AN INTRODUCTION TO FORENSIC SCIENCE
The Search For Hidden Truths

“In school, every period ends with a bell. Every sentence ends with a period. Every crime ends with a sentence.”

---- Stephen Wright, comedian
Meet Inspector Beaudeaux…

He would like to introduce you to the world of forensic science.
Follow me . . .
Forensic Science (or Criminalistics) is the use of science & technology to enforce civil & criminal laws.
LAWS THAT PERTAIN TO THE U.S. CRIMINAL JUSTICE SYSTEM

- The U.S. Constitution
  - Statutory Law
- Common Law or Case Law
  - Civil Law
  - Criminal Law
- Equity Law
- Administrative Law
## CIVIL VS. CRIMINAL LAW

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<th>CIVIL LAW</th>
<th>CRIMINAL LAW</th>
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| • filed by a **private** party.  
  - a corporation  
  - an individual  
| • filed by the **government**  
| • **Penalty**: a guilty defendant pays the plaintiff for losses caused by their actions.  
  - no incarceration  
| • **Penalty**: a guilty defendant is punished by  
  - incarceration (in jail/prison)  
  - **fine** paid to the gov’t  
  - **execution** (death penalty)  
| • Crimes are divided into 2 classes:  
  - **misdemeanors** - < 1 year incarceration  
  - **felonies** - 1+ year sentence |
So, who’s a forensic scientist?
A FORENSIC SCIENTIST STUDIES AND ANALYZES PHYSICAL EVIDENCE USED IN CRIMINAL COURT CASES.
Many accused criminals are found either innocent or guilty based on the strength of evidence that a forensic scientist provides.
FORENSIC SCIENTISTS CAN SPECIALIZE IN A VARIETY OF DIFFERENT AREAS:

- Studying blood for presence of drugs, alcohol, or toxins
- Performing DNA analysis on hair & body fluids
- Examining documents to determine if forgery occurred
• Matching fingerprints
• Identifying type of firearm or tool used in a crime
• Determining results of polygraph tests
WHAT PERSONAL ATTRIBUTES ARE DESIRABLE IN A GOOD FORENSIC SCIENTIST?
• Detail-oriented & organized
  (it may be that one small detail that leads to the accused being found either innocent or guilty)

• Patient & thorough
  (must perform variety of time-consuming / comprehensive tests on evidence)

• Proficient in science & math
  (these concepts are the backbone of forensic science)
• Skilled at research & writing
  (need to prepare reports based on findings)

• Excellent communicator
  (explain & are cross-examined about findings)

• Curious and creative-minded
  (looking at situation in different ways is necessary for solving crimes)
The inspector’s partner wants you to know some of the job advantages of forensic scientists.
• You have a high level of responsibility
• Every case is unique
• You get to implement & validate new techniques
• You’re not confined to an office space
There are also some disadvantages.
• Some cases are gruesome and distressing
• Number of cases varies, so it's difficult to control work load
• You have to go to court & spend time waiting to testify
• Journalists may call at your home
Course focus is on the collection and analysis of crime scene evidence (such as serology, toxicology, entomology, odontology and trace evidence), and the exploration of lab analysis techniques, (such as chromatography, DNA analysis, fingerprinting, and hair and footprint analysis).
PROFESSIONS THAT USE FORENSIC SCIENCE

- Criminalistics
- Medical Science
- Odontology
- Pathology
- Anthropology
- Psychiatry
- Physics
- Engineer

- Computer Science
- Jurisprudence
- Entomologists
- Biologists
- Chemists
- Toxicology
- Botanists
- Forgery/ Documents

Video links click on each title
Forensic scientists are also required to testify in court about their analysis of evidence.

To make a convincing case, you need to be able to clearly and concisely explain your results and their significance in lab reports.

Finally, mock crime scenes will be investigated and real case studies analyzed.
Forensics is a diverse field, and rarely are forensic scientists “generalists” – people who specialize in all aspects of forensic science. Forget what you see on CSI.

Forensic scientists:

- Don’t wear pumps to a crime scene,
- rarely interview suspects or make arrests,
- are not experts in all areas of forensic investigations.

Rather, forensic experts usually specialize in one or two branches of forensic investigation.
A botanist may be an expert in forensic botany.

An entomologist may be an expert in forensic entomology.

Chemists may specialize in forensic toxicology or arson and bomb analysis.

People with expertise in physics may focus on firearms and ballistics or blood spatter analysis.
A group of professional investigators, each trained in a variety of special disciplines

Team members:
- First police officer on the scene
- Medics (if necessary)
- Investigators
- Medical examiner or representative (if necessary)
- Photographer and/or field evidence technician

Lab experts:
- Pathologist
- Toxicologist
- Forensic odontologist
- Forensic psychologist
- Firearm examiner
- Document & handwriting experts
- DNA expert
- Fingerprint expert
- Forensic anthropologist
- Forensic entomologist
- Bomb and arson experts
- Serologist
MAJOR FEDERAL CRIME LABS

• The Federal Bureau of Investigations (FBI) (Department of Justice)
  • Used to be called Bureau of Investigations
  • maintains the largest crime laboratory in the world.
• The Drug Enforcement Administration (DEA) Laboratories (Department of Justice) are responsible for the analysis of drugs seized in violation of federal laws regulating the production, sale, and transportation of drugs.
• The laboratories of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) (Department of Justice) have responsibility for analyzing alcoholic beverages and documents relating to tax law enforcement and for examining weapons, explosive devices.

• The U.S. Postal Inspection Service maintains laboratories concerned with criminal investigations relating to the postal service.
What are some of the forensic science specialties?
SERVICES OF THE CRIME LABORATORY

Firearms Unit – Examines firearms, discharged bullets, cartridge cases, shotgun shells, and ammunition.
Document Examination Unit – handwriting and typewriting on documents is analyzed
SERVICES OF THE CRIME LABORATORY

Photography Unit – digital imaging, infrared, ultraviolet, and X-ray photography are used.

- Two pinholes X 100
- Left pinhole X 400
- Right pinhole X 400
OTHER UNITS OF A CRIME LAB

Latent Fingerprint Unit – Processing and examining evidence for latent fingerprints.
OTHER UNITS OF A CRIME LAB

Polygraph Unit – Lie detector
Voiceprint Analysis Unit
– Involved in telephoned threats or tape-recorded messages.
Forensic Engineering – Concerned with failure analysis, accident reconstruction, and causes and origins of fires or explosions.
Evidence-Collection Unit

CSIs trained to collect evidence at the crime scene
Biology Unit – Analyzes DNA, blood, body fluids, hair, fibers, wood, and plants.
Physical Science Unit – Analyzes drugs, glass, paint, explosives, and soil.
A medical doctor who performs autopsies to determine cause of death.

Autopsies are performed during the investigation of sudden, unnatural, unexplained, or violent deaths. Also called Medical Examiners.
• **Forensic Psychiatry** – involves the assessment and treatment of mentally abnormal offenders. It includes knowledge of the law relating to ordinary psychiatric practice, civil law and issues of criminal responsibility.

• **Forensic Psychology** - involves the application of psychological knowledge, theory and skills to the understanding and functioning of the legal and criminal justice system.
  • psychology of police and policing,
  • corrections, parole,
  • victim services,
  • addiction services and family services
  • assessment and treatment of juvenile and adult offenders.
FORENSIC ANTHROPOLOGIST

Identifies, examines and reconstructs human bones; determines gender, age, & cause of death.
FORENSIC ODONTOLOGIST (DENTIST)

Helps identify bodies by looking at their teeth.

Identification of victims when the body is left in an unrecognizable state by their teeth, the alignment, and overall structure of the mouth.
FORENSIC NURSE

Provides treatment for crime victims. They are especially needed in emergency rooms to gather and package criminal evidence.
Forensic scientists who track down criminals who harm wild animals.
Study of insects and their relation to a criminal investigation. Uses insects that inhabit decomposing bodies to determine time of death.
Analyses alcohol, drugs, & poisons in body fluids for the benefit of the courts.
DIGITAL IMAGERY RECONSTRUCTION:
USE OF COMPUTER SUPERIMPOSES PHOTO OF SKULL WITH OUTER SKIN.
FACIAL RECONSTRUCTION TECHNIQUE USED BY FORENSIC ARTISTS.
SOME FORENSIC SCIENTISTS PARTICIPATE IN HIGH PROFILE CASES AND BECOME FAMOUS.
Known for finding the tiniest clues

- Once solved a murder without a body
- Worked on cases like: O.J. Simpson, JonBenet Ramsey,
- Lee began his career in Taiwan as a police officer.

- His first homicide case was a dismembering case. He recalls, “For a month, I didn’t want to eat meat. I almost became a vegetarian.”

- Lee came to New York in 1965. He remembers that he only had about $50. In his pocket and knew about three words of English. Ten years later, he had a doctorate degree in biochemistry and was running a small forensics department.

- Lee is methodical and patient in his endeavors to solve crimes. One of Lee’s colleagues stated that Lee always insisted on going to the scene of the crime himself.

- His colleague remembers that Lee once asked him to bite his own tissue and then examine the mark to learn about the healing process!
THE INSPECTOR HOPES YOU ENJOYED LEARNING ABOUT THE WORLD OF FORENSIC SCIENCE.