Unit 1: Introduction to Forensics and Fingerprinting

Content Area: **Science**
Course(s):
Time Period: **MP1**
Length: **18 days**
Status: **Published**

NJSLS - Science

9-12.HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.

Science and Engineering Practices

Constructing Explanations and Designing Solutions Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)

Disciplinary Core Ideas

LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)

Crosscutting Concepts

Structure and Function Invesgang or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and the connections of components to reveal their function and/or solve a problem. (HS-LS1-1)

Rationale and Transfer Goals

Forensic science is the application of science (chemistry, physics, and biology) to criminal and civil laws that are enforced by police agencies in a criminal justice system. It includes the investigation of fingerprinting, fiber analysis, ballistics, arson, trace evidence analysis, poisons, drugs, blood splatters, and blood samples. Students are taught the proper collection, preservation, and laboratory analysis of various samples. Forensic science is the application of scientific methods to solving crimes. The largest area of forensic science is criminalistics, which includes the physical evidence (such as fingerprints) commonly found at crime scenes.

The crime scene contains clues or evidence that help tell the story of the crime. This evidence must be recognized, carefully collected, and preserved. Evidence can be classified in several different ways. All evidence undergoes an identical process whereby its physical and chemical characteristics are discovered and described.

Enduring Understandings

Forensic Scientists use evidence to reconstruct the events of a crime.

Fingerprints are unique to individuals and can be used as evidence in arguing which individuals were present at a crime scene

Essential Questions

How do we catch and convict criminals?

Can fingerprints identify a criminal with absolute certainty?

What should be the standard of proof when finding an individual innocent or guilty?

Content - What will students know?

Testimonial evidence is a witness statement.

Physical evidence is an object or material relevant to the crime that can prove or back up statements involving a crime.

Physical evidence is an object or material relevant to the crime that can link a suspect or identify a person involved in a crime.

Class data can be used to narrow a suspect down to one person out of a large group of people based on known characteristics.

Information at a crime scene must be gathered systematically.

Chemical methods for developing latent prints by reacting with the residue left by the finger create a visible mark.

All fingerprints have three basic patterns: loops, whorls, and arches.

Probability is used to determine the likelihood that a fingerprint belongs to a certain individual by comparing population statistics.

Individual ridge characteristics are compared between evidence and suspect.

Skills - What will students be able to do?

Use an equation to calculate probability

Follow procedures while investigating a crime scene.

Use physical and chemical methods to develop latent fingerprints

Practice safety in the science laboratory

Using a key, identify individual ridge characteristics in an inked print.

Activities - How will we teach the content and skills?

Structure lessons around questions that are authentic, and relate to students' interests, social/family background, and knowledge of their community.

Provide students with multiple choices for how they can represent their understanding.

Provide opportunities for students to connect with people of similar backgrounds.

Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures.

Engage students with a variety of science and engineering practices to provide students with multiple entry points and multiple ways to demonstrate understanding.

Evidence/Assessments - How will we know what students have learned?

Case Study 1.1 Strong Whiskey

Class discussion

Observational Skills activity- The Forensic Teacher

Case Study 2.2 Ronald Coon

Activity 2.1: Probability and Class Evidence

Case Study 3.1 Evaluating a Crime Scene

Forensic Science Careers Presentation

Lab Activity 4.1 Observing and Taking Fingerprints

Lab 4.2 Developing Latent Fingerprints Activity

Back to the crime scene Quiz

Forensics Benchmark # 1

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
Use an equation to calculate the probability Use physical and chemical methods to develop latent fingerprints Practice safety in the science laboratory	Math practices and probability Lab Safety training Physical properties and chemical properties	Lab Activity 4.1 Observing and Taking Fingerprints Lab 4.2 Developing Latent Fingerprints Acvtiity 2.1: Probability and Class Evidence

Key Resources

Discovery Streaming: Forensic Evidence

Video: Nat Geo Crime Scene Evidence- Ronald Cotton

Anthropometry- Measurable you!

Video: Real CSI Latent Prints Interactive Fingerprint Analysis

Fingerprint type slides

Career Readiness, Life Literacies, & Key Skills

TECH.9.4.12.CT.3	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
TECH.9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
TECH.9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
TECH.9.4.12.IML.2	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
TECH.9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
TECH.9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).
TECH.9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).

Interdisciplinary Connections/Companion Standards

LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.