Lindenwold Public Schools

Unit 1: Introduction to Forensics and Fingerprinting
18 instructional days

Targeted Standards

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. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]

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' own investigations, models, theories, simulations, 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

Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its 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 the 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.

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This evidence must be recognized, carefully collected and preserved. Evidence can be classified in a number of different ways. All evidence undergoes an identification 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/Objectives		Instructional Actions	
Content ***What students will know***	**Skills** ***What students will be able to do***	**Activities/Strategies** ***How we teach content and skills***	**Evidence (Assessments)** ***How we know students have learned***
• Testimonial evidence is a witness statement. • Physical evidence is an object or material relevant to the crime which can prove or back up statements involving a crime. • Physical evidence is an object or material relevant to the crime which 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	• 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.	• Structure lessons around questions that are authentic, 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.	• Case Study 1.1 Strong Whiskey • Class discussion • Observational Skills activity- The Forensic Teacher • Case Study 2.2 Ronald Cotton • 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

group of people based on known characteristics. ● Information at a crime scene must be gathered in a systematic way. ● 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.		● 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 their understanding. ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around exploring or solving a social or community-based issue. ● Provide ELL students with multiple literacy strategies. ● Collaborate with after-school programs or clubs to extend learning opportunities.	● Activity- Back to the crime science ● Quiz ● Forensics Benchmark #1

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Spiraling for Mastery
Where does this unit spiral back to other units from this or previous years in order to ensure that students retain mastery of what they've learned?

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• Use an equation to calculate 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 • Activity 2.1: Probability and Class Evidence

Key resources:

DiscoveryStreaming: Forensic Evidence

Video: Nat Geo Crime Scene Evidence- Ronald Cotton

Anthropometry- Measureable you!

Video: Real CSI Latent Prints

Interactive Fingerprint Analysis

Fingerprint type slides

21st Century Life & Careers:

9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.

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Career Readiness, Life Literacies, & Key Skills:

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).

9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.

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.

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.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.

9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.

9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately.

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.

Interdisciplinary Connections/Companion Standards:

NJSLS ELA

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. (HS-LS1-1)

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1)

Companion Standards for ELA in Science and Technical Subjects: Reading

Key Ideas and Details

RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-LS1-1)

Companion Standards for ELA in Science and Technical Subjects: Writing

Text Types and Purposes

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-LS1-1)

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research. (HS-LS1-1)