Proper handling and storage of compressed gas cylinders.
2. Complete the New Employee/Transfer Safety Orientation form 3000-342-175.
3. Complete the Safety Orientation Checklist form CLD-SAF-15001.
4. Perform the eyewash inspection with the designated person.
5. Perform the fume hood inspection.
6. Review the mandatory online WSP Bloodborne Pathogens Training for Civil Service Employees PowerPoint.
7. Review the mandatory online WSP Narcan Naloxone HCl PowerPoint.
8. In the fume hood and wearing the appropriate PPE, pour approximately 10 milliliters of water onto the counter. Go through the proper clean up procedure, using the spill kit, if the water was methanol. Repeat as if the water was sulfuric acid. Repeat for sodium hydroxide.
9. With the assistance of a colleague, blindfolded, make your way to the nearest shower or eyewash from your lab bench.

10. Determine if the following are compatible and therefore can be stored next to each other:
- a. aluminum hydroxide and aluminum oxide
 - b. aluminum oxide and aluminum sulfate
 - c. benzoyl chloride and benzylamine
 - d. oxalic acid and nitric acid
 - e. nitric acid and pine-sol
 - f. methanol and heptanes

3 GENERAL FORENSIC CASE CONSIDERATIONS

3.1 OBJECTIVES

- To introduce the trainee to evidence handling, accountability and chain of custody policies.
- To instruct the trainee on proper preparation of case notes and reports.
- To introduce the trainee to case approach and interpretation of data.
- To familiarize the trainee with special safety considerations involved in materials analysis casework.

3.2 TOPIC AREAS

1. Evidence Management
 - a. Request for Laboratory Examination Form (RFLE)
 - b. Evidence Seal (tape, staples, markings)
 - c. Receiving Evidence
 - d. Handling Evidence
 - i. Physical safety
 - ii. Contamination prevention
 - e. LIMS
 - f. Chain of Custody/Transfers
 - i. User Agency to Laboratory
 - ii. InterLaboratory
 - iii. IntraLaboratory
 - g. Storage
 - h. Standard Evidence Abbreviations
2. Review of the Request
3. Case Management (see QOM and MATP Part 1)
 - a. Prioritization
 - i. RUSH
 - ii. Backlog
 - iii. Turnaround Goals
 - iv. Multiple requests for same evidence
 - b. Administrative Documentation
 - c. Examination Documentation (details based on subdiscipline)
 - d. Digital Image Policies
 - e. LIMS
 - i. Findings
 - ii. Milestones
 - iii. Activities
 - iv. NFLIS (Seized Drugs only)
 - v. Crystal Reports
 - f. Laboratory Reports
 - i. Draft
 - ii. Final
 - iii. Amended
 - g. Casework Review
 - i. Verifications (Impressions & Physical Fit only)
 - ii. Analyst Review
 - iii. Technical Review
 - iv. Administrative Review
 - v. Resolution of Technical Differences of Opinion

3.3 READINGS

1. DeForest PR, Gaensslen RE, and Lee HC **(1983)** Forensic Science: An Introduction to Criminalistics, New York: Mc-Graw Hill [Read chapters 1-3].
2. Houck MM, Crispino F, and McAdam T **(2012)** "From Scene to Laboratory to Court" chapter 1.1 in *The Science of Crime Scenes*. New York: Elsevier Inc. (Academic Press), pp 11-19.
3. Wickenheiser RA **(2021)** "Reimagining forensic science – The mission of the forensic laboratory" in Forensic Science International: Synergy 3: article 100153.
4. Crime Laboratory Division's Quality Operations Manual (QOM) – Focus on Chapter 10
5. Crime Laboratory Division's LIMS Manual
6. Forensic Laboratory Services Bureau (FLSB) Forensic Services Guide (FSG)
7. Materials Analysis Technical Procedures (MATP) – Focus on Part 1

3.4 STUDY QUESTIONS

1. Discuss the methods and purpose of evidence security and chain of custody.
2. Discuss the marking of evidence. What are the minimum markings required on evidence packaging?
3. Discuss the required documentation used for analytical examinations.
4. What types of "new evidence" may be created during the course of analysis? Give an example of new evidence that could be created and explain what you would do to document this new evidence in your notes, in your report, on an RFLE, and in LIMS.
5. You are analyzing evidence and you are paged to go to the phone. Describe your activities.
6. You receive a phone call from an officer with a syringe. What do you tell them? (Answer in your own words what you would say).
7. It's lunchtime and you have an open case at your work area. Describe your actions. It's quitting time and the same case is on your work bench. Describe your actions.
8. What must be considered when a piece of evidence has multiple exam codes listed on the RFLE?
9. How are cases received and logged into the lab?
10. What are the ways items are brought to the lab?
11. In your own words, what are some elements that a report should contain?
12. Can the person who performs the technical review be the same person who performs the administrative review? Explain.

3.5 PRACTICAL EXERCISES

1. Observe your instructor or other qualified employee during the analysis of a case.
2. Review a minimum of 10 case folders from several experienced forensic scientists.
3. Observe the entire process that a case follows while in the laboratory.
4. Log a case into the Lab and into the LIMS system.

4 CRIMINALISTICS 101

4.1 OBJECTIVES

This two day interdisciplinary training program will cover the fundamental aspects of criminalistics. Criminalistics 101 training is based on agency availability and will not delay an individual's progress through the overall training plan.

- To familiarize the trainee with the different types of evidence examined in each functional area and discipline.
- To instruct the trainee how to safely handle and evaluate a broad range of evidence, including firearms, smears and stains, blood patterns, cuts and tears and small particle characterization.
- To discuss strategies to document, recover evidence, prevent contamination and preserve evidence (e.g., A DNA examiner will understand the potential significance of smokeless powder grains, metal turnings or vomit on a shirt).

4.2 TOPIC AREAS

1. Introduction to Criminalistics
 - a. Team building approach – we all have value
 - b. Interdisciplinary study of physical evidence
 - c. Contamination and evidence preservation
 - d. Documentation, collection, and packaging of evidence
2. Cognitive Bias
3. Law and Ethics
4. Functional Areas/Disciplines/LIMS Services
 - a. Crime Scene Response Team (CSRT)
 - i. Bloodstain Pattern Analysis
 - ii. Crime Scene Investigation
 - iii. Reconstruction
 - b. DNA
 - i. CODIS Match
 - ii. High Throughput STR (HT-STR)
 - iii. Post Conviction DNA Testing
 - iv. SAK (1, 2, 3)
 - v. STR
 - vi. Y-STR
 - c. CODIS (Convicted Felon Database)
 - i. CODIS STR
 - d. Firearms and Toolmarks (FA-TM)
 - i. Comparisons
 - ii. Firearms Swabbing
 - iii. Gunshot Residue Proximity
 - iv. NIBIN Searching
 - v. NIBIN Test Fire
 - vi. Serial Number Restoration
 - vii. TASER/Other Weapon
 - viii. Toolmarks
 - e. Latent Prints (LP)
 - i. AFIS
 - ii. Comparisons
 - iii. Processing

- f. Materials Analysis (MA)
 - i. Fire Debris and Explosives
 - 1. Explosives
 - 2. Ignitable Liquids
 - ii. Impressions
 - 1. Comparisons
 - 2. Make/Model Searches
 - iii. Seized Drugs
 - 1. Seized Drugs
 - 2. Marijuana Quantification
 - 3. CLAN Laboratory Analysis
 - iv. Trace (Materials)
 - 1. Fiber
 - 2. General Chemical Analysis
 - 3. General Criminalistics
 - 4. Glass
 - 5. Hair
 - 6. Paint/Polymer
 - 7. Physical Fit
 - 8. Tape
 - 9. Vehicle Lamp

4.3 READINGS

- 1. None.

4.4 STUDY QUESTIONS

- 1. None.

4.5 PRACTICAL EXERCISES

- 1. Listen to the presentations and participate in any activities offered through the program.

5 ETHICS

5.1 OBJECTIVES

- To familiarize the trainee with forensic ethics and standards of professional conduct.
- To familiarize the trainee with State policies on use of resources and acceptance of gifts.

5.2 TOPIC AREAS

1. Ethics in Forensics
 - a. ABC Rules of Professional Conduct
 - b. ANAB Guiding Principles of Professional Responsibility
 - c. NCFS National Code of Professional Responsibility for Forensic Science and Forensic Medicine Service Providers
2. Ethics for State Employees
 - a. Use of State Resources
 - b. Gift Policy

5.3 READINGS

1. ABC **(2022)** *ABC Rules of Professional Conduct* (09-0001F) v1.2 electronically downloaded from the American Board of Criminalistics (<https://www.criminalistics.com/ethics.html>) on November 7, 2022.
2. ANAB **(2021)** *GD3150 Guiding Principles of Professional Responsibility for Forensic Service Providers and Forensic Personnel* electronically downloaded from the American Board of Criminalistics (<https://www.criminalistics.com/ethics.html>) on November 7, 2022.
3. Elkins KM and Fambegbe I **(2020)** "Case studies and methods of teaching professional ethics for forensic science students" in *Journal of Forensic Science Education* 2(1).
4. FLSB Guidance on Gifts (located on FLSB Portal under Ethics).
5. Lucas DM **(1989)** "The ethical responsibilities of the forensic scientist: Exploring the limits" in *Journal of Forensic Sciences* 34(4):719-729.
6. NCFS **(2016)** *Recommendation to the Attorney General National Code of Professional Responsibility for Forensic Science and Forensic Medicine Service Providers* electronically downloaded from <https://www.justice.gov/archives/ncfs/work-products-adopted-commission> on November 7, 2022.
7. Revised Code of Washington (RCW) 42.52 Ethics in Public Service.
8. Washington State Legislature (WAC) 292-110-010 Use of State Resources
9. Yadav PK **(2017)** "Ethical issues across different fields of forensic science" in *Egyptian Journal of Forensic Sciences* 7(1): 10.

RESOURCES

1. Bowen RT **(2021)** *Ethics and the Practice of Forensic Science*, 2nd Edition. CRC Press.
2. Barnett PD **(2001)** *Ethics in Forensic Science Professional Standards for the Practice of Criminalistics*, Boca Raton (FL): CRC Press LLC.
3. Other Readings on the Portal FLSB Home Page under the Ethics area, Ethics Documents Articles ([here](#)).

5.4 STUDY QUESTIONS

1. None.

5.5 PRACTICAL EXERCISES

1. Review the presentation(s) located on the Portal FLSB Home Page under the Ethics area (Ethics Documents/ Presentations, [here](#)). Discuss the content of the presentations with the trainer.
2. Review the Ethics Scenarios and Answers on the Portal FLSB Home Page under the Ethics area (Ethics Documents/Scenarios, [here](#)). Discuss these scenarios with the trainer.
3. Review the following documents and discuss the information with your trainer.
 - ABC Rules of Professional Conduct (ABC, 2022)
 - ANAB GD3150 Guiding Principles of Professional Responsibility for Forensic Service Providers and Forensic Personnel (ANAB, 2021)
 - NCFS Recommendation to the Attorney General National Code of Professional Responsibility for Forensic Science and Forensic Medicine Service Providers (NCFS, 2016)
4. [RTI International](#) provides free or reasonably priced online forensic training. These courses are optional and may be recommended by your trainer.

6 COGNITIVE BIAS

6.1 OBJECTIVES

- To instruct the trainee on the definition and types of cognitive bias.
- To familiarize the trainee on the importance and potential impact to different forensic disciplines.
- To familiarize the trainee with various tactics that can be used to minimize the influence of cognitive bias.

6.2 TOPIC AREAS

1. Definition of Cognitive Bias
2. Types of Cognitive Bias
3. Impact of Cognitive Bias in Forensics
4. Reports Addressing Cognitive Bias in Forensics
 - a. National Academy of Sciences 2009 Report
 - b. PCAST 2016 Report
5. Tactics to Reduce Cognitive Bias in Casework
 - a. Reduce Exposure to Task Irrelevant Information
 - b. Methodical Approach/Technical Procedures
 - c. Technical and Administrative Review of All Cases
 - d. Verifications
 - e. Proficiency Testing
 - f. Corrective Action Procedures
 - g. Internal Quality Audits
 - h. Independent, External Assessments

6.3 READINGS

1. Cooper GS and Meterko V **(2019)** "Cognitive bias research in forensic science: A systematic review" in *Forensic Science International* 297:35-46.
2. Curley LJ, Munro J, Lages M, MacLean R, and Murray J **(2020)** "Assessing cognitive bias in forensic decisions: A review and outlook" in *Journal of Forensic Sciences* 65(2): 354-360.
3. Dror IE **(2020)** "Cognitive and human factors in expert decision making: Six fallacies and the eight sources of bias" in *Analytical Chemistry* 92: 7998-8004.
4. Dror IE and Cole SA **(2010)** "The vision in 'blind' justice: Expert perception, judgment, and visual cognition in forensic pattern recognition" in *Psychonomic Bulletin & Review* 17(2): 161-167.
5. Dror IE and Kukucka J **(2021)** "Linear sequential unmasking-expanded (LSU-E): A general approach for improving decision making as well as minimizing noise and bias" in *Forensic Science International: Synergy* 3: article 100161.
6. Dror IE and Langenburg G **(2019)** "'Cannot decide': The fine line between appropriate inconclusive determinations versus unjustifiably deciding not to decide*" in *Journal of Forensic Sciences* 64(1): 10-15.
7. Dror IE and Pierce ML **(2020)** "ISO standards addressing issues of bias and impartiality in forensic work" in *Journal of Forensic Sciences* 65(3): 800-808.
8. Forensic Science Regulator Guidance **(2020)** FSR-G-217 "Cognitive Bias Effects Relevant to Forensic Science Examinations", Issue 2; UK Crown [Read discipline related chapters].
9. Kassin SM, Dror IE, and Kukucka J **(2013)** "The forensic confirmation bias: Problems, perspectives, and proposed solutions" in *Journal of Applied Research in Memory and Cognition* 2: 42-52.

10. Lebowitz S and Baer D **(2015)** “20 cognitive biases that screw up your decisions” in *Business Insider*, August 6, 2015. [Read chart].
11. Murrie DC, Boccaccini MT, Guarnera LA, and Rufino KA **(2013)** “Are forensic experts biased by the side that retained them?” in *Psychological Science* 24(10): 1889-1897.

RESOURCES

1. National Academies of Science Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council **(2009)** *Strengthening Forensic Science in the United States: A Path Forward*, NCJRS document 228091, National Academies Press.
2. Executive Office of the President President’s Council of Advisors on Science and Technology **(2016)** *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods*, September 2016.
3. Other Readings on the FLSB Portal (Cognitive Bias Documents/Articles).

6.4 STUDY QUESTIONS

1. Describe three ways that cognitive bias can be or is minimized in your casework.

6.5 PRACTICAL EXERCISES

1. Review the presentation(s) located on the Portal FLSB Home Page under the Cognitive Bias area (Cognitive Bias Documents/ Presentations, [here](#)). Discuss the content of the presentation(s) with the trainer.
2. NIST 2015 International Forensics Symposium on Forensic Error Management
 - a. Refer to the document on Isilon drive with video links & time points
 - b. Watch the yellow highlighted topics & discuss with your trainer.
 - i. Fingerprint Forensics & the Fourth Amendment in a Time of Terror
 - ii. Cognitive Sources of Error and Ways to Minimize Them
 - iii. What is the Proper Evidentiary Basis for Forensic Science Opinion?
3. Read the following articles and discuss with your trainer:
 - a. Dror I, Melinek J, Arden JL, Kukucka J, Hawkins S, Carter J, and Atherton DS **(2021)** “Cognitive bias in forensic pathology decisions” in *Journal of Forensic Sciences* 66: 1751-1757.
 - b. Taylor M **(2021)** “Journal editor calls out ‘emotional’ response to controversial study” in *Forensic Science Magazine* September 29, 2021 issue, electronically downloaded from <https://www.forensicmag.com/579648-Journal-Editor-Calls-Out-Emotional-Response-to-Controversial-Study/> on February 21, 2023.
4. Practice identifying bias and subjectivity:
 - a. Read the following article and review the associated blank and example worksheets: Quigley-McBride A, Dror IE, Roy T, Garrett BL, and Kukucka J (2022) “A practical tool for information management in forensic decisions: Using linear sequential unmasking-expanded (LSU-E) in casework” in *Forensic Science International: Synergy* 4: article 100216.
 - b. Discuss with your trainer different scenarios and fill out the “Cognitive Bias Practice Worksheet” based on those scenarios.

7 LAW BASICS AND COURT TESTIMONY

7.1 OBJECTIVES

- To instruct the trainee on the legal system, the various courts, and its participants
- To instruct the trainee on the judicial process, criminal procedure, and how cases are tried in different courts
- To familiarize the trainee with the terms, legal decisions and issues relevant to the forensic scientist.
- To instruct the trainee on the forensic significance of the Bill of Rights and other amendments to the US Constitution.
- To instruct the trainee on all aspects of forensic testimony – preparation, demeanor, delivery, and use of visual aids.

7.2 TOPIC AREAS

1. The Legal System Overview
 - a. The basis of law
 - b. Law foundations
 - i. The Constitution
 - ii. Statutes
 - iii. Administrative regulations
 - iv. Judicial decisions
 - c. Adversarial system
 - d. Presumption of innocence
 - i. Beyond a reasonable doubt
 - ii. Preponderance of the evidence
 - e. Rights of the accused
 - i. Due process
 - ii. Bill of Rights
 - f. Civil versus criminal law
2. Dual Court System
 - a. Jurisdiction
 - b. Federal Courts
 - i. US District Courts
 - ii. US Court of Appeals
 - iii. US Supreme Court
 - iv. Specialized Courts
 1. Military Justice
 2. Tribal Courts
 - c. State Courts
 - i. Courts of Limited Jurisdiction: Lower Courts
 1. District
 2. City
 3. Municipal
 - ii. Courts of General Jurisdiction: Major Trial Courts
 1. Superior
 2. Criminal and civil cases
 - iii. Intermediate Courts of Appeals
 - iv. State Supreme Court

3. Participants in the Court System
 - a. Law Enforcement
 - i. Security Staff
 - ii. Sheriff's Deputies
 - iii. Bailiff
 - b. Courts
 - i. Legal
 1. Prosecutor
 2. Public defender
 3. Private defense attorney
 4. Judge
 5. Law clerk
 - ii. Court Support Staff
 1. Court clerk
 2. Court reporter
 3. Court administrator
 4. Translator
 - c. Corrections
 - i. Probation officer
 - ii. Pretrial services
 - iii. Drug rehabilitation program
 - d. Public
 - i. Defendant
 - ii. Victim
 - iii. Witness
 - iv. Jurors
 - v. Bail agent
 - vi. Victim witness assistance program
 - vii. Rape crisis center
 - viii. Child advocate
 - ix. Court watchers
 - x. Media
4. Steps of Criminal Procedure
 - a. Crime
 - b. Arrest
 - c. Initial appearance
 - i. Accused is told of the charges, advised of their rights, bail is set and a date for the preliminary hearing is set.
 - ii. Suspect may enter a plea.
 - d. Charging
 - i. Information
 - ii. Complaint
 - iii. Arrest warrant
 - e. Preliminary hearing
 - i. Hearing to determine if there is probable cause to proceed with the case.
 - f. Grand jury
 - i. Required in twenty-two states and federal courts
 - ii. Indictment
 - g. Arraignment
 - i. The defendant is formally charged and must enter a plea.

- ii. Types of pleas
 - 1. Guilty
 - a. Regular guilty plea
 - b. Nolo contendere (no contest)
 - c. Alford plea
 - d. Conditional guilty plea
 - 2. Not guilty
 - 3. Insanity plea
 - h. Bail
 - i. Disclosing and suppressing evidence
 - j. Negotiated Justice
 - i. Plea agreements
 - 1. Charge bargaining
 - 2. Count bargaining
 - 3. Sentence bargaining
 - k. Trials
 - l. Sentencing
 - m. Appeals
- 5. Constitutional Rights of Forensic Significance
 - a. Fourth Amendment
 - b. Fifth Amendment
 - c. Sixth Amendment
 - d. Fourteenth Amendment
- 6. Rules of Evidence
 - a. Federal Rules of Evidence
 - b. Uniform Rules of Evidence
 - c. Washington Rules of Evidence
 - d. Aligned rules to know
 - i. Rule 401
 - ii. Rule 402
 - iii. Rule 702
 - iv. Rule 703
 - v. Rule 705
 - vi. Rule 1002
- 7. Court Decisions of Forensic Significance
 - a. 1923 – Frye v. United States
 - b. 1957 – Jencks v. United States
 - c. 1963 – Brady v. Maryland
 - d. 1972 – Giglio v. United States
 - e. 1988 – Arizona v. Youngblood
 - f. 1993 – Daubert v. Merrell Dow Pharmaceuticals
 - g. 1997 – General Electric Co. v. Joiner
 - h. 1999 – Kuhmo Tire Co. v. Carmichael
 - i. 2002 – State of Washington v. Nation
 - j. 2004 – Crawford v. Washington
 - k. 2006 – United States v. Plaza
 - l. 2009 – Melendez-Diaz v. Massachusetts
 - m. 2009 – State of Washington v. Lui
 - n. 2011 – Bullcoming v. New Mexico
 - o. 2012 – Williams v. Illinois
 - p. 2013 – State of Washington v. Manion
 - q. 2021 – State of Washington v. Blake
 - r. 2022 – City of Seattle v. Wiggins

8. Testimony

- a. Preparation for testimony
 - i. pretrial discussions and/or meetings with attorneys
 - ii. review of case notes and report
 - iii. Curriculum Vitae (CV)
 - iv. notification of supervisor
- b. Courtroom appearance and dress
 - i. professional appearance
 - ii. appropriate attire
 - iii. posture
- c. Courtroom demeanor
 - i. exclusion from the courtroom
 - ii. outside courtroom considerations
 - iii. eye contact
 - iv. tone of voice
 - v. volume
 - vi. courtesy
 - vii. impartiality
 - viii. ethics
- d. Presenting Testimony
 - i. taking the oath
 - ii. taking the witness stand
 - iii. qualifying as an expert
 - 1. voir dire
- e. handling evidence on the stand
 - i. recognition
 - ii. safety
 - iii. gloves
 - iv. refrain from displaying evidence ("publishing") to jury without prior permission
- f. direct examination
 - i. communication skills
 - 1. verbal: avoid slang, professional jargon, profanity, unexplained abbreviations and acronyms
 - 2. nonverbal
 - 3. pace
 - ii. use of analogies
 - iii. credibility
 - 1. recognizing limits of knowledge or expertise
 - iv. admitting mistakes, limitations and problems
 - v. inability to remember
 - vi. objections
 - vii. cross-examination
 - 1. open-ended questions
 - 2. leading questions
 - 3. unclear questions
 - 4. compound questions
 - 5. hypothetical questions
 - 6. yes or no questions
 - 7. listening carefully
 - viii. re-direct
 - ix. re-cross-examination
 - x. leaving the witness stand
 - xi. being finally excused

- g. Opposition tactics
 - i. attacking credibility and qualifications
 - ii. attacking chain of custody
 - iii. attacking procedures
 - iv. attacking conclusions
 - v. weight of testimony
 - vi. proffering “authoritative” texts
 - vii. hostile demeanor
- h. Use of visual displays and other presentation aids
 - i. prior discussion with attorney
 - ii. easily seen and understood
 - iii. photographs and glare
 - iv. digital images
 - v. use of colors on charts, graphs
 - vi. retention as court exhibit
 - vii. demonstrations
- i. Testimony review
 - i. required annually
 - ii. performed by supervisor, another analyst or officer of the court
 - iii. documented on testimony review form
 - iv. evaluation criteria
- j. Discovery
 - i. WAC 446-10-050
 - ii. WSP policies

7.3 READINGS

1. Kogan JD **(1978)** “On Being a Good Expert Witness in a Criminal Case” in *Journal of Forensic Sciences* 23:190-200.
2. Ling S, Kaplan J, and Berryessa CM **(2021)** “The importance of forensic evidence for decisions on criminal guilt” in *Science & Justice* 61: 142-149.
3. Ribeiro G, Tangen JM, and McKimmie BM **(2019)** “Beliefs about error rates and human judgment in forensic science” in *Forensic Science International* 297: 138-147.
4. Ron Smith & Associates **(2015)** Training Seminar handout “Courtroom Testimony Techniques ‘Success Instead of Survival’”.
5. Sapir GJ **(2020)** “Legal Aspects of Forensic Science” chapter 1 in Saferstein R [Ed.] *Forensic Science Handbook. Vol. 1*, 3rd Ed. Upper Saddle River (NJ): Prentice Hall, pp 1-80.
6. US Legal **(2023)** “Uniform Rules of Evidence Act Law and Legal Definition” electronically downloaded from US Legal website (<http://definitions.uslegal.com/u/uniform-rules-of-evidence-act/>) on April 4, 2023.

RESOURCES

1. Bronstein DA **(1998)** *Law for the Expert Witness*, 2nd edition, Boca Raton: CRC Press.
2. Matson JV, Daou SF, and Soper JG **(2004)** *Effective Expert Witnessing: Practices for the 21st Century*, 4th edition, Boca Raton: CRC Press.
3. Rules of Evidence
 - a) The Federal Rules of Evidence
 - b) The Uniform Rules of Evidence
 - c) The Washington State Rules of Evidence
4. Court opinions of forensic significance (decisions listed in topic area 7)

7.4 STUDY QUESTIONS

1. Briefly describe the difference between the Frye Standard and the Daubert Standard? Which standard is the law in Washington?
2. What is the Confrontation Clause of the Sixth Amendment? How does this impact forensic science? Which legal decisions are based on the Confrontation Clause?
3. What is "Relevant Evidence"? Where is relevant evidence legally defined?
4. What is a *subpoena duces tecum*? What should you do if you receive this type of subpoena?
5. You have spent months analyzing evidence in a case and on the eve of the trial you learn the evidence was excluded under the "fruit of the poisonous tree doctrine". What does this mean?
6. What is a bench trial? How does this differ from a jury trial?
7. It is estimated that less than ten percent of cases go to trial. What processes could contribute to so few of cases going to trial?
8. What is an Omnibus hearing? What is a 3.5-3.6 hearing?
9. Discuss appropriate court demeanor and dress.
10. What is the difference between a regular witness and an expert witness?
11. What are the Uniform Rules of Evidence, and how do they relate to the Federal Rules of Evidence and the Washington Rules of Evidence?
12. As you are delivering testimony, one of the attorneys exclaims, "Objection". What do you do?
13. How can you avoid technical jargon when testifying?
14. In a jury trial, whom should the witness address?
15. How would you answer in court when asked what is your error rate?
16. Define the following terms:
 - a. Continuance
 - b. Deposition
 - c. Disclosure
 - d. Discovery
 - e. Omnibus hearing
 - f. Spoliation
 - g. Stipulation
 - h. Subpoena duces tecum
 - i. Voir dire
17. What does WAC 446-10-050 say regarding availability of public records? What is the difference between a disclosure request and a discovery request? How is each handled?
18. How would you address a question regarding why you didn't examine an item for fingerprints? For DNA?
19. Why is testimony reviewed annually? What criteria are included in the annual review?

7.5 PRACTICAL EXERCISES

1. Develop a Curriculum Vitae (CV).
2. Observe court testimony by other members of the laboratory staff.