

## Crime Lab Division Frequently Asked Questions (FAQ's)

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### *What does it take to become a forensic scientist? What course of study should I take in college?*

If you wish to work in a crime laboratory as a forensic scientist, you must have a solid educational foundation in the basic sciences of chemistry, biology, physics, and mathematics. Positions typically require a Bachelor of Science degree in a natural science (Biology, Chemistry, etc.), forensic science, or a closely related field.

Required Coursework (DNA, Materials Analysis):

- 20 Semester/30 Quarter hours of chemistry
- 5 Semester/8 Quarter hours of physics (Desirable for DNA)

DNA Additional Required Coursework

- Biochemistry
- Genetics
- Molecular Biology
- Statistics/Population Genetics

Education requirements for other forensic science disciplines (Latent Prints, Questioned Documents, Firearms/Toolmarks, Crime Scene Response) may vary, depending on the forensic field.

Examples of related fields include but are not limited to, pharmacology, medical technology, genetics or molecular biology, analytical chemistry, biochemistry, clinical chemistry, nuclear chemistry, or toxicology.

Because of the nature of the work and security requirements, all Washington State Patrol applicants are subject to background investigations, including a polygraph examination.

Additional information can be found on the Washington State HR website,

<http://www.dop.wa.gov/Pages/default.aspx> , and more specifically:

<http://www.dop.wa.gov/CompClass/JobClassesSalaries/Pages/ClassifiedJoblisting-F.aspx>

Also the Washington State Patrol website:

<http://www.wsp.wa.gov/employment/forencareer.htm>

To apply for a job, click here: <http://www.careers.wa.gov/>

Another online resource with a variety of forensic information is the American Academy of Forensic Sciences (AAFS): <http://www.aafs.org/>

### *How is CSI different from real world forensic science?*

Television programs like “CSI” may be a wonderful source of entertainment for many people, but they are not a wonderful source of how forensic science works in the real world.

One main difference is that, while on TV, you get analytical results and a solved crime within an hour, in the real world an examination may take up to a week or more. An analysis can only begin after the evidence has been collected and submitted to the lab in a secure condition. Television shows are geared to a one hour program schedule, much faster and

much more glamorous than real life. You will rarely, if ever, see a forensic scientist drive up in a Hummer or carry a gun, much less do so wearing tight leather pants and high heels. Scientists do not interrogate suspects or “pound the pavement” investigating crimes. We are not involved in raids or arrests. Except for the Crime Scene Response Team members, scientists typically remain in the lab and examine evidence delivered by law enforcement agencies. A good deal of a forensic scientist’s time is spent at a computer or poring over paperwork, analyzing and interpreting data, writing reports, and reviewing casework.

A forensic scientist may not always get a conclusive result from their testing, or a result that implicates the suspect. Not everything that is touched will leave a fingerprint or DNA. If a fingerprint or DNA is detected, it may not be of sufficient quality to lead to a definitive conclusion. Forensic analyses do not always deliver the solution to a crime. Rather, forensic results may lend corroborating evidence to the overall case, or potentially exonerate innocent suspects.

Another difference from TV is that when DNA, fingerprints or other types of evidence are compared for a common source, forensic scientists don’t get a flashy red computer alert declaring “MATCH!” More likely, results (sometimes multiple) are provided from such computerized comparisons that must be studied and verified by a trained and experienced scientist. In the end, the scientist determines the match, not the computer program. Furthermore, all analytical results, conclusions and reports are technically reviewed before the results go out to the law enforcement agency detective or investigator.

### *How long does it take to complete a case?*

Case completion can take anywhere from an hour to several weeks. It will depend on a number of factors including:

- Type and quality of evidence;
- Complexity of examination;
- Whether all necessary controls and references are received;
- Number of tests involved in the examination;
- Existing backlog of evidence at the crime lab.

A straight-forward single item controlled substance case, such as suspected cocaine, may take about an hour. A DNA case may take a week or more depending on the number of items that require analysis, the condition of the evidence items, and whether necessary reference samples are submitted in a timely manner. Rush cases, such as those with upcoming court dates, are prioritized, and scientists always try to meet deadlines.

### *How can I get a tour of the crime lab?*

Tours are often limited due to concerns for the integrity, security and privacy of the evidence, and to eliminate extraneous sources of contamination, particularly from DNA. General public tours that are permitted are typically limited to groups of no larger than 8-10 people who are at least middle school age or older and are subject to lab personnel availability. You can contact the manager of your local lab for availability and any specific tour limitation for that site.

### *Can my high school student do a job shadow in the lab?*

Job shadows, much like lab tours, are often limited due to concerns for the integrity, security and privacy of the evidence, and to eliminate extraneous sources of contamination, particularly from DNA. Job shadows that are permitted are typically limited to no more than a few hours and are subject to lab personnel availability. You can contact the manager of your local lab for availability.

### *Do you have internships and how can a student secure an internship?*

We do try to use interns during the summer. We focus on students who have completed at least their second year of college, with a major course of study in a natural science. Many of our interns have already graduated from college. We ask the laboratory managers to develop projects for summer interns, and we try to place the intern with their preferred lab and forensic discipline. The internships are unpaid and competitive. The application for internships can be found on the Crime Lab Division website (<http://www.wsp.wa.gov/forensics/crimlabs.htm>). The intern selection process includes a background and polygraph exam. The polygraph will be administered by the WSP in Olympia, WA. If you have questions on internships, you can send them to [wspcrimelabinternship@wsp.wa.gov](mailto:wspcrimelabinternship@wsp.wa.gov) and we will get an answer to you. We start to accept applications for upcoming summer internships around December; application closure is usually in January.

### *What kinds of analysis can the laboratory perform?*

The Washington State Patrol Crime Lab Division performs a wide variety of forensic testing and examines an even wider variety of evidence, from crimes involving controlled substance violations to rapes and homicides. Areas of testing include DNA, body fluid identification, controlled substances, chemical analysis of unknowns, clandestine laboratory analysis, microanalysis/trace evidence (such as paint chips, fibers, tire and shoe impressions), fire debris, explosives, questioned documents, firearms and tool marks, latent prints and crime scene investigation.

- DNA – Evidence received from agencies for DNA analysis include sexual assault kits, victim and suspect clothing, weapons, and other items from crime scenes that may have biological evidence (blood, semen, saliva) associated with it.
- CODIS (Combined DNA Index System) – DNA samples from convicted offenders are typed and entered into the State and National levels of CODIS. DNA profiles from the offender index are searched on a regular basis against DNA profiles obtained from crime scene samples from a putative perpetrator. CODIS matches resulting from those searches are evaluated by qualified forensic scientists and can result in an investigative lead to the submitting agency. The CODIS software also conducts other searches (e.g. crime scene sample against crime scene sample).
- Materials Analysis (Chemical Analysis) – Evidence received for chemical analysis may include suspected drugs recovered from suspects or from crime scenes,

undercover buys, drug distribution rings and manufacturers, and clandestine drug labs. Fire debris from suspected arsons can be analyzed for any residual ignitable liquids that may have been used as an accelerant. Residues from exploded devices may be submitted for explosives analysis in order to determine the type of device and explosive material used.

- Material Analysis (Microanalysis) – Types of trace evidence that can be submitted varies widely but can include clothing from suspects and victims, shoe or tire impressions found at a crime scene, paint chips from a hit and run, and hairs and fibers. The evidence is examined to determine if there is any link between the suspect and victim and crime scene. We may also examine vehicle lamps in order to determine if they were on or off during a collision.
- Questioned Documents – This section examines and compares handwriting, hand printing, altered documents, indented writing, machine-generated documents, paper, and ink.
- Firearms/Toolmarks - Recovered bullets and expended cartridge cases are examined to determine the caliber of the fired ammunition, type of firearm used, and for comparison to submitted firearms to see if they were fired from a particular weapon. Firearms and other objects can also be submitted for serial number restoration. Fractured knife blades, cut padlocks, pry bars, and tool marks left at the entry to a burglary may be examined and compared for tool mark impressions.
- Latent Prints – Evidence known to be handled or touched such as documents, weapons, drink containers, tools, electronics, and packaging can be submitted for latent print processing. Powdered/lifted prints submitted from crime scenes are also analyzed. Latent prints developed or submitted will be compared to any named subject if prints are on file. ABIS database searching will be done if appropriate.

### *Who can submit evidence to the lab?*

Any law enforcement agency can submit criminal cases to the laboratory for examination. Typically this is city and county police and sheriff's departments, and fire departments. We also receive state agency cases (such as from the Washington State Patrol, Department of Corrections, Department of Fish and Wildlife), and some federal cases (such as from ATF and ICE). Each laboratory has assigned areas of responsibility around the state to provide forensic services.

### *What can you tell from someone's DNA profile?*

A forensic DNA profile is a set of numbers corresponding to a person's combination of specific DNA markers. Each person's DNA contains two copies of these markers, one copy inherited from the father and one from the mother. At each stage of development, nearly all of the cells forming the body contain the same DNA. This allows forensic DNA profiling for all types of samples including cells from the cheeks collected using buccal swabs, blood or

other types of biological samples. The forensic DNA profiles developed at the WSP crime labs do not include physical characteristics and medical conditions

While approximately 99.9% of human DNA sequences are the same in every person, there is sufficient variation in DNA to distinguish one individual from another, unless they are identical twins. While a lot of DNA contains information for a specific function, the DNA used in forensic applications does not code for a particular protein but is still useful for human identification. Specific locations (called loci) of an individual's DNA are used by forensic scientists for obtaining DNA profiles. The standard method of DNA analysis conducted by the Washington State Patrol Crime Laboratory for criminal cases and for the convicted offender database is the analysis of 23 Short Tandem Repeat (STR) regions and 3 Y-STR regions plus a sex determination region utilizing the Polymerase Chain Reaction (PCR). In addition, analysis of STR regions of the Y chromosome present in male individuals only can be employed at the Crime Laboratory. PCR is a method used for the amplification of a specific DNA segment such that only small quantities are required for analysis. The PCR reaction is repeated for a number of cycles and results in the exponential accumulation of the specified DNA segment.

By entering a DNA profile into a DNA database, that profile can be compared with millions of other DNA profiles for potential matches.

### *What do you see when you get a 'hit' to the felon database?*

Qualifying DNA profiles from evidentiary items are entered into a database (Combined DNA Index System or CODIS) which contains other evidentiary DNA profiles, as well as individuals convicted of a felony and certain gross misdemeanors/misdemeanors. CODIS profiles are compared to one another on a regular basis to search for matching DNA profiles. A hit occurs when two or more profiles in the database match and provides an investigative lead on a case(s). All CODIS hits are confirmed by qualified DNA analysts.

### *What happens when you get a "hit" to the fingerprint/palm print database?*

The Automated Biometric Identification System (ABIS) is a computerized database of millions of fingerprint and palm print images. If a latent print meets search criteria, an analyst can search the print against the file records. The print is scanned and identifying features are plotted in the image. The computer algorithm returns a list of candidate images based on the plotted features. The analyst reviews the candidates, and when a candidate matches the latent print, he or she obtains exemplars of the candidate and compares the actual latent print with the exemplar print. In the case of an identification (a "hit"), the results are verified by two other qualified latent print analysts. A negative result means that no matching print was located in the database; it does not mean that no matching print exists in the database.

### *What services do you provide at a crime scene?*

Various law enforcement agencies may call out the Washington State Patrol Crime Scene Response Team (CSRT) to assist in their investigation of major crimes or scenes that overwhelm their own resources. The CSRT consists of forensic scientists and is a free

service available for response 24 hours a day. Each scene is unique, but in general, CSRT members may do all or any combination of the following:

- Meet and consult with the requesting agency and gather information.
- Take responsibility for scene processing.
- Take highly detailed field notes of observations made, items collected, and chemical tests performed.
- Extensively photograph the scene and any items of interest with overall, midrange, and close-up photography.
- Scan the scene with a 3D scanner.
- Thoroughly document bloodstains with the goal of reconstructing the events of the scene.
- Record any bullet trajectories and bullet defects.
- Perform chemical presumptive tests for blood, semen, copper, and lead (gunshot residues).
- Perform chemical blood enhancement techniques to aid visualization of any potential latent blood.
- Process scenes for latent fingerprints. This may include the use of chemical enhancement techniques.
- Evidence item recognition and collection including trace (hairs, fiber, paint, shoe and tire impressions), DNA, firearms and tool marks.

After the scene, CSRT members provide the requesting agency with a written report and testimony as needed.

### *What does a typical day look like?*

The primary duties of a forensic scientist include: examination of physical evidence using accepted and validated methods and analytical instrumentation; preserving evidence according to laboratory procedures; maintaining chain of custody, i.e., documentation establishing the receipt, handling, and disposition of evidence; interpreting observations and test results; preparing written opinion reports; testifying as an expert witness in courts of law; participating in proficiency testing; and receiving on-going training and professional development. A typical day may involve all of those duties, but evidence analysis constitutes the bulk of one's duties. Detailed documentation must be kept in all phases of testing and numerous quality measures must be implemented and maintained along the way.

Forensic scientist must be flexible with their time and frequently need to reprioritize their tasks throughout the day or week. Rush cases, calls from court, or other urgent situations will often dictate how a forensic scientist spends their day. Documentation is critical and must be done contemporaneous with laboratory analysis. Interpretation of data is often more time consuming than laboratory or crime scene processing. Scientists can expect to spend more time doing paperwork than they spend in the laboratory or at a crime scene!

### *How often do you testify?*

The number of times a forensic scientist testifies varies widely and depends on the type of casework they perform and the number of cases they complete. Not every case completed goes to court, and not every court case demands the testimony of a scientist. Counties and

jurisdictions also vary in how frequently they call scientists to court. For example, because of the relatively large number of controlled substance cases a material analysis forensic scientist completes (these cases don't take as long to complete), and the sheer volume of drug crimes across the state, these scientists testify more frequently, perhaps as often as once a month. Due to the much larger length of time it takes to complete a DNA case, DNA scientists may only testify a couple of times per year.

### *What is the pay range for a forensic scientist?*

Pay ranges shown below are approximate and depend on level of experience and length of time with the agency.

• Forensic Scientist 1 (Entry level)	\$43,000 to 56,000
• Forensic Scientist 2 (Intermediate level)	\$50,000 to 66,000
• Forensic Scientist 3 (Journey level)	\$64,000 to 84,000
• Forensic Scientist 4 (Technical Lead)	\$67,000 to 88,000
• Forensic Scientist 5 (Supervisor level)	\$72,000 to 95,000

### *Do you work on property crimes cases?*

Yes, the Crime Lab does work property crime cases, especially in the Latent Prints, Firearms, Materials Analysis and Questioned Documents sections. However, for DNA analysis, there are restrictions. Current staffing and caseload require us to carefully evaluate requests we receive for DNA analysis as the number has increased and our staffing has not kept pace. Submissions for DNA are limited to cases:

- Involving substantial property loss;
- Are part of a series;
- Have a sexual component;
- Involve crimes against government agencies;
- Are associated with sentencing enhancements;
- Involve thefts of large quantities of dangerous or hazardous materials; or
- Indicate an ongoing and specific public safety threat

If accepted, property crime submissions for DNA will generally be limited to 2 evidence items and require any suspect reference samples and a completed Authorization for Consumption of DNA evidence form.

For cases involving multiple examinations, the above described limitation will only apply to evidence on which DNA analysis is requested.

### *Does the Crime Lab examine computer evidence?*

The Crime Lab does not examine computer crimes but another section of the Washington State Patrol does. The Special Investigations Section of the Investigative Assistance Division consists of the High Tech Crimes Unit (HTCU), Missing and Exploited Children Task Force (MECTF), Missing and Unidentified Persons Unit (MUPU), Special Weapons and Tactics Team (SWAT). The HTCU provides computer forensic technical support and training along with recovering relevant evidence that may exist on computer hard drives and other storage media for use in related criminal and internal investigation.

- HTCUC is a full service computer evidence retrieval and analysis unit. Evidence is sought in a varied field of computer related issues involving computer crime. HTCUC computer crimes detectives are experienced professional investigators that can retrieve evidence without damaging or altering the original data. The data can be recovered from deleted or damage file structures. HTCUC can provide an independent, impartial, and secure investigation while revealing and preserving important evidence, which agencies use to ensure an appropriate outcome to important computer criminal investigations.

HTCUC Services:

- Recovery of e-mail files
- Recovery of deleted files
- Recovery of Internet History files
- Recovery of financial records
- Recovery of photo/video files
- Recovery of text documents
- Training in computer seizures

Typical Investigations: Stalking, Homicide, Forgery, Theft, Child Pornography, Financial Fraud, Narcotics, and Embezzlement.