

Forensics

**Prepared by:
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Superintendent of Schools:
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Approved by the Midland Park Board of Education on
June 21, 2022

Born on **Date June 20, 2022**

Forensics (Semester Course)

Course Description:

Forensics is designed to investigate, collect data, and solve crimes. Forensic scientists use chemistry, physics, biology, mathematics engineering and psychology to help solve crimes. Forensic science incorporates both science and the law. Forensic scientist document evidence from a crime scene, study the physical evidence, research and present evidence to detectives, police officers, lawyers, and the court of law to help solve crimes. Students will learn the history of forensics, forensic methodologies and techniques, physical evidence detection and collection, forensic tools and analyzing data to link evidence to the criminal.

A guided inquiry program, problem-based learning experience and engineering projects will give students the opportunity to explore topics and concepts through investigations. Participating in this hands-on program helps students:

- 1. To be prepared for college/career**
- 2. Career by emphasizing key skills and practices (NGSS, CCS, STEM).**
- 3. Become lifelong learners and engaged citizens.**

Suggested Course Sequence:

- Unit 1 Forensics and the Law**
- Unit 2 Evidence & the Crime Scene**
- Unit 3 Fingerprints and Impressions**
- Unit 4 The Criminal Mind**
- Unit 5 Hair & Fiber evidence**
- Unit 6 Handwriting Analysis**
- Unit 7 Human Remains**
- Unit 8 Blood & Blood Spatter**
- Unit 9 Fire Investigation & Ballistics**

**The number of instructional days is an estimate based on the information available at this time. 1 day equals approximately 48 minutes of seat time.*

Unit #1 Introduction to Forensics Science

Content Area: Science

Unit Title: Introduction to Forensic Science and the Law

Grade Level: 11th/12th

Core Ideas: Introduce students to Forensic Science, branches of forensics, lab skills, laws that govern court evidence and ethical issues.

Unit #1- Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSLS)

HS-PS2-2

Use mathematical representation of phenomena to describe explanations.

HS-PS1-1

Use a model to predict relationships between systems or between components of systems.

Career Readiness, Life Literacies, and Key Skills

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.

9.4.12.CT.2

Explain the potential benefits of collaborating to enhance critical thinking and problem solving

9.4.12.IML.7

Develop an argument to support a claim regarding a current workplace or societal/ethical issue

Computer Science and Design Thinking

8.2.12.C.4

Explain and identify interdependent systems and their functions.

8.1.12.E.1

Produce a position statement about a real-world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

Intercultural Statements (Amistad, Holocaust, LGBT, etc...)

Study diverse Scientist contributions to forensics

Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)

Understand others' perspectives to effectively interpret their arguments. (Social awareness) (CASEL)

Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
ELD-LA.9-12 Inform Interpretive	Analyzing descriptions and inferences in textual evidence for key attributes, qualities, characteristics, activities, and conceptual relationships
ELD-LA.9-12 Inform Expressive	Add precision, details, and clarity about complex attributes, qualities, characteristics, activities, and conceptual relationships
ELD-SS.9-12. Explain. Expressive	Develop sound reasoning, sequences with linear and nonlinear relationships, evidence, and details with significant and pertinent information, acknowledging strengths and weaknesses.
WLD-SC.9-12 Explain. Interpretive	Evaluating the extent to which reasoning, theory and/or models link evidence to claims and support conclusions.

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Interdisciplinary Connection	
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
WHST.11-12.1	Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

<p>Unit Essential Question(s): What is forensic science? What are the different careers in forensic science? How does Federal Law relate to evidence in crimes? How does diversity play a part in the history of Science?</p>	<p>Unit Enduring Understandings: -Careers in Forensic Science -How forensic science determines what evidence to submit to court. -How the scientific method is utilized in solving crimes. -Diversity in the history of forensic science</p>
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Evidence of Learning

Formative Assessments: Lab Report, Quiz, Case Studies, Q&A
Summative/Benchmark Assessment(s): Test
Alternative Assessments: Video Worksheets

<p>Resources/Materials: Forensic Science by Richard Silverstein Text – Forensic Science and Forensics for Dummies</p>	<p>Key Vocabulary: Forensics, Evidence, Criminal Law, Forensic Careers</p>
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Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Forensic Science	What is Forensic Science?	Forensic Power Point	1 day
History of Forensics and famous scientist	Summarize the History of Forensics	History of Forensics and diversity in the field	1 day
Methodology	Analyze Science and Methodology	Methods used in forensics labs	1 day
Forensics & the Law	Explore Criminal Justice and the Law-Rules of Evidence	What is admissible in court as evidence?	2 days
Forensic careers	Examine Forensic Science Careers and Specialties	Explore careers in Forensic Science	2 days

Teacher Notes: Use Top 10 Forensic Scientist

Additional Resources: Video 88 minutes

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Hands-on activities -Assess comprehension through demonstration -Give instructions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with guidance counselors, other teachers -Consult with I&RS	-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions

Unit 2 – Evidence & the Crime Scene

Content Area: Forensic Science

Unit Title: Types of Evidence and the Crime Scene

Grade Level: 11th/12th

Core Ideas: Evidence that can be gathered at a crime scene to be used in court. Discuss how to collect and preserve evidence. A forensic scientist's main goal is to find a unique source for evidence that can be presented in court. Processing a crime scene.

Unit #2- Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSLS)

HS-PS1-1

Use a model to predict relationships between systems or between components of systems.

HS-PS2-2	Use mathematical representation of phenomena to describe explanations.
Career Readiness, Life Literacies, and Key Skills	
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.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving
9.4.12.IML.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue
Computer Science and Design Thinking	

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8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.1.12.E.1	Produce a position statement about a real-world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
Develop, implement and model effective problem solving and critical thinking skills (CASEL)	
Study diverse Scientist contributions to forensics	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of Science
ELD-LA.9-12 Inform. Interpretive	Analyzing descriptions and inferences in textual evidence for key attributes, qualities, characteristics, activities, and conceptual relationships
ELD-LA.9-12 Inform. Expressive	Introduce and define topic and/or entity for audience
ELS-SS.9-12. Explain Interpretive	Determining multiple types of sources, points of view in sources, and potential uses of sources for answering compelling and supporting questions about phenomena or events
ELD-SS.9-12. Explain.	Develop sound reasoning, sequences with linear and nonlinear relationships, evidence, and details with significant and pertinent information, acknowledging strengths and weaknesses.

Expressive	
ELD-SC.9-12.Argue Interpretive	Identifying appropriate and sufficient evidence from data, models, and/or information from investigations of a phenomenon or design solutions
ELF-SC.9-12. Argue Expressive	Signal logical relationships among reasoning, evidence, data, and/or models when making and defending a claim, counterclaim, and/or rebuttal
Interdisciplinary Connection	
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.
WHST.11-12.1	Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
Unit Essential Question(s): <ul style="list-style-type: none"> • What types of evidence is used in forensics? • How is evidence collected? • What processes occur at a crime scene? 	Unit Enduring Understandings <ul style="list-style-type: none"> • Different Types of Evidence • Evidence Collection • Searching and securing a crime scene

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• What is the Locard Principle	• Locard as a diverse scientist
Evidence of Learning	

Formative Assessments:

- Lab Reports
- Quizzes
- Test
- Forensic Files Video
- Evaluating a crime scene

Summative/Benchmark Assessment(s): Test**Alternative Assessments:**

- Sketching a crime scene
- Case studies
- Video Worksheet Lovely Bones

Resources/Materials:

Forensic Science by Richard Silverstein
Forensics – Teachers A-Z Resource Guide
 Discovery School Science Collections *Forensic Science* Text - *Forensic Science and Forensics for Dummies*

Key Vocabulary: Evidence, testimony, crime scene, deductive reasoning, Locard Principle

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Evidence	Explain the difference between indirect and direct evidence. Evaluate Testimonial & Physical Evidence	Types of evidence	2 days
Retaining Evidence	Compare class evidence vs. individual evidence Locate, evaluate, and package evidence Define Chain of custody	Type of evidence that stands up in court Collecting and processing evidence	2 days
Crime Scene Evidence	At the Crime Scene Evaluating the Crime Scene Processing a Crime Scene	Evaluate crime scenes for evidence	2 days
Deductive Reasoning	Deductive Reasoning Create a sketch of a crime scene	Deductive Reasoning Lab Sketching a crime scene	5 days

Teacher Notes:**Additional Resources:**

<http://www.crime-scene-investigator.net/>
<http://www.feinc.net/sketch.htm>
<http://www.fbi.gov/about-us/lab/forensic-science-communications/fsc/july2000/deedric4.htm>
<http://www.pathguy.com/autopsy.htm>

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
Hands on activity -Cooperative Learning	-Hands-on activities	-Provide extension activities per student interest	-Hands on Activity -Cooperative Learning	-Hands on Activity -Cooperative Learning

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-Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word	-Build on students' intrinsic motivation	-Reteach in various methods -Consult with guidance counselors, other teachers -Consult with I&RS	-Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions
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Unit #3 – Fingerprints

Content Area: Science

Unit Title: Fingerprint Analysis

Grade Level: 11th/12th

Core Ideas: Differentiate the different types of fingerprints. Learn how to read a fingerprint and process a print.

Unit # 3- Standards

Standards (Content and Technology):	
CPI#:	Statement:
Performance Expectations (NJSLS)	
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
Career Readiness, Life Literacies, and Key Skills	
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.7	Develop an argument to support a claim regarding a current workplace or societal/ethical issue
Computer Science and Design Thinking	
8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
Develop, implement, and model effective problem solving and critical thinking skills (CASEL)	

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Study diverse Scientist contributions to forensics	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Think metacognitively and organize their own thoughts with given information. (CASEL)	
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
ELD-SC.9-12.Argue. Expressive	Introduce and contextualize topic/phenomenon in current scientific or historical episodes in science.
ELD-SC.9-12.Argue. Interpretive	Identifying appropriate and sufficient evidence from data, models, and/or information from investigations of a phenomenon or design solutions

ELD-SI.4-12.Narrate	Identify and raise questions about what might be unexplained, missing, or left unsaid		
ELD-SI.4-12 Inform	Sort, clarify, and summarize relationships Report on explicit and inferred characteristics, patterns, or behavior		
Interdisciplinary Connection			
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.		
Math	Summarize numerical data sets about a ratio relationship between genetic variations in a population and the probability of some individuals in the population surviving and reproducing.		
Math	Reason abstractly and quantitatively while collecting and analyzing numerical and symbolic data as part of an investigation that has been planned individually and collaboratively.		
HSN.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.		
WHST.11-12.9	Draw evidence from informational tests to support analysis, reflection, and research.		
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.		
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Unit Essential Question(s):</p> <ul style="list-style-type: none"> • How do forensic scientists utilize fingerprints? • How are shoe and tire prints characterized? • What types of impressions are utilized in forensics? • Scientist famous for history of fingerprinting </td> <td style="width: 50%; vertical-align: top;"> <p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • Impression evidence • Unique Fingerprints • Computers Personal Identification </td> </tr> </table>		<p>Unit Essential Question(s):</p> <ul style="list-style-type: none"> • How do forensic scientists utilize fingerprints? • How are shoe and tire prints characterized? • What types of impressions are utilized in forensics? • Scientist famous for history of fingerprinting 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • Impression evidence • Unique Fingerprints • Computers Personal Identification
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Evidence of Learning			
<p>Formative Assessments:</p> <ul style="list-style-type: none"> • Lab Reports • Quizzes • Projects <p>Summative/Benchmark Assessment(s): Test</p> <p>Alternative Assessments:</p> <p>Fingerprints on Balloon</p>			
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Discovery Channel School Science Collections <i>Forensic Science</i> Text - <i>Forensic Science and Forensics for Dummies</i> <i>Forensic Science for High School by Deslich & Funkhouser</i>				
Suggested Pacing Guide				
Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete	
History of fingerprinting	Explore the History of Fingerprinting	Fingerprinting history	1 day	
Compare & Contrast Fingerprints	Compare & Contrast types of fingerprints Lab “Constructing Self Fingerprints”	Classification of fingerprints Construct set of self-prints Galton scientific contribution Henry’s Law utilizing classification	3 days	
Identify fingerprints	Identifying fingerprints at the crime scene Examine physical and chemical methods of lifting fingerprints	Lifting fingerprints	2 days	
Examine Fingerprints	Critique types of fingerprints Identify Fingerprints		1 day	
Teacher Notes:				
Additional Resources: http://www.fbi.gov/news/stories/2010/july/fingerprints/fingerprint-systems/ http://www.fbi.gov/news/stories/2010/march/biometrics_031110/delivering-the-future-the-biometric-center-of-excellence				
Differentiation/Modification Strategies				
Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students

Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with guidance counselors, other teachers -Consult with I&RS	-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions
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Unit # 4- The Criminal Mind

Content Area: Science

Unit Title: The Criminal Mind

Grade Level: 11th/12th

Core Ideas: To peer into the criminal mind. Dealing with deception, sanity, profiling, and MO of suspects. Tracking and defining serial offenders. Linking criminals and crime scenes.

Unit # 4- Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSLs)

HS-PS2-2

Use mathematical representation of phenomena to describe explanations

HS-LS3-3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

HS-PS1-1	Use a model to predict relationships between systems or between components of systems.
Career Readiness, Life Literacies, and Key Skills	
9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
9.4.12.IML.8	Evaluate media sources for point of view, bias, and motivations.
9.4.12.DC.7	Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society.
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
Computer Science and Design Thinking	
8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.B.4	Investigate a technology used in a given period of history and identify their impact and how they may have changed to meet human needs and wants.
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
Develop, implement, and model effective problem solving and critical thinking skills (CASEL)	
Study diverse criminal activity in forensics from different parts of the world.	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Think metacognitively and organize their own thoughts with given information. (CASEL)	
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of Science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain. Expressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-SI.4-12. Inform	Report on explicit and inferred characteristics, patterns, or behavior

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ELD-SI.4-	Identify and raise questions about what might be unexplained, missing or left unsaid
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12 Narrate			
Interdisciplinary Connection			
SL.9-10.4:	“Present information, findings, and supporting evidence clearly, concisely, and logically...”		
SL.11-12.1:	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task		
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.		
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.		
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.		
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.		
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.		
RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.		
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Evidence of Learning			
Formative Assessments: Test Summative/Benchmark Assessment(s): <ul style="list-style-type: none"> • Lab Reports • Quiz Alternative Assessments: Power point project			
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Suggested Pacing Guide			

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Diverse Case Studies	Explore the role of the Forensic Psychiatric Professional Analyzing the psyche	Psychiatric Test The forensic Psychiatrist Case Studies of Forensic Criminals	4 days
Questioning Techniques	Examine questioning techniques, Deception, & sanity	Techniques to analyze questioning	2 days

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Profiling offenders	Examine how to track offenders Analyze Profiling the Perpetrator Discuss Motive Operandi	Tracking or profiling offenders	4 days
Crime Scenes	Link Criminals and Crime Scenes Analyzing background of Serial Offenders	How crime scenes and criminals are linked Project on Serial Offenders	6 days

Teacher Notes:

Additional Resources:

<https://www.youtube.com/watch?v=iT6ac-LFkIA> Forensics Files John List
 Episode https://www.youtube.com/watch?v=zOwRDO_R0Sc John List
 Documentary
<https://www.youtube.com/watch?v=Fduv5obY0UI> John List Crimes Video
<https://www.youtube.com/watch?v=HP-I07o-Va0> Cold Case Files John List
<https://www.youtube.com/watch?v=Y1EWmrzD2Mk> Real Crimes: Jeff Dahmer Story

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
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Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with guidance counselors, other teachers	-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions
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Unit # 5- Fiber & Hair as Evidence	
Content Area: Science	
Unit Title: Fiber & Hair as Evidence	
Grade Level: 11/12	
Core Ideas:	

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Fibers are used as circumstantial evidence to link the victim, suspect and crime scene. Hair is used as class evidence and has probative value after analysis.	
Unit # 5- Standards	
Standards (Content and Technology):	
CPI#:	Statement:
Performance Expectations (NJSLS)	

HS-PS1-1	Use a model to predict relationships between systems or between components of systems.
HS-PS2-2	Use mathematical representation of phenomena to describe explanations.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Career Readiness, Life Literacies, and Key Skills

9.4.12.DC.3	Evaluate the social and economic implications of privacy in the context of safety, law or ethics.
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Computer Science and Design Thinking

8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.C.4	Explain & identify interdependent systems and their functions.

Intercultural Statements (Amistad, Holocaust, LGBT, etc...)

Think metacognitively and organize their own thoughts with given information. (CASEL)

Develop, implement, and model effective problem solving and critical thinking skills (CASEL)

Companion Standards ELA/L

ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain. Expressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-SC.9-12.Argue. Interpretive	Comparing reasoning and claims based on evidence from competing arguments or design solutions
ELD-SC.9-12 Argue. Expressive	Defend or refute a claim based on data and evidence
ELD-MA.9-12.Argue.	Evaluating relationships among evidence and mathematical principles to create generalizations

Interpretive	
ELD-MA.9-12.Argue Expressive	Justify (and refute) conclusions with evidence and mathematical principles
Interdisciplinary Connection	
WHST.9-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
SL.9-10.4:	“Present information, findings, and supporting evidence clearly, concisely, and logically...”
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
MP.2	Reason abstractly and quantitatively

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HSN.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MP.4	Model with mathematics
Unit Essential Question(s): <ul style="list-style-type: none"> • How are fibers used as trace evidence? • How does hair relate to forensic science? • How does hair differ between nationalities? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Different types of fibers as evidence • Different types of hair as evidence

Evidence of Learning

<ul style="list-style-type: none"> • Formative Assessments: • Lab Reports • Quizzes • Project on Hair • Test <p>Summative/Benchmark Assessment(s): Test</p> <p>Alternative Assessments:</p>	
<p>Resources/Materials: <i>Forensic Science</i> by Richard Silverstein Text - <i>Forensic Science and Forensics for Dummies</i> <i>Forensic Science for High School</i> by Deslich & Funkhouser</p>	<p>Key Vocabulary: Fibers, Evidence, Hair, Classify, Hair structure, Diversity of Hair in races</p>

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Types of fibers	Identify different types of fibers Categorize fibers as evidence	Fibers as Evidence Sources of Fibers	2 days

Classify fibers	Classifying fibers	Types of fibers Chemical Structure of Fibers	2 days
Structure of Hair	Explore the structure of hair	Hair as evidence The form and structure of hair Hair structure of different races	2 days
Hair in forensics	Characteristics of hair important in forensics Analyzing hair for environmental factors	Hair as a chemical indicator The crime scene and fiber/hair evidence	1 day
Human vs. Animal Hair	Compare and contrast human vs. animal hair	Characteristics of human vs. animal hair	2 days

Teacher Notes:

Additional Resources:

https://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/july2004/research/2004_03_research02.htm#:~:text=The%20root%20of%20human%20hairs,are%20highly%20variable%20between%20animals.&text=The%20scale%20pattern%20of%20the,more%20variable%20in%20animal%20hairs.
<https://www.webmd.com/skin-problems-and-treatments/hair-loss/science-hair#:~:text=The%20hair%20shaft%20is%20made,outer%20layer%20is%20the%20cuticle.>

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
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Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with I&RS	-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions
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Unit # 6- Handwriting Analysis, Forgery and Counterfeiting

Content Area: Science

Unit Title: Handwriting Analysis, Forgery and Counterfeiting

Grade Level: 11th/12th

Core Ideas: Analysis of handwriting and forgery, characteristics of counterfeit items.

Unit # 6- Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSL)

HS-LS4-4

Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-PS2-2

Use mathematical representation of phenomena to describe explanations.

Career Readiness, Life Literacies, and Key Skills

9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
9.4.12.IML.8	Evaluate media sources for point of view, bias, and motivations.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas
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.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving
Computer Science and Design Thinking	
8.2.12.C.4	Explain and identify interdependent systems and their functions.

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8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
Develop, implement, and model effective problem solving and critical thinking skills (CASEL)	
Study diverse criminal activity in forensics from different parts of the world.	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Think metacognitively and organize their own thoughts with given information. (CASEL)	
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of Science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain. Expressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-SI.4-12. Inform	Report on explicit and inferred characteristics, patterns, or behavior
ELD-SI.4-12 Narrate	Identify and raise questions about what might be unexplained, missing or left unsaid

ELD-MA.9-12.Argue. Interpretive	Evaluating relationships among evidence and mathematical principles to create generalizations
ELD-MA.9-12.Argue Expressive	Justify (and refute) conclusions with evidence and mathematical principles
Interdisciplinary Connection	
SL.9-10.4:	“Present information, findings, and supporting evidence clearly, concisely, and logically...”
SL.11-12.1:	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
WHST.9-12.9	Draw evidence from informational texts to support analysis, reflection, and research.

Evidence of Learning

- **Formative Assessments:**
 - **Lab Reports**
 - **Quizzes**
 - **Project**
 - **Test**
- Summative/Benchmark Assessment(s): Test**
- Alternative Assessments:**

Resources/Materials:
Forensic Science by Richard Silverstein
 Text - *Forensic Science and Forensics for Dummies*
Forensic Science for High School by Deslich & Funkhouse

Key Vocabulary: Forgery, documents, analysis, handwriting, inks, counterfeiting

Suggested Pacing Guide

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Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Characteristics of Handwriting	Learn characteristics of handwriting	Characteristics of handwriting Obliterations and indentations	1 day

Analyze Handwriting	Analyze different handwriting samples.	Documents as evidence Analysis of handwriting and printing Forgery of documents	2 days
Compare inks	Compare and contrast different inks in documents.	Ink analysis	2 days
Analyze documents	Analyze documents for forgery.	Methods of forgery	2 days
Counterfeiting	Predict if currency is counterfeit Examine currency	Counterfeiting Characteristics	1 day

Teacher Notes:

Additional Resources:

<http://www.fbi.gov/about-us/lab/forensic-science>

communications/fsc/oct2007/research/2007_10_research01_test1.htm

www.treas.gov/ussf

<https://www.questioneddocuments.com/questioned-document-overviews/signatures-forgery/>

<https://www.wattpad.com/828608314-criminology-board-exam-criminalistics/page/3>

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions	-Hands-on activities -Assess comprehension through demonstration -Give instructions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at	-Provide extension activities per student interest -Build on students' intrinsic motivation	-Hands on Activity -Cooperative Learning -Reteach in various methods	-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions

	any level, even one word			
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Unit # 7- Overview

Content Area: Science

Unit Title: Human Remains

Grade Level: 11th/12th

Core Ideas: Identification of human remains and time of death utilizing various techniques.

Unit # 7- Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSLS)

HS-PS2-2

Use mathematical representation of phenomena to describe explanations

HS-LS4-4

Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS3-3

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population

Career Readiness, Life Literacies, and Key Skills

9.4.12.IML.
5

Evaluate, synthesize, and apply information on climate change from various sources appropriately.

9.4.12.DC.7

Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society

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.CT.2

Explain the potential benefits of collaborating to enhance critical thinking and problem solving

Computer Science and Design Thinking

8.2.8.C.8

Develop a proposal for a chosen solution that include models to communicate the solution to peers.

8.2.12.E.1

Demonstrate an understanding of the problem-solving capacity of computers in our world.

8.1.12.IC.1

Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.

Intercultural Statements (Amistad, Holocaust, LGBT, etc...)	
Develop, implement, and model effective problem solving and critical thinking skills (CASEL)	
Study diverse bones from different races in forensics from different parts of the world.	
Recognize the importance of self-confidence in handling daily tasks and challenges (CASEL)	
Think metacognitively and organize their own thoughts with given information. (CASEL)	
Listen actively to further explore the arguments of others.	
Understand others' perspectives to effectively interpret their arguments.	
Companion Standards ELA/L	
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain. Expressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-SI.4-12. Inform	Report on explicit and inferred characteristics, patterns, or behavior
ELD-SI.4-12	Identify and raise questions about what might be unexplained, missing or left unsaid

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Narrate	
ELD-MA.9-12.Argue. Interpretive	Evaluating relationships among evidence and mathematical principles to create generalizations
ELD-MA.9-12.Argue Expressive	Justify (and refute) conclusions with evidence and mathematical principles
Interdisciplinary Connection	
SL.9-10.4:	“Present information, findings, and supporting evidence clearly, concisely, and logically...”
SI.11-12.1:	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task

RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
WHST.11-12.9	Draw evidence from informational texts to support analysis, reflection, and research.
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.
NJSLSA.R8.	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
MP.2	Reason abstractly and quantitatively
MP.4	Model with mathematics
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Unit Essential Question(s):

- How is a person identified from remains?
- How is time of death determined?
- How are different races characterized?

Unit Enduring Understandings:

- How forensic anthropologists determine sex, age, race, and time of death from remains.

Evidence of Learning

- **Formative Assessments:**
- **Lab Reports**
- **Quizzes**
- **Test**

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Summative/Benchmark Assessment(s): Test

- **Alternative Assessments: Identification of Remains (Problem Based Learning) , Assess comprehension through demonstration**

Resources/Materials:

Text - *Forensic Science and Forensics for Dummies*
Forensic Science for High School by Deslich & Funkhouser

Key Vocabulary: Anthropologists, bone, remains, time of death, crime scene, cause of death, race differences in bones, prediction, scientific argument, defend argument

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Human skeleton	Discuss the human skeleton Distinguish between a male and female skeleton.	The Skeleton Forensic Anthropology: Skeletal Remains	2 days
Mark identification	Identification of marks on remains	Markings on bones	1 day
Characteristics of races	Predict race and sex Determine Age Determine Race	Estimating Height using Long Bones Sex determination Differences in skull features/races	4 days
Human vs. Animal bones	Examine human vs. animal remains Facial Reconstruction	Differences in animal vs human bones John List Video	2 days
Time of death	Estimating time since death Predicting cause and manner of death. Explore human remains research	Post mortem interval: Determining the time of death The Body Farm	2 days
Defend a scientific argument	Analyze, Communicate, and defend a scientific argument of a missing persons remains.	Lab: Determine whose bones Analyze missing person reports	4 days

Teacher Notes:

Additional Resources:

<https://www.free-anatomy-quiz.com/skeletonIDQ1.html>

<https://www.youtube.com/watch?v=jiIBpHC7Lfo> National Geographic “The Body Farm”

<https://naturalhistory.si.edu/education/teaching-resources/social-studies/forensic-anthropology#:~:text=DNA%20analysis%20may%20be%20used,with%20deceased%20or%20living%20descendants>.

<https://www.getbodysmart.com/skeletal-system-quizzes/skull-lateral-markings-quiz>

<https://play.howstuffworks.com/quiz/can-you-guess-these-human-bones-from-an-image>

<https://statemuseum.arizona.edu/sites/default/files/Distinguishing%20Human%20From%20Animal%20Bone%20%28Watson%20and%20McClelland%202018%29.pdf>

<https://www.science.org/content/article/skeleton-keys-how-forensic-anthropologists-identify-victims-and-solve-crimes>

<https://medium.com/forensic-anthropology/what-can-be-read-in-bone-remains-a81fb7562fde>

<https://www.uab.edu/uabmagazine/identifying-skeletal-remains>

https://watermark.silverchair.com/labmed29-0423.pdf?token=AOECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAs0wggLJBgkqh

<https://www.uab.edu/uabmagazine/identifying-skeletal-remains>

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Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
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<p>Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>	<p>-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word -Use translation dictionaries to locate words in the native language</p>	<p>-Provide extension activities per student interest -Build on students' intrinsic motivation</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with I&RS</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>
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Unit #8 – Blood and Blood Spatter	
Content Area: Science	

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Unit Title: Blood and Blood Spatter	
Grade Level: 11th/12th	
Core Ideas: Investigators often find blood at the scenes of crimes. They can use the location, distribution, and pattern of blood and bloodstains to help reconstruct the crime. Blood evidence is analyzed for comparison DNA and utilized as court evidence.	
Unit # 8- Standards	
Standards (Content and Technology):	

CPI#:	Statement:	
Performance Expectations (NJSL)		
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaption of populations.	
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	
HS-PS2-2	Use mathematical representation of phenomena to describe explanations	
HS-PS2.A	Forces and Motion	
Career Readiness, Life Literacies, and Key Skills		
9.4.12.IML.5	Evaluate, synthesize, and apply information on climate change from various sources appropriately.	
9.4.12.DC.7	Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society	
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas	
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Computer Science and Design Thinking		
8.2.12.C.4	Explain and identify interdependent systems and their functions.	
8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.	
Intercultural Statements (Amistad, Holocaust, LGBT, etc...)		
Think metacognitively and organize their own thoughts with given information. (CASEL)		
Listen actively to further explore the arguments of others. (CASEL)		
Understand others' perspectives to effectively interpret their arguments. (CASEL)		
Diversity in races and inherited diseases		
Companion Standards ELA/L		
ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science	
ELD-SC.9-12.Argue.E Expressive	Introduce and contextualize topic/phenomenon in current scientific or historical episodes in science.	

ELD-SC.9-12.Argue. Interpretive	Identifying appropriate and sufficient evidence from data, models, and/or information from investigations of a phenomenon or design solutions	
ELD-SI.4-12. Inform	Report on explicit and inferred characteristics, patterns, or behavior	
ELD-SI.4-12 Narrate	Identify and raise questions about what might be unexplained, missing or left unsaid	
ELD-MA.9-12.Argue. Interpretive	Evaluating relationships among evidence and mathematical principles to create generalizations	
ELD-MA.9-12.Argue	Justify (and refute) conclusions with evidence and mathematical principles	

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Expressive		
Interdisciplinary Connection		
6.3.12.D.1	Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.	
MP.2	Reason abstractly and quantitatively.	
MP.4	Model with mathematics	
WHST.9-12.9	Draw evidence from informational texts to support analysis, reflection and research	
WHST.9-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.	
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	
RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroboration or challenging conclusions with other sources of information.	
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	
RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.	

<p>Unit Essential Question(s):</p> <ul style="list-style-type: none"> • How is blood used as evidence? • What are the different types of blood? • How does blood spatter determine where the crime occurred? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • Understand blood’s character. • Analyze bloodstain patterns. • Understand blood types
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Evidence of Learning

Formative Assessments: Lab Reports, Quiz
Summative/Benchmark Assessment(s): Test
Alternative Assessments: Case Studies

<p>Resources/Materials: <u>Forensic Science</u> by Richard Silverstein <u>Forensics – Teachers A-Z Resource Guide</u>,</p>	<p>Key Vocabulary: Blood types, blood, evidence, blood spatter, blood type, bloodstain, patterns</p>
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Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Crime Scene Blood	Determine whether a stain is blood	Blood at the Crime Scene	2 days
Animal or Human Blood	Determine whether a bloodstain is human or animal blood	Human or Animal Blood	1 day
Blood Typing	Understand blood types and clotting Blood as Class Evidence	Serology	3 days
Blood Spatters	Analyze blood spatters Classify blood spatters	Blood Spatter Evidence	2 days

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	Reconstruct the crime scene from bloodstains.		
Determine whose blood	Use technology and mathematics to improve investigations and communications Communicate and defend a scientific argument.	Blood Pattern Analysis	4 days

Teacher Notes:

Additional Resources:

<http://www.pimall.com/nais/nl/n.bloodstains.html>

http://www.crimescene-forensics.com/Blood_Stains.html

<http://science.howstuffworks.com/bloodstain-pattern-analysis.html>

<https://embryo.asu.edu/pages/abo-blood-type-identification-and-forensic-science-1900-1960#:~:text=Forensic%20scientists%20often%20use%20techniques,blood%2Dtyping%20to%20determine%20paternity.>

<https://science.jrank.org/pages/2824/Forensic-Science-Evidence-tools-used-in-forensic-science.html>

<http://recovery10p.weebly.com/forensics.html#:~:text=Another%20analyst%20types%20the%20blood,some%20being%20rarer%20than%20others.>

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
<p>Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>	<p>-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word -Use translation dictionaries to locate words in the native language</p>	<p>-Provide extension activities per student interest -Build on students' intrinsic motivation</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with I&RS</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>

Unit # -9 Forensics Aspects of Fire Investigation and Ballistics

Content Area: Science

Unit Title: Forensic Aspects of Fire Investigation

Grade Level: 11th/12th

**Core Ideas: Learn the characteristics of fire and how to determine if it is arson.
Rifling on guns and bullets**

Unit # -9 Standards

Standards (Content and Technology):

CPI#:

Statement:

Performance Expectations (NJSL)

HS-PS3-3

Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of and within a system.

HS-PS3-1

Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

HS-PS1-1

Use a model to predict relationships between systems or between components of systems.

Career Readiness, Life Literacies, and Key Skills

9.4.12.TL.3

Analyze the effectiveness of the process and quality of collaborative environments.

9.4.12.IML.8

Evaluate media sources for point of view, bias, and motivations.

9.4.12.CI.1

Demonstrate the ability to reflect, analyze, and use creative skills and ideas

Computer Science and Design Thinking

8.2.12.C.4

Explain and identify interdependent systems and their functions.

8.1.12.F.1

Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Intercultural Statements (Amistad, Holocaust, LGBT, etc...)

Anticipate how their own arguments may be interpreted and received by taking on the perspectives of others. (CASEL)

Think metacognitively and organize their own thoughts with given information. (CASEL)

Develop, implement, and model effective problem solving and critical thinking skills (CASEL).

Companion Standards ELA/L

ELD Standard 4	English language learners communicate information, ideas, and concepts necessary for academic success in the content area of Science
ELD-SC.9-12.Explain. Interpretive	Defining investigable questions or problems based on observations, information, and/or data about a phenomenon.
ELD-SC.9-12.Explain. Expressive	Develop reasoning to illustrate and/or predict the relationships between variables in a system or between components of a system.
ELD-SI.4-12. Inform	Report on explicit and inferred characteristics, patterns, or behavior
ELD-SI.4-12 Narrate	Identify and raise questions about what might be unexplained, missing or left unsaid
ELD-MA.9-12.Argue. Interpretive	Evaluating relationships among evidence and mathematical principles to create generalizations
ELD-MA.9-12.Argue Expressive	Justify (and refute) conclusions with evidence and mathematical principles
Interdisciplinary Connection	

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SL.9-10.4:	“Present information, findings, and supporting evidence clearly, concisely, and logically...”
SI.11-12.1:	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task
WHST.11-12.9	Draw evidence from informational tests to support analysis, reflection, and research.
MP.2	Reason abstractly and quantitatively
MP.4	Model with mathematics
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
Unit Essential Question(s): <ul style="list-style-type: none"> • What is arson? • How is the source of arson determined? • How do they match bullets to guns? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Determination of arson and the source of the fire. • Differences in guns and bullet markings

Evidence of Learning

Formative Assessments:

- Lab Reports
- Quizzes

Summative/Benchmark Assessment(s): Tests

Alternative Assessments:

Resources/Materials:

Forensic Science by Richard Silverstein

Key Vocabulary: Fire, Arson, Accelerant, physical evidence, Flammable, Ballistics, Rifling, Bullet, Guns, Markings

Suggested Pacing Guide

Lesson Name/Topic	Student Learning Objective(s)	Suggested Tasks/Activities:	Day(s) to Complete
Chemistry of fire	List the conditions necessary to initiate and sustain combustion. Understand the three mechanisms of heat transfer.	Forensic Investigation of Arson Chemistry of Fire	2 days
Signs of Arson	Recognize the telltale signs of an accelerant-initiated fire	Searching the fire scene	1 day
Evidence of Arson	Examine how to collect physical evidence at the scene of a suspected arson. Identification of hydrocarbon residues in labs.	Collection and Preservation of Arson Evidence Analysis of Flammable Residues	3 days
Guns & Bullets	Analyze gun and bullet rifle markings	Analysis of gun and bullet rifle marks after firing a gun	2 days

Teacher Notes:

Additional Resources:

<http://www.tcforensic.com.au/docs/article3.html>

<https://www.ncjrs.gov/pdffiles1/nij/181584.pdf>

<https://www.youtube.com/watch?v=nMhjMIJYJeM> Forensics Files “Point of Origin” <https://www.youtube.com/watch?v=ubiszd0t-XU> Forensics Files “Gone Ballistic”

<https://www.youtube.com/watch?v=e8HR5TxlPMc> Bullet marking

https://msrobbinspnhs.weebly.com/uploads/1/4/1/6/14166475/1-intro_to_ballistics.pdf

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<https://www.atf.gov/firearms/automated-firearms-ballistics-technology>

Differentiation/Modification Strategies

Students with Disabilities	English Language Learners	Gifted and Talented Students	Students at Risk	504Students
<p>Hands on activity -Cooperative Learning -Peer Tutoring -Extended Time -Reteach in various methods -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>	<p>-Hands-on activities -Assess comprehension through demonstration -Give instruction/directions in writing & oral -Allow errors in speaking -Rephrase questions, directions, and explanations -Allow extended time to answer questions Accept participation at any level, even one word -Use translation dictionaries to locate words in the native language</p>	<p>-Provide extension activities per student interest -Build on students' intrinsic motivation</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Consult with I&RS</p>	<p>-Hands on Activity -Cooperative Learning -Reteach in various methods -Extended time -Rephrase questions, directions, and explanations -Allow extended time to answer questions</p>