DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Forensic Science B
_____

Grade Level: 10, 11, 12

Date of Board Approval: _____2018_____

NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Planned Instruction

Title of Planned Instruction: Forensic Science B

Subject Area: Science   **Grade(s): 10, 11, 12**

Course Description:

This advanced science course will provide academic theories and extensive lab experiences about the application of science to criminal investigation and the role of science in the criminal justice system. Semester topics include but are not limited to Crime Scene Analysis and Reconstruction Overview, Criminal Psychology and Profiling, Serology and DNA analysis, Fingerprints and Other Personal Identification Patterns, Cyber Crimes, and final Crime Scene Processing and Analysis capstone project. Students with diverse learning styles will have the opportunity to use a variety of learning methods to attain mastery of the skills and concepts necessary for success. These methodologies include direct instruction, laboratory activities and/or demonstrations, hands-on creative projects, interaction with various text and media, collaboration with peers, guided inquiry, and written assignments. This course is designed to build upon students' prior knowledge. Forensic Science A is not a pre-requisite for this course; however, it is highly encouraged in that it allows the student a good framework of prior knowledge and skills to build upon in order to get the most out of this this course.

Time/Credit for the Course: Half Year Course, meeting daily for 46 minutes / 0.5 Credits

Curriculum Writing Committee: Lindsay Baker and Chelsea Ryder

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Map

1. **Marking Period One -Overview with time range in days: 45 Days**

   UNIT 1: Review of Crime Scene Analysis and Reconstruction
   UNIT 2: Criminal Psychology and Profiling
   UNIT 3: Serology and DNA Analysis

   Marking Period One
   Goals and Understanding of:
   - Key Concepts of Forensic Science
   - Crime Scene Processing
   - Evidence Collection and Protocol
   - Crime Scene Analysis and Reconstruction
   - Medical Examiners Report on Death Cases
   - Reconstruction vs. Reenactment
   - Examination and Interpretation of Patterns for Reconstruction
   - Reconstruction vs. Individualization Patterns
   - Experimentally Produced Patterns for Interpretation
   - Documentation of Reconstruction Patterns
   - Historical Development of Criminal Psychology
   - Criminal Profiling process
   - Role of Profiler in Criminal Investigation
   - Stages of the Profiling Process
   - Organized vs Disorganized Killers
   - Sociopaths vs Psychopathy
   - MO vs. Signature
   - Victimology
   - Serial Killers vs Spree Killers
   - Role of Blood in the Body
   - Antibodies vs Antigens
   - Blood characteristics
   - Blood typing
   - Blood stain examination
   - Angle of Impact
   - Area of Intersection
   - DNA profile
   - Collection of Biological evidence
   - Presumptive Blood Tests: Kastle Meyer & Luminol Tests
   - Precipitin Test
   - ABO Blood Typing system
   - Platelets, RBCs, WBCs, Plasma

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

- Rh Factor
- Cast off, Back spatter, Parent drop, tail, satellite spatter, spines,
- Passive, Projected, Transfer, Artifactual Blood Stains
- High, Medium, Low Velocity Stains

2. **Marking Period Two -Overview with time range in days: 45 days**

   UNIT 4: Fingerprints and Other Patterns of Identification
   UNIT 5: Questioned Documents
   UNIT 6: Cyber Crimes and Crime Scene Processing and Analysis

   Marking Period Two
   Goals and Understanding of:

- History and Development of Fingerprint use
- Development and Nature of Fingerprints
- Bertillion Measurement System
- Anatomy of Fingerprints
- Sebaceaous Glands
- Eccrine Gland and Appocrine Gland
- Embryonic development
- Classification of Prints
- Loops, Whorls, Arches
- Double Loop, Accidental
- Ridge Patterns (Bridge, delta, fork, ridge ending)
- AFIS
- Collection and Preservation Fingerprints
- Fingerprint Comparison and Identification
- Other types of Prints (palm, sole, voice, lip,)
- Inking Fingerprints
- Latent prints, plastic prints
- Dusting for Latent prints
- Lifting latent prints
- Primary Classification of Fingerprints
- Calculation of Primary Classification number
- Questioned documents
- Review of individual and class characteristics of evidence
- Questioned documents
- Graphology
- Handwriting Analysis
- Handwriting characteristics

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

- Forged checks, insurance documents, wills, credit cards
- Analysis of printers, ink, paper, instruments
- Chromatography tests on ink, paper, and hardness of lead.
- Counterfeit checks, currency, medicine, cosmetics, clothing
- Security Features on US Currency
- Ransom Notes
- Jon Benet Ramsey Case Analysis
- Types of Cyber Crimes
- Investigating and Prosecuting Cyber Crimes
- Future of Cyber Crime of
- Identity theft
- Dark Web
- Cat phishing
- Digital Forensics
- Social Media
- Digital Footprint
- Review of Crime Scene processing
- Sketching crime scene
- Photographing the crime scene
- Identification, collection, and preservation of evidence
- Collaborative crime scene team

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Plan

<u>**Unit 1:**</u>   **Review of Crime Scene Analysis and Reconstruction**
<u>**Time Range in Days:**</u> 7-15

Standards Addressed:
Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology, and Science as Inquiry

PACS: CC.3.5.11-12.B.; CC.3.5.11-12.E.; CC.3.6.11-12.C.; CC.3.6.11-12.D.; CC.3.6.11-12.E.; CC.3.6.11-12.G.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A5.; 3.1.12.A8.; 3.1.12.A9.; 3.4.12.A2; 3.4.12.A3; 3.4.12.B1

Biology Keystone Anchors:
BIO.A.4.2.1, BIO.A.4.1.1, BIO.A.4.1.2, BIO.A.1.2.2

Anchor(s): S11.A.1; S11.B.1; S11.A.1.2; S11.A.1.3; S11.A.2.1; S11.A.3.1; S11.A.3.2; S11.A.3.3; S11.B.3.2

Big Idea # 1: Asking questions and defining problems is/are essential to developing a scientific habits of mind.

 Essential Questions:
- What kinds of questions do forensic scientists ask?
- How does science impact a criminal or civil investigation?
 Concepts:
- Students will define and understand the role of Forensic Science in legal investigations
- Students will recognize the role of the scientific method in all aspects of Forensic Science
- Students will identify proper protocol in identifying, collecting, and analyzing evidence
- Importance of science in the Justice System and Society
- Summarize the history of Forensic Science
Competencies:
- Collect Evidence and Maintain Chain of Custody
- Investigate a crime scene using proper protocol

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

- Use observational skills to identify important clues/evidence
- Summarize purpose of reconstruction for judicial system
- Describe how different fields are pertinent to the reconstruction process
- Strengthen observation and inquiry skills through laboratory analysis

Big Idea # 2: Scientists construct mental and conceptual models of phenomena to represent ways of knowing that are represented and communicated by words, diagrams, charts, graphs, images, and symbols.

Essential Questions:
- In what ways do scientists communicate their knowledge?

Concepts:
- Students will define and understand the role of various scientific disciplines in legal investigations
- Students will design/plan investigations appropriate for answering scientific questions or testing hypotheses
- Students will use/draw diagrams and/or models to demonstrate understanding of science concepts, structures, relationships, and processes.

Competencies:
- Students will explain how forensic scientists communicate their findings.
- Students will describe how multiple disciplines interact to solve crimes.
- Students will outline the steps of the judicial process from identification of a suspect through the trial.

Big Idea # 3: Observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.

Essential Questions:
- How can patterns be used to associate evidence with a suspect, victim, or scene?

Concepts:
- Students will be able to review the Locard Exchange Postulate
- Students will be able to understand what determines the admissibility of evidence in the courtroom

Competencies:
- Students will be able to differentiate between evidence with class and individual characteristics.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

- Students will be able to evaluate the validity of physical vs. testimonial evidence
- Students will be able to evaluate a crime scene in a logical manner applying the Locard exchange postulate

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. Students will be introduced to the history and value of forensic science to society. In this introductory unit students will be reacquainted with the various scientific disciplines and skill acquired through Forensic Science A. Students of this course will have a brief review of all of the scientific disciplines listed under the wide umbrella of forensic science. Additionally, students will be presented with an introductory mock crime scene scenario to review effective identification, packaging and analysis of evidence as students collaboratively work to successfully reconstruct a crime scene.

Goals:
Students will be able to recall the importance of crime scene processing protocol and the significance of maintaining chain of custody of evidence so it may be deemed admissible in court. Students will continue to use their inductive and reasoning skills in using the scientific method and how it applies to crime investigations.

Objectives:
(Students will be able to)
1. Recognize and define basic definitions and terminology and concepts of forensic science (DOK 1)
2. Recall what disciplines play a pivotal role in forensic investigations (DOK 1)
3. Observe and evaluate scenarios using inductive and deductive reasoning skills (DOK 2)
4. Draw conclusions about the use of forensic science in the judicial system. (DOK 3)
5. Asses the relationship between science and society (DOK 3)
6. Interpret and analyze one or more scientific investigations (DOK 2 and DOK 4)
7. Formulate a hypothesis to determine the events of a crime as well as to locate evidence (cause/effect) (DOK 3)
8. Draw conclusions as to how the evidence was left at the scene and how it may be associated with a suspect, victim, or location. (DOK 3)
9. Apply concepts of basic procedures to a crime scene in order to maintain chain of custody and recording the scene (DOK 4)
10. Apply concepts of previous material presented in Forensic Science A to a crime scene scenario (DOK 4)
11. Create a police report document summarizing the findings of the case (DOK 4)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

Core Activities and Corresponding Instructional Methods:
Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.

1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: "Why does a crime scene investigation rely on science to help lead to conclusions? How can the scientific method be beneficial with respect to an investigation?" or "How does crime scene reconstruction impact forensic investigations?**"**
3. Students will participate in and complete an introductory group logic problem solving activity to promote the development of communication and critical thinking skills needed throughout the course.
4. Students will work at designated lab stations in partners to complete a deductive and inductive reasoning analysis lab to simulate the cooperative learning environment of the different sections of the FBI crime lab. This will also serve as structured practice for students to use observational, communication, and reasoning skills.
5. Students will review the various forensic science disciplines and responsibilities of an investigative team through direct instruction of teacher generated PowerPoint or Smart Notebook software.
6. Students will conduct a collaborative team investigation of a mock crime scene using skills learned during Forensic Science A. This activity continues to serve as structured practice for students to use observational, communication, and reasoning skills.
7. Students will follow proper protocol to document, photograph, sketch, collect evidence and process the crime scene.
8. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.
9. Students will read case studies to answer content questions, write summary paragraphs, or create materials for debate, discussion, or presentation.

Assessments:
    Diagnostic:
- Informal Questioning
- Pre-Assessment Activity
- Teacher Observation
- Class Discussion
- At-the-Bell Questions

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Formative:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions
- Assorted worksheets
- Teacher-generated assignments
- Laboratory Exercises
- Vocabulary practice
- Diagrams if applicable
- Study guides
- Video guides
- Current case logs/journals
- Structured class discussion
- Activities and Review Games

Summative:
- Crime Scene analysis and reconstruction project
- Review of Concepts of forensic science Unit quiz

Extensions:
1. Case Studies chosen by teacher
2. Analysis of flaws of forensic science
3. Additional Observation Activities chosen by teacher
4. Team Collaboration Activity of senses and observation activity.

Correctives:
1. Examples of additional Logic Problems
2. Student generated flashcards
3. Concept Mapping
4. Introduction outline of key terms
5. Teacher generated worksheets/diagrams
6. Review questions at end of corresponding chapter

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Materials and Resources:

Main Text <u>Forensic Science and Criminalistics</u>, Gaensslen, Harris, & Lee, 2008

1. "Murder of Bob Watts" Crime Scene Analysis Project
2. Observation Lab
3. Laptop Computers/ Chrome Books/ IPADS
4. Teacher Generated Worksheets
5. Ted Talks
6. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Plan

<u>**Unit 2 :**</u> **Criminal Psychology and Profiling**   <u>**Time Range in Days:**</u> 7-15

Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology

Standards Addressed:
PACS: CC.3.5.11-12.A.; CC.3.5.11-12.B.; CC.3.5.11-12.C.; CC.3.5.11-12.D.; CC.3.5.11-12.F.; CC.3.5.11-12.H.; CC.3.5.11-12.I.; CC.3.6.11-12.A.; CC.3.6.11-12.C.; CC.3.6.11-12.G.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A1.; 3.1.12.A5.; 3.1.12.A8.; 3.1.12.C2.; 3.4.12.A2.; 3.4.12.B1.; 3.4.12.C3.

Anchor(s): S11.A.1; S11.B.1

Big Idea # 1: Cause and Effect: Casual relationships and their mechanisms can be tested and used to predict and explain events.

    Essential Questions:
- How can a criminal's behavior play a role in an investigation?
- Can investigators pre-determine or predict the behavior of a criminal or suspect?

    Concepts:
- Students will understand the different components that get pulled together to arrive as a criminal profile
- Students will understand the history of how criminal profiling originated
- Students will understand the difference between criminal psychology and criminal profiling

    Competencies
- Students will evaluate a crime scene to deduce a rough description of the type of person who may have committed the crime in that manner
- Students will differentiate between criminal psychology and profiling
- Students will have the skills to infer victimology given a scenario or event
- Students will recall the steps/protocol from criminal profiling

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

Big Idea # 2: Observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.

Essential Questions:
- What can interaction with evidence and the scene reveal about the crime?
- How can patterns be used to associate evidence with a suspect, victim, or scene?
- How can behavioral pattern evidence help reconstruct a crime?

Concepts:
- Students will be able to identify the behavioral patterns of serial offenders
- Students will understand the categories of serial killers
- Students will be able to understand the general principles of the McDonald Triad.

Competencies:
- Students will differentiate between the psychological competencies of offenders.
- Students will evaluate different types of evidence to determine behaviors or selection of victim by the offender.
- Students will evaluate a victim or a crime scene in a to determine a motive or predict behaviors making connections between behavioral evidence and other physical evidence

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. In this unit students will be introduced to the history and development of criminal psychology. Students will connect prior knowledge of protocol of evidence and the legal system to the analysis of characteristics of human behaviors. Students will analyze crime scene scenarios to identify methodology and victimology of criminal offenders. Additionally, students will investigate different categories of serial killers and will highlight infamous killers associated with the identified psychological category.

Goals:
As a result of this unit students will be able to understand how criminal profiling differs from criminal psychology. Students will understand techniques used by criminal profilers in order to derive a profile of a suspect. Students will recognize that victimology is important to a criminal profile as well as understanding the psychological categories of serial killers.

Objectives:
(Students will be able to)
1. Differentiate between criminal psychology and criminal profiling (DOK 3)
2. Identify historical events in criminal psychology (DOK 1)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

3. List key contributors to and their work in the field of criminal profiling (DOK 1)
4. Apply concepts of the stages of the criminal profiling process to a crime scene (DOK 4)
5. Assess the importance of victimology in the criminal profiling process (DOK 3)
6. Differentiate between the roles of the investigator and the profiler (DOK 3)
7. Explain the value of developing a victim's timeline (DOK 2)
8. Compare and contrast psychopathy and sociopaths (DOK 3)
9. Make observations in order to decide on the 'type' of person who may have committed a crime (DOK 2)
10. Analyze and evaluate the types of individuals who may have committed a particular crime in a particular manner (DOK 4)
11. List the key characteristics of the McDonald Triad of Serial Killers (DOK 1)
12. Distinguish between serial killers and spree killers (DOK 1)
13. Assess a crime scene to determine if it is an organized or disorganized offender (DOK 3)
14. State the different characteristics of male and female serial killers (DOK 1)
15. Organize killers into a psychological category based upon their victimology and M.O. (DOK 2)
16. Distinguish between M.O. and Signature of killers (DOK 2)
17. Analyze a crime scene scenario to construct a profile of the offender (DOK 4)

Core Activities and Corresponding Instructional Methods:
Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.
1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: "How can Criminal Profiling lead to an arrest and possible conviction? "How can criminal profiling impact the outcome of an investigation?"
3. Students will participate in and complete an introductory activity investigating the differences between M.O. and signatures while also assessing the risk levels of victims. This activity is used to continue the development of communication and critical thinking skills needed throughout the course.
4. Students will work at designated lab stations in partners to complete a deductive and inductive reasoning analysis lab on profiling the victims using every day object found at the crime scene or victims home. Example activities include: "Another Man's Trash" and "Who live here?" This will serve as structured practice for students to use observational, communication, and reasoning skills.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

5. Students will review the responsibilities of an investigative team and their respective roles during the stages of developing a criminal profile through direct instruction of teacher generated PowerPoint or Smart Notebook software.
6. Students will analyze a mock crime scene or several crime scene scenarios using skills to evaluate the psychological and behavior characteristics of the crime to determine the psychological category of the offender.
7. Students will conduct an independent investigation using computer-based skills on a selected serial killer and will present the information through media, text, or other resources on regarding careers available in that related field and current or previous cases highlighting that specific discipline and prepare a multimedia presentation to share knowledge of discipline studied.
8. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.
9. Students will read case studies to answer content questions, write summary paragraphs, or create materials for debate, discussion, or presentation.

Assessments:
   Diagnostic:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions

   Formative:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions
- Assorted worksheets
- Teacher-generated assignments
- Laboratory Exercises
- Vocabulary practice
- Study guides
- Video guides
- Current case logs/journals
- Structured class discussion
- Activities and Review Games

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Summative:
- Serial Killer Quiz
- Criminal Psychology and Profiling Unit Exam
- Serial Killer Investigation Project

Extensions:
1. Case Studies chosen by teacher
2. Analysis of Famous Crimes to create a profile
3. Victimology project

Correctives:
1. Examples of M.O. and signatures of crimes
2. Student generated flashcards
3. Concept Mapping
4. Vocab Word Spatter activity of key terms
5. Teacher generated worksheets/diagrams
6. Review questions at end of unit

Materials and Resources:
Main Text Forensic Science and Criminalistics, Gaensslen, Harris, & Lee, 2008
1. "Another man's trash" Profiling activity
2. Pictures of crime scene scenarios
3. Laptop Computers/ Chrome Books/ IPADS
4. Teacher Generated Worksheets
5. Ted Talks
6. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Plan

Unit 3: **Serology and DNA Analysis**   **Time Range in Days:** 10-15

Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology, Science as Inquiry

Standards Addressed:
PACS: CC.3.5.11-12.C.; CC.3.5.11-12.D.; CC.3.5.11-12.F.CC.3.5.11-12.G.; CC.3.5.11-12.H.; CC.3.5.11-12.I.; CC.3.6.11-12.A.; CC.3.6.11-12.E.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A1.; 3.1.12.A2.; 3.1.12.A6.; 3.1.12.A8.; 3.1.12.B1.; 3.1.12.B2.; 3.1.12.B3.; 3.1.12.B4.; 3.2.12.A1.; 3.4.12.A3.; 3.4.12.B1.; 3.4.12.C3.
Biology Keystone Anchors:
BIO.A.1.2.2, BIO.B.1.2.1, BIO.B.1.2.2, BIO.B.2.2.1, BIO.B.2.2.2, BIO.A.4.1.3

Anchor(s): S11.A.1; S11.B.1, S11.A.2; S11.A.3; S11.B.1, ; CHEM.A.1;

Big Idea # 1: Hereditary information in genes is inherited and expressed

Essential Questions:
- How is DNA profiling used to identify one individual or family member?

Concepts:
- Students will understand what DNA profiling is and when it is used
- Students will recognize the benefits and limitations of DNA analysis
- Students will evaluate the ethical and moral implications of collecting DNA as evidence
- Students will Understand the inheritance pattern of DNA segments as well as blood type

Competencies:
- Students will be able to explain and summarize the process of DNA profiling
- Students will be able to differentiate between mitochondrial and nuclear DNA analysis
- Analyze and evaluate a simulated Case in which DNA profiling is required

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Big Idea # 2: DNA segments contain information for production of proteins necessary for growth and reproduction of cells

Essential Questions:
- How is blood used to link a victim or suspect to another person or crime scene?

Concepts:
- Students will understand the protocol for analyzing and collecting blood samples
- Students will identify the role of Karl Landsteiner in ABO blood typing system
- Students will understand the different types of presumptive blood tests

Competencies:
- Students will investigate a hypothetical scenario using blood typing to pinpoint a suspect
- Students will be able to complete Punnett squares to show inheritance patterns for blood type
- Students will differentiate between human and animal blood cells

Big Idea # 3: Observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.

Essential Questions:
- How can pattern evidence be directly associated with a suspect, victim, or scene?
- How can blood spatter pattern evidence help reconstruct a crime?

Concepts:
- Students will be able to understand the difference between blood spatter patterns
- Students will understand the three categories of individualization of these patterns
- Students will be able to understand the general principles in blood droplet characteristics

Competencies:
- Students will be able to differentiate between the information that different types of pattern evidence can reveal (i.e. blood spatter vs. glass)
- Students will be able to evaluate different types of evidence to determine direction of travel of an object, suspect and/or victim.
- Students will be able to evaluate a crime scene in a logical manner and determine the difference between blood pattern evidence and other physical evidence to reconstruct a crime.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. In this unit students will be introduced to the history and development of biological pieces of evidence such as blood and DNA. Students will connect prior knowledge of protocol of evidence and the legal system to the analysis of blood stain characteristics, blood typing, & presumptive blood tests as well as the importance of proper DNA collection and analysis.

Goals:

During this unit students will be able to understand how DNA and blood typing are two types of evidence that help to link or exclude suspects and/or victims to a scene or to another individual. Students will understand how DNA profiling is conducted and when DNA samples are obtained. Additionally, students will perform tests to differentiate human blood and animal in the field as well as understand why blood typing is conducted more often than DNA analysis. Students will also perform labs investigating how to use pattern evidence in order to help provide information to an investigation.

Objectives:
(Students will be able to)
1. Identify and explain the composition of blood (DOK 1)
2. Recognize and process blood evidence at a scene (DOK 1)
3. Describe the function of blood cells (DOK 2)
4. Determine the blood type of a blood sample (DOK2)
5. Differentiate between animal and human blood cells through comparison (DOK 3)
6. Predict the blood type of offspring based on inheritance patterns. (DOK 2)
7. Connect blood splatter analysis to positions of victim and offender (DOK 4)
8. Assess blood stain wounds on a victim and describe the nature of the weapon (DOK 3)
9. Differentiate between the various types of DNA analysis (DOK 3)
10. Compare and contrast the methods of extracting DNA (DOK 3)
11. Display the proper methods of collecting DNA evidence at a crime scene (DOK2)
12. Analyze, evaluate and draw conclusions about which suspect is responsible for the 'crime' based on applying the concepts of DNA profiling as well as blood typing (DOK 3 and DOK 4)
13. Connect instruments used at a scene to reconstruction patterns of blood pattern evidence left at the scene (DOK 4)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Core Activities and Corresponding Instructional Methods:
Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.

1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: Why is DNA thought of as an essential and conclusive piece of evidence in many investigations? What type of information can blood evidence provide in an investigation?
3. Students will participate in and complete a blood typing activity lab investigating a homicide case and the suspect's blood is left as the scene. Students will work in partners to complete this lab. This activity is used to continue the development of communication and critical thinking skills needed throughout the course.
4. Students will work different Punnett square problems using blood types to determine paternity.
5. Students will work at designated lab stations in partners to complete a lab analysis on presumptive blood tests using luminol and the Kastle Meyers test. This will serve as structured practice for students to use observational, communication, and reasoning skills.
6. Students will review the responsibilities of an investigative team and their respective roles in the identification and collection of blood and DNA evidence through direct instruction of teacher generated PowerPoint or Smart Notebook software.
7. Students will conduct blood spatter analysis and texture lab using a variety of different textured surfaces. Examples include: hardwood, tile, fabric, and glass.
8. Students will conduct blood spatter analysis and Angle of Impact lab analysis. Students will calculate the angle of impact to determine positioning of victim and offender.
9. Students will conduct a direction of travel and velocity of blood spatter analysis lab. Students will be able to identify blood droplet and stain characteristics associated with different velocities and direction of travel.
10. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.
11. Students will read case studies to answer content questions, write summary paragraphs, or create materials for debate, discussion, or presentation.

Assessments:
    Diagnostic:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Formative:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions
- Assorted worksheets
- Teacher-generated assignments
- Laboratory Exercises
- Vocabulary practice
- Study guides
- Video guides
- Current case logs/journals
- Structured class discussion
- Activities and Review Games

Summative:
- Characteristics of blood quiz
- Forensic Serology/DNA Unit Exam
- Shermari Davis Murder case activity

Extensions:
1. Case Studies chosen by teacher (pages 92, 98, 118, 197, 202)
2. Blood Spatter Video and Worksheet generated by teacher
3. Pattern Evidence Catalogue Investigations
   i. Teacher generated database of known and unknown samples for comparison this can be used for ballistics, tracks, trails, impression evidence, etc…)

Correctives:
1. "Word spatter" – Vocabulary Activity (concept map)
2. Teacher generates worksheets
3. Read and complete review questions at end of corresponding chapter
4. Student generated flashcards

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Materials and Resources:

Main Text <u>Forensic Science and Criminalistics</u>, Gaensslen, Harris, & Lee, 2008

1. Laptop Computers/ Chrome Books/ IPADS
2. Teacher Generated Worksheets
3. Blood Spatter Lab Supplies
4. Blood Typing Lab Supplies
5. Pictures of crime scene scenarios
6. Ted Talks
7. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Plan

<u>**Unit 4:**</u>   **Fingerprints and Pattern Evidence**   <u>**Time Range in Days:**</u> Approximately 7-15

Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology, and Science as Inquiry

Standards Addressed:
PACS: CC.3.5.11-12.B.; CC.3.5.11-12.E.; CC.3.6.11-12.C.; CC.3.6.11-12.D.; CC.3.6.11-12.E.; CC.3.6.11-12.G.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A5.; 3.1.12.A8.; 3.1.12.A9.; 3.4.12.A2; 3.4.12.A3; 3.4.12.B1.

Biology Keystone Anchors: BIO.A.4.2.1, BIO.A.1.2.2

Anchor(s): S11.A.1; S11.B.1; S11.A.1.2; S11.A.1.3; S11.A.2.1; S11.A.3.1; S11.A.3.2; S11.A.3.3; S11.B.3.2

Big Idea # 1: Scientists construct mental and conceptual models of phenomena to represent ways of knowing that are represented and communicated by words, diagrams, charts, graphs, images, and symbols.

> **Essential Questions:**
> ● How did forensic scientists develop the fingerprinting system?
>
> **Concepts:**
> ● Students will understand the history of developing the fingerprinting system
>
> **Competencies:**
> ● Students will summarize the history of fingerprinting
> ● Students will differentiate from the models used in the past to the fingerprinting system currently accepted

Big Idea # 2: Data must be presented in a form that can reveal any patterns and relationships and that allows results to be communicated to others.

> **Essential Questions:**
> ● In what ways are fingerprints analyzed, interrupted, and communicated?

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Concepts:
- Students will define and understand the different types of fingerprint patterns
- Students will identify different types of minutiae details in fingerprints
- Students with identify latent prints and how to collect them at a crime scene

Competencies:
- Students will identify the different fingerprint patterns
- Students will identify and label minutiae details in prints
- Students will illustrate how to correctly dust and lift latent prints

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. Students will be introduced to the history of the fingerprint system. Using this information, students will be able to identify and distinguish between prints, analyze small details within the prints, and collect them correctly.

Goals

For students to better understand how the fingerprinting system was developed and be able to apply concepts to determine different types of prints. Students should differentiate between whorls, loops, and arches and the small minutiae details that make each fingerprint an individual characteristic.   In addition, students should be able to dust for latent prints and use proper protocol to collect the print as evidence.

Objectives:
(Students will be able to)
1. Summarize the history of fingerprinting (DOK 2)
2. Summarize the Bertillon system and identify why it is no longer an accepted system (DOK 1 and DOK 2)
3. Identify the anatomy of a fingerprint and how it is created (DOK 1)
4. State the fundamental principles of fingerprints (DOK 1)
5. Identify the three types of fingerprints, whorls, loops, and arches (DOK 1)
6. Classify print characteristics in diagrams (DOK 2)
7. Predict print characteristics of oneself (DOK 2)
8. Analyze prints in diagrams to determine loops, whorls, and arches (DOK 4)
9. Analyze class prints to determine percentages of whorls, loops, and arches (DOK 4)
10. Compare plain and tented arches (DOK 3)
11. Compare the four whorl patterns (DOK 3)
12. Compare ulnar and radial loops (DOK 3)
13. Summarize how ridgeology makes a fingerprint an individual characteristic (DOK 2)
14. Identify the minutiae details that can be present in a fingerprint (DOK 1)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

15. Label the minutiae details in diagrams and pictures (DOK 1)
16. Calculate primary classification number from a set of prints (DOK 1)
17. State what AFIS is (DOK 1)
18. Identify a latent print (DOK 1)
19. Define how latent prints can be collected (DOK 1)
20. Illustrate how to lift latent prints (DOK 1)
21. Analyze lifted latent prints to identify fingerprint characteristics (DOK 4)
22. Students will be able to analyze, evaluate and draw conclusions about prints they have lifted from a mock scene and determine the source from which they came (DOK 3 and DOK 4)
23. Identify other sources of pattern evidence, examples being shoe prints, toe prints, palms, and lips (DOK 1)

Core Activities and Corresponding Instructional Methods:
Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.

1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: "What are the differences between the three major fingerprints?" "How is a fingerprint created?" "Why are they considered individual evidence?"
3. Students will complete a case study connecting the history of fingerprinting and why the Bertillon system is no longer accepted. "Will and William West"
4. Students will complete a read-aloud, discussion, or jigsaw activity using the readings in in Forensic Science & Criminalistics by Gaensslen, Harris, & Lee: chapter 6 to evaluate the different characteristics of fingerprints and how they are used in a criminal investigation.
5. Students will create a rough draft of their prints, identify their characteristics, and then calculate class percentages of each type.
6. Students will be introduced to historical figures that developed multiple forensic science disciplines through direct instruction of teacher generated PowerPoint or Smart Notebook software.
7. Students will complete teacher generated worksheets classifying and labeling minutiae patterns.
8. Students will complete a ten card of their own prints.
9. Students will calculate primary classification number based on their print characteristics.
10. Students will complete balloon labeling activity. Using ink pads, students will print their own fingerprints on balloon, then blow the balloon up to analyze their prints more carefully.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

11. Students will lift latent prints off glassware and other household items using black powder, tape, and paint brushes.
12. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.
13. Students will read case studies to answer content questions, write summary paragraphs, or create materials for debate, discussion, or presentation.

Assessments:
   Diagnostic:
   - Informal Questioning
   - Teacher Observation
   - Class Discussion
   - At-the-Bell Questions

   Formative:
   - Informal Questioning
   - Teacher Observation
   - Class Discussion
   - At-the-Bell Questions
   - Assorted worksheets
   - Teacher-generated assignments
   - Laboratory Exercises
   - Vocabulary practice
   - Diagrams if applicable
   - Study guides
   - Video guides
   - Current case logs/journals
   - Structured class discussion
   - Activities and Review Games

   Summative:
   - Fingerprint Basics Quiz
   - Common Assessment: Fingerprint and Pattern Evidence Exam

Extensions:
   1. Case Studies chosen by teacher
   2. Toe Print Activity
   3. Lip Print Analysis
   4. Shoe Print Impressions

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Correctives:
1. Student generated flashcards
2. Concept Mapping
3. Introduction outline of key terms
4. Teacher generated worksheets/diagrams
5. Review questions at end of corresponding chapter

Materials and Resources:

Main Text <u>Forensic Science and Criminalistics</u>, Gaensslen, Harris, & Lee, 2008
1. Ten Cards
2. Ink Pads
3. Paint Brushes
4. Balloons
5. Black Powder
6. Glassware/Household Items
7. Laptop Computers/ Chrome Books/ IPADS
8. Teacher Generated Worksheets
9. Ted Talks
10. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files…)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Curriculum Plan

<u>**Unit 5:**</u> **Document Analysis and Counterfeit**   <u>**Time Range in Days:**</u> Approximately 7-15

Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology, and Science as Inquiry

Standards Addressed:

PACS: CC.3.5.11-12.B.; CC.3.5.11-12.E.; CC.3.6.11-12.C.; CC.3.6.11-12.D.; CC.3.6.11-12.E.; CC.3.6.11-12.G.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A5.; 3.1.12.A8.; 3.1.12.A9.; 3.4.12.A2; 3.4.12.A3; 3.4.12.B1.

Anchor(s): S11.A.1; S11.B.1; S11.A.1.2; S11.A.1.3; S11.A.2.1; S11.A.3.1; S11.A.3.2; S11.A.3.3; S11.B.3.2

Big Idea # 1: Patterns: observed patterns of forms and events guide organization and classification and prompt questions about relationships and the factors that influence them.
Essential Questions:
● How are patterns analyzed in handwriting to determine the source?

Concepts:
● Students will understand the difference between graphology, linguistics, and forensic document examination
● Students will identify and describe 10 handwriting characteristics
● Students will understand phases of document analysis (hardware and visual)
● Students will understand protocol that must be followed to attain handwriting samples from suspect

Competencies:
● Students will be able to differentiate between a graphologist, linguistic, and forensic document examiner.
● Students will be able to evaluate handwriting based on the specific characteristics
● Students will be able to analyze a handwriting sample by evaluating characteristics and resources used
● Students will understand how to collect a handwriting sample

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Big Idea # 2: Scientists construct mental and conceptual models of phenomena to represent current understandings, aid in developing questions and experiments, and to communicate ideas to others.

Essential Questions:
- How do forensic scientists use models to determine counterfeit items?

Concepts:
- Students will understand that money of all denominations have specific characteristics that make it real
- Students will understand that counterfeiting happens in many different sources

Competencies:
- Students will analyze counterfeit items

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. Students will be introduced to the characteristics that make handwriting individual. They will analyze various samples of handwriting to identify these characteristics. In addition, students will analyze what characteristics make money and other items real and not counterfeit.

Goals:

Students will be able to identify handwriting characteristics and understand how these can be used to identify and individual. They will understand how to collect a handwriting sample from a suspect and make comparisons. They will also be able to identify counterfeit money based on the characteristics that should be present on each denomination.

Objectives:
(Students will be able to)
1. Identify the difference between a linguist and graphologist (DOK 1)
2. Summarize how handwriting is developed (DOK 2)
3. Identify the 12 different handwriting characteristics (DOK 1)
4. Identify the two aspects of analyzing handwriting (visual and hardware) (DOK 1)
5. Discuss how these handwriting characteristics are individual (DOK 2)
6. Analyze handwriting characteristics in various samples/ransom notes (DOK 4)
7. Differentiate between hardware used in various writing samples (DOK 3)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

8. Make observations of handwriting in various samples/student handwriting (DOK 2)
9. Analyze the Jon Benet Ramsey case ransom note (DOK 4)
10. Classify characteristics that can be found on each domination of money to identify if it is counterfeit (DOK 2)
11. Label the characteristics of money and where they can be found on each bill (DOK 1)
12. Analyze bills of different denominations and determine if they are counterfeit (DOK 4)

Core Activities and Corresponding Instructional Methods:

Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.

1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented. Students establish connections from introductory material to being introduced to new concepts on evidence.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: **"**Why is handwriting an individual characteristic?" "What are some characteristics to determine if money is counterfeit?"
3. Students will use a graphic organizer to outline key concepts of significant court cases from the readings in Forensic Science & Criminalistics by Gaensslen, Harris, & Lee: chapter 7 to evaluate what a questioned document is and how to properly analyze it in a criminal investigation.
4. Students will analyze various handwriting samples to identify handwriting characteristics.
5. Students will work as collaborative pairs to compare handwriting samples with one another. In doing so, they should be able to identify individual characteristics and compare they to one another.
6. Students will analyze the JonBenet Case and the ransom note left at the scene. Analyzing the ransom note, they should be making observations about the handwriting.
7. Students will identify characteristics of different denominations to determine if the bill is counterfeit.
8. Students will complete the "Fourth Amendment" activity. They will write two samples of the fourth amendment, later be given a random sample, and analyze the characteristics to find its matching sample.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

9. Students will read case studies to answer content questions, write summary paragraphs, or create materials for debate, discussion, or presentation. Examples of case studies include: "JonBenet Ramsey," "Skyway Man", and "Lindbergh Kindnapping."
10. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.

Assessments:

Diagnostic:
- Informal Questioning
- Pre-unit questionnaire
- Teacher Observation
- Class Discussion
- At-the-Bell Questions

Formative:
- Informal Questioning
- Teacher Observation
- Class Discussion
- At-the-Bell Questions
- Assorted worksheets
- Teacher-generated assignments
- Laboratory Exercises
- Vocabulary practice
- Diagrams if applicable
- Study guides
- Video guides
- Current case logs/journals
- Structured class discussion
- Activities and Review Games
- Guided Reading Worksheets

Summative:
- JonBenet Ramsey Ransom Note Evaluation
- Handwriting Analysis Evaluation
- Document Analysis and Counterfeit Quiz
- Document Analysis and Counterfeit Unit Common Assessment

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Extensions:
1. Case Studies chosen by teacher
2. JonBenet Ramsey Investigation Video
3. Lindbergh Kidnapping Video
4. Catch Me If You Can

Correctives:
1. Student generated flashcards
2. Concept Mapping
3. Introduction outline of key terms
4. Teacher generated worksheets/diagrams
5. Review questions at end of corresponding chapter

Materials and Resources:

Main Text <u>Forensic Science and Criminalistics</u>, Gaensslen, Harris, & Lee, 2008

1. Laptop Computers/Chrome Books/IPADS
2. Teacher Generated Worksheets
3. Bills of Different Denominations
4. Black Light
5. Ted Talks
6. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

Curriculum Plan

<u>Unit 6:</u>   **Cyber Crimes and Final Reconstruction**   <u>Time Range in Days:</u> 15

Standard(s): PA Academic Standards, PACS Reading and Writing for Science and Technology, and Science as Inquiry

Standards Addressed:
PACS: CC.3.5.11-12.B.; CC.3.5.11-12.E.; CC.3.6.11-12.C.; CC.3.6.11-12.D.; CC.3.6.11-12.E.; CC.3.6.11-12.G.

Science as Inquiry: 3.1.12.A2, 3.1.12.A9, 4.5.12.F, 4.3.12.C, 4.1.12.F

PA Academic Standards: 3.1.12.A5.; 3.1.12.A8.; 3.1.12.A9.; 3.4.12.A2; 3.4.12.A3; 3.4.12.B1.

Anchor(s): S11.A.1; S11.B.1; S11.A.1.2; S11.A.1.3; S11.A.2.1; S11.A.3.1; S11.A.3.2; S11.A.3.3; S11.B.3.2

Big Idea # 1: Systems and system models: Scientists develop and use system models to represent current understandings, aid in developing questions and experiments, and communicate ideas to others.

> **Essential Questions:**
> ● How and why do forensic scientists develop and use models to investigate Cyber Crimes?
>
> **Concepts:**
> ● Students will identify the uses of the internet
> ● Students will understand the different types of cyber crimes
> ● Students will understand how a Cyber Crime is investigated
>
> **Competencies:**
> ● Students will differentiate between the different types of cyber crimes
> ● Students will discuss the importance of evaluating each type of cyber crime
> ● Students will evaluate how each Cyber Crime is investigated

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Big Idea # 2: Scientists construct mental and conceptual models of phenomena to represent current understandings, aid in developing questions and experiments, and to communicate idea to others.

    Essential Questions:
- How do forensic scientists develop and use models to investigate a crime scene correctly?

    Concepts:
- Students will understand the steps involved in preserving, packaging, and processing evidence
- Students will understand protocol is important to the admissibility of evidence
- Students will understand the role of the first officer at the scene
- Students will understand the steps in crime scene processing and analysis
- Students will understand documentation is important in the stages of an investigation

    Competencies:
- Students will analyze written scenarios for proper protocol
- Students will evaluate, collect, and process material from a mock scene using appropriate skills and knowledge of preserving, packaging, and processing
- Students will illustrate various methods of documenting a scene
- Students will exclude or link a suspect through proper comparison of evidence

Big Idea # 3: Data must be presented in a form that can reveal any patterns and relationships and that allows results to be communicated to others.

    Essential Questions:
- In what ways are pieces of evidence analyzed, interpreted, and communicated within a crime scene investigation?

    Concepts:
- Students will understand that evidence must be properly identified, collected, preserved, and analyzed for reconstruction.

    Competencies:
- Students will evaluate evidence presented and analyze correctly to gain information on reconstruction of mock crime scene and suspect.

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

Overview: Forensic science is a multiple disciplinary science course that focuses on the connection and application of science to the criminal justice and legal system. Current events relating to scientific issues and the events that occur within the criminal justice system will be highlighted. Current events/cases/investigations will be incorporated freely throughout each unit. Students will evaluate different Cyber Crimes and how they are investigated. In addition, students will connect prior knowledge of evidence and crime scene protocol to the proper identification, collection, and classification of evidence in a mock crime scene.

Goals:
Students will classify the different types of Cyber Crimes and how they are investigated. In the final crime scene, students will understand and apply proper crime scene protocol to a mock crime scene. Students should illustrate how to properly analyze evidence, collect evidence, sketch a scene, document, take photos, fill in logs, and use these skills to determine the suspect of the crime.

Objectives:
(Students will be able to)
1. Identify typical uses of the internet (DOK 1)
2. Differentiate between the three general categories of Cyber Crimes (DOK 3)
3. Analyze the process of investigating and process various types of computer evidence (DOK 4)
4. Identify various types of evidence that can be collected at a Cyber Crime scene and the forensic value of each (DOK 1)
5. State concerns associated with the future of Cyber Crimes (DOK 1)
6. Recall proper crime scene protocol (DOK 1)
7. Make observations while processing witness statements, evidence, autopsy reports, and crime scene (DOK 2)
8. Compare the roles of the lead investigator, criminal photographer, sketch artist, and evidence technician in a criminal investigation (DOK 2)
9. Classify the three different types of documentation during a crime scene investigation (DOK 2)
10. Identify how to correctly package and preserve evidence (DOK 1)
11. Recognize that if evidence is not properly collected it will be admissible (DOK 1)
12. Recall the four different sketch patterns (DOK 1)
13. List important details that should be included within a sketch (DOK 1)
14. Recall how to correctly take photos (DOK 1)
15. Distinguish between the different crime scene logs and identify which each is used for (DOK 1 and DOK 2)
16. Illustrate how to identify and evaluate evidence (DOK 1)
17. Hypothesize events that occurred in a crime scene investigation (DOK 3)
18. Summarize events that occurred throughout mock crime scene (DOK 2)

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

19. Draw conclusions based on documentation and analysis of evidence (DOK 3 and DOK 4)
20. Apply concepts of crime scene protocol to mock crime scene (DOK 4)

Core Activities and Corresponding Instructional Methods:
Due to ongoing current events, cases, technology, and topics in the course, flexibility is needed by the instructor in the presentation of materials and content of this course.

1. Students will take notes via PowerPoint presentation or Smart Notebook software and use graphic organizers and concept maps to organize major concepts of the content being presented.
2. Students will provide a written response to daily at the bell prompted discussion questions. For example: "Why is proper collection, packaging, and preservation of evidence essential to analysis and evaluation?" or "What are the general types of Cyber Crimes?
3. Students will use a graphic organizer to outline key concepts of significant court cases from the readings in Forensic Science & Criminalistics by Gaensslen, Harris, & Lee: chapters 3 to evaluate the importance of processing a crime scene, packaging, and preserving evidence correctly.
4. Students will complete teacher generated activities to evaluate Cyber Crimes. Examples include Activity 14-1 Password Protected and Activity 14-2 Hidden Secrets.
5. Students will read articles on cyber bullying (example, Rebecca Sedwick) and generate class discussions about the long terms effects of the popularity of social media and bullying.
6. In groups, students will become a crime scene investigative team. Each student will have a role/job they are responsible for. Students will evaluate a mock crime scene using proper crime scene protocol to determine the events leading up to the crime and finding the suspect.
7. Students will complete note sheets, worksheets, vocabulary evaluations, and content evaluations to demonstrate understanding of the concepts within the unit.

Assessments:
    Diagnostic:
- Informal Questioning
- Pre-unit questionnaire
- Teacher Observation
- Class Discussion
- At-the-Bell Questions

    Formative:
- Informal Questioning
- Teacher Observation
- Class Discussion

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

- At-the-Bell Questions
- Assorted worksheets
- Teacher-generated assignments
- Laboratory Exercises
- Vocabulary practice
- Diagrams if applicable
- Study guides
- Video guides
- Current case logs/journals
- Structured class discussion
- Activities and Review Games
- Guided Reading Worksheets
- Mock Crime Scene Scenarios (generated by teacher)

Summative:
- Cyber Crime Quiz
- Final Mock Crime Scene

Extensions:
1. Case Studies (phishing, hacking, bullying) chosen/generated by teacher
2. Phishing Ted Talk Video

Correctives:
1. Student generated flashcards
2. Concept Mapping
3. Outline of key terms
4. Teacher generated worksheets/diagrams
5. Review questions at end of corresponding chapter

Materials and Resources:
Main Text Forensic Science and Criminalistics, Gaensslen, Harris, & Lee, 2008
1. Laptop Computers/Chrome Books/IPADS
2. Teacher Generated Worksheets
3. FACES Software
4. Mock Crime Scene supplies
5. Ted Talks
6. Assorted Forensics Videos (FBI Files, Cold Case, Investigation Discovery, Forensic Files

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: Introduction to Forensic Science & Criminalistics

Textbook ISBN #: 9780072988482

Textbook Publisher &Year of Publication: McGraw-Hill 2007

Curriculum Textbook is utilized in (title of course): Forensic Science B

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

Checklist to Complete and Submit with Curriculum:

_____   A hard copy of the curriculum using The template entitled "Planned Instruction," available on the district website

_____   Hard copies of all supplemental resources not available electronically

_____   The primary textbook form(s)

_____   The appropriate payment form, in compliance with the maximum curriculum writing hours noted on the first page of this document

_____   A USB/Flash Drive containing a single file that will print the curriculum in its intended sequence from beginning to end and all supplemental resources that are available in electronic format.

Each principal and/or department chair has a schedule of First and Second Readers/Reviewers. Each Reader/Reviewer must sign & date below.

First Reader/Reviewer Printed Name_____

First Reader/Reviewer Signature_____ Date_____

Second Reader/Reviewer Printed Name_____

Second Reader/Reviewer Signature _____ Date_____

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."

DELAWARE VALLEY SCHOOL DISTRICT

*NOTE: Example laboratory demonstrations/experiments and/or activities that have been highlighted in the core activities or assessments can be found in public file "BakerL" in a file titled "Resources – Forensic Science Curricula."