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

—Stephen Wright, comedian
Objectives

You will understand:
How crime labs in the United States are organized and what services they provide.
The growth and development of forensic science through history.
Federal rules of evidence, including the Frye standard and the Daubert ruling.
Basic types of law in the criminal justice system.

You will be able to:
Research the history of forensic science and careers in forensic science.
Apply various techniques and communicate findings used by forensic scientists to real world forensic problems.
Interpret Miranda Rights and the Bill of Rights and apply them to real world and hypothetical situations.
Categorize various types of evidence based on forensic descriptors.
Explain procedures used to work a crime scene.
Forensic Science

The study and application of science to matters of law

Includes the business of providing timely, accurate, and thorough information to all levels of decision makers in our criminal justice system

The word *forensic* is derived from the Latin *forensis* meaning forum, a public place where, in Roman times, senators and others debated, performed, and held judicial proceedings.
Criminalistics or Criminology?

**Criminalistics**
The scientific examination of physical evidence for legal purposes

**Criminology**
Includes the psychological angle: studying the crime scene for motive, traits, and behavior that will help to interpret the evidence
Basic Services Provided by the Crime Lab

Physical science unit
- **Chemistry**
- **Physics**
- **Geology**

Biology unit

Firearms and ballistics unit

Document examination unit

Photography unit

*The most common types of evidence examined are drugs, firearms, and fingerprints.*
Optional Services of a Crime Lab

Crime labs can be government-run at the federal, state, or local level, or they can be private consulting businesses.

- Toxicology unit
- Latent fingerprint unit
- Polygraph unit
- Voiceprint analysis unit
- Evidence collection unit
- Engineering
Forensic pathology: Establish the cause of death/perform autopsies

Forensic anthropology: Study human remains to determine cause of death

Forensic entomology: Study of insects and other arthropods

Forensic psychiatry: Make assessments about the mental health of people and provide a means of treatment

Forensic odontology: Study of dental structures

Forensic engineering: Investigation of materials, products, structures or components that fail or do not operate or function as intended.

Cybertechnology: Protects networks, computers, programs, and data from attack.

Geology: Connects earth science with criminology

Environmental science: Uses a combination of analytical and environmental chemistry to examine evidence.

Palynology: Study of pollen and powdered minerals to determine that a body or object was in a certain place at a certain time.

Polygraphy: Administering the Lie detector test

Voiceprint analysis: Interpretation of listening and visualizing one’s voice
Federal Crime Labs

FBI: Federal Bureau of Investigation

DEA: Drug Enforcement Agency

ATF: Alcohol, Tobacco, and Firearms

USPS: United States Postal Service

U.S. Fish and Wildlife Service

Department of Homeland Security

Department of the Treasury
The Locard Principle

**Edmond Locard** *(1877–1966)*

French professor

Considered the father of criminalistics

Built the world’s first forensic laboratory in France in 1910

Locard Exchange Principle:

*Whenever two objects come into contact with each other, there is always a transfer of material.*
Crime Scene Team

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
DNA expert
forensic odontologist
forensic psychologist
firearm examiner
document and handwriting experts
serologist
toxicologist
forensic anthropologist
forensic entomologist
bomb and arson experts
fingerprint expert
Chapter 1

Introduction to Forensic Science and the Law

FORENSIC SCIENCE

LIFE SCIENCES
Anatomy: Fingerprints, hair, bones, blood, teeth, saliva, semen
Botany: Plant identification
Entomology: Insects
Serology: Blood, DNA
Zoology: Animal hair and blood

MATH
Algebra
Graphing
Measurements
Ratios
Word problems
Statistics
Trigonometry

LANGUAGE ARTS
Biographies
Communication: Oral, written
Fiction and non-fiction
Research skills
Technical reading skills

CHEMISTRY
Density
Fiber analysis
Fire and explosives
Inorganic analysis
Mixtures and separations
Organic analysis
Paints
Toxicology: Drugs and poisons

MISCELLANEOUS
Cosmetics
Forgery
Handwriting
Paper and ink analysis
Typewriting
Tool marks

SOCIAL STUDIES
Careers
Constitutional rights
Criminal justice
Forensic history
Law
Psychology: The criminal mind

PHYSICS
Ballistics
Blood spatters and patterns
Fracture patterns: Bone, glass
Light
Refractive index
Sound: Voice patterns
Trajectories

TECHNOLOGY
Chromatography
Computers
Electrophoresis
Microscopy
Photography
Spectroscopy

EARTH SCIENCES
Casts and molds
Mineralogy
Soil studies
Scientific Method
(as it pertains to criminalistics)

A. Observe a problem or questioned evidence and collect objective data.

B. Consider a hypothesis or possible solution.

C. Examine, test, and then analyze the evidence.

D. Determine the significance of the evidence.

E. Formulate a theory based on evaluation of the significance of the evidence.
Introduction to Forensic Science and the Law

**Types of Law**

- **Constitutional law:** Study, practice, and interpretation and administration of laws set forth by the constitution.

- **Statutory law:** Written law set down by a legislature.

- **Common law or case law:** Made by judges that interprets or refines statutes and constitutions.

- **Civil law:** Law of citizens’ rights.

- **Criminal law:** Branch of the law dealing with crime.

- **Equity law:** Form of resolution in which an aggrieved party is asking his opponent for something other than money (judge-ordered).

- **Administrative law:** Law dealing with the affairs of agencies of the executive branch of a government.
The Bill of Rights
Gives individuals the right:

- To be presumed innocent until proven guilty
- Not to be searched unreasonably
- Not to be arrested without probable cause
- Against unreasonable seizure of personal property
- Against self-incrimination
- To fair questioning by police
- To protection from physical harm throughout the justice process
- To an attorney
- To trial by jury
- To know any charges against oneself

How does it pertain to forensics?
Miranda Rights

The following is a minimal Miranda warning:

You have the right to remain silent. Anything you say can and will be used against you in a court of law. You have the right to speak to an attorney, and to have an attorney present during any questioning. If you cannot afford a lawyer, one will be provided for you at the government’s expense.
Types of Crimes

**Infraction:** minor offense or petty crime; penalty is usually a fine

**Misdemeanor:** minor crime punishable by fine or jail

**Felony:** major crime punishable by fines and/or more than one year in prison
Federal Rules of Evidence

In order for scientific evidence to be admitted in a court of law, it must be:

_Probative_: actually proves something

_Material_: addresses an issue that is relevant to the particular crime
Admissibility of Evidence

**The Frye Standard**

*From the 1923 case Frye v. United States*

Scientific evidence is allowed into the courtroom if it is generally accepted by the relevant scientific community. The *Frye* standard does not offer any guidance on reliability. The evidence is presented in the trial and the *jury* decides if it can be used.
Admissibility of Evidence

The Daubert Ruling
From the 1993 case Daubert v. Dow

The judge decides if the evidence can be entered into the trial.

Admissibility is determined by:

- Whether the theory or technique can be tested
- Whether the science has been offered for peer review
- Whether the rate of error is acceptable
- Whether the method at issue enjoys widespread acceptance
- Whether the theory or technique follows standards
The Expert Witness

The expert witness presents scientific evidence in court. He/She will:

- Establish credibility through credentials, background experience.
- Evaluate evidence.
- Render an opinion about the evidence. The judge may accept or reject the opinion’s significance.
Facets of Guilt

To prove a case, the “MMO” must be established; it must be shown that the suspect had:

**Motive**—person had a reason to do the crime (not necessary to prove in a court of law)

**Means**—person had the ability to do the crime

**Opportunity**—person can be placed at the crime scene