

Pascack Valley Regional High School District

**Pascack Hills High School, Montvale, New Jersey
Pascack Valley High School, Hillsdale, New Jersey**

Course Name: Honors Forensic Science

Born On: August, 2026
Board Approval: 8/24/26

New Jersey Curricular Mandates for Science Instruction

Disabled & LGBT:

18A:35-4.35 - History of disabled and LGBT persons included in middle and high school curriculum. A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards.

Diversity, Equity, and Inclusion (DEI):

C.18A:35-4.36a - Curriculum to include instruction on diversity and inclusion. 1. a. Beginning in the 2021-2022 school year, each school district shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards. b. The instruction shall: (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance; (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs. c. The Commissioner of Education shall provide school districts with sample learning activities and resources designed to promote diversity and inclusion.

Amistad Law:

N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Climate Change:

2026 NJSLS-Science: Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. Global climate change has already resulted in a wide range of impacts across New Jersey and in many sectors of its economy. The addition of academic standards that focus on climate change is important so that all students will have a basic understanding of the climate system, including the natural and human-caused factors that affect it. The underpinnings of climate change span across physical, life, as well as Earth and space sciences. The goal is for students to understand climate science as a way to inform decisions that improve quality of life for themselves, their community, and globally and to know how engineering solutions can allow us to mitigate impacts, adapt practices, and build resilient systems.

Dissection Law

N.J.S.A. 18A:35-4.25 and N.J.S.A. 18A:35-4.24 authorizes parents or guardians to assert the right of their children to refuse to dissect, vivisect, incubate, capture or otherwise harm or destroy animals or any parts thereof as part of a course of instruction.

Honors Forensic Science		
Unit Title	Approx # of weeks	Months
What is Forensic Science?	3-4 Weeks	August - September
Analysis of a Crime Scene	2 weeks	September - October
Types of Physical Evidence	2 Weeks	October
Physical Properties of Glass and Soil	3 Weeks	October - November
Analysis of Hair and Fiber	2 Weeks	November
Forensic Chemistry & Toxicology	2-3 Weeks	November - December
Serology	2-3 Weeks	January
Analysis of DNA Evidence	2-3 Weeks	January - February
Fingerprint Analysis	2-3 Weeks	February - March
Arson and Explosion Investigation	2-3 Weeks	March
Ballistic, Firearms, and Tool Marks	2 Weeks	April
Document Analysis	1-2 Weeks	April
Human Remains	4-6 Weeks	April - May
Forensic Psychology	2-3 Weeks	May - June

Honors Forensic Science			
Unit 1: What is Forensic Science?			
Related Phenomena: Notice and Wonder Activity Show video: https://www.youtube.com/watch?v=Z6-fdp8wlEk			
Pacing: Approximately 3-4 Weeks			
New Jersey Student Learning Standards (NJSLS)			
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.			
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. Analyze complex real-world problems by specifying criteria and constraints for successful solutions.	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u>	
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What is forensic science? - How did forensic science develop? - What does a forensic scientist do? - How is a forensic lab setup? - What is the difference between the Bergen County crime lab and the NJ State crime lab? - How can we effectively communicate ideas? What do you think is the percentage of people who have been unjustly convicted of a crime? Case Studies	The students will be able to: - Define forensics science - Explain the roles and responsibilities of forensic scientist - Perform measurements using Bertillon's technique and use the data to discriminate between different people - Analyze and interpret genetic data in order to determine who murdered the victim - Describe the areas of a crime laboratory	Laboratory Investigations: <i>Application of scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> Bertillon Measurement Lab: Students measure different body parts using Bertillon's measurements as a guide. Then see if they can use these measurements to identify a student in the class. Murder and Genetics Lab: Students determine blood type of suspects and analyze DNA profiles and familial connections to determine who killed	Formative and Summative: - Performing Bertillon measurements and analyzing its accuracy for identifying individuals - Describing the role of forensic scientist, and the areas of a crime lab - Explaining legal aspects of scientific admissibility - Research and present notorious crimes and pertinent case studies - Laboratory activities

- Why is it important to have scientific admissibility standards in court?	- Explain characteristics of local, state and federal crime laboratories - Describe important individual that contributed to forensic science - Explain the legal aspects of analysis of evidence- Daubert Criteria and Frye Standard - Research and present notorious crimes	Capt. Relish. Deadly Picnic Activity: Students analyze and discuss crime scene evidence to determine the killer. <i>Effectively Communicate Information</i> Notorious Crimes Presentations: Students research and prepare presentation about a notorious crime Case Studies and Current Events Mini Presentations: Each week, students research, present and discuss an interesting case.	Presentations
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		

Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
• Display labeled images of individuals, terms and content • Use body movement and gestures to further explain concepts to students. • Restate design steps aloud before project activity. • Assign a native language partner. • Spanish for law enforcement	• Provide adequate scaffolds for the educational process. • Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. • Provide an outline of lessons • Get a written list of instructions • Work or take a test in a different setting, such as a quiet room with few distractions. • Sit where they learn best (for example, near the teacher). • Use an alarm to help with time management. • Work with a partner.	• Incorporate student choice • Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. • Provide peer mentoring to improve techniques.	• Take on an additional or more complex crime scene challenge. • Interview someone in the field of forensic science about how they use the analysis in their profession

Honors Forensic Science		
Unit 2: Analysis of the Crime Scene		
Related Phenomena: Crime Scene set up when students walk into the room- What do you think happened? Record observations and discuss		
Pacing: Approximately: 2 Weeks		
New Jersey Student Learning Standards (NJSL)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Analyze complex real-world problems by specifying criteria and constraints for successful solutions.	ETS1.A: Defining and Delimiting Engineering Problems • Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed	Influence of Science, Engineering, and Technology on Society and the Natural World • <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u>

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.

- Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

through engineering. These global challenges also may have manifestations in local communities.

ETS1.B: Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
• How can the recreation of a crime scene aid in its solution? • What are proper evidence collection and preservation techniques? • How can eyewitness testimony be both helpful and harmful to an investigation?	The Students will be able to: • Perform the role of the forensic scientists by conducting a proper systematic search, properly recording and packaging evidence and maintaining the chain of custody at a crime scene • Evaluate the legitimacy of eyewitness testimony by enacting mock crime scenes and analyzing the information observed • Research case studies that demonstrate legal issues of search and seizure of evidence • Evaluate the cost of running a crime lab • Build a 3-d model of a crime scene with evidence	Laboratory Investigations: <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> • <u>Analyzing a mock crime scene:</u> Teacher creates mock crime scenes for the students to “process and record evidence”. Class discusses what they did correctly and what would need to improve • <u>Crime Scene Sketching-Sketch Artist Activity:</u> Students create a simple crime scene somewhere in the school with evidence. They then measure and create an accurate sketch to scale using templates. • <u>Crime Scene Skits-Is Eyewitness Testimony Reliable?</u> : Students perform quick skits that are observed by class. The next day	Formative and Summative: • Ability to perform a proper systematic search, package evidence maintaining the chain of custody • Evaluating the legitimacy of eyewitness testimony • Evaluating the cost of running a crime lab • Researching case studies and communicating them to the class • Designing a model of a crime scene • Demonstrating mastery through: ○ Summative Assessments ○ Laboratory activities ○ Class participation ○ Project ○ Presentation

		they are tasked with recording observations about the scene they saw. • Diagnostic Forensics Solutions Inc: Students are given a budget and based on a crime that occurred determine which tests are necessary by calculating the costs. Then communicating with the police department explaining their needs and why. <i>Effectively Communicate Information:</i> • Clay Crime Scenes Project: Students create crime stories and represent the crime scene in 3-dimensions. Students present and class discusses • Case Studies and Current Events Mini Presentations: Each week, students research, present and discuss an interesting case.	
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).		

	9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
● Display labeled images of individuals, terms and content ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. ● When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling, etc. ● Provide a variety of texts and resources on curriculum topics at a range of reading levels. ● Provide models of completed assignments, projects, etc.	● Provide extended time for the creation of products. ● Scaffolded explanations for proper use of equipment. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions. ● Sit where they learn best (for example, near the teacher). ● Use an alarm to help with time management. ● Work with a partner.	● Provide an outline for project tasks. ● Incorporate student choice ● Use effort and achievement rubrics ● Assure students they can be successful. ● Allow students many opportunities for practice and learning. ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. ● Provide peer mentoring to improve techniques.	● Take on additional or more complex crime scene challenges. ● Interview someone in the field of forensic science about how they use the analysis in their profession.

Honors Forensic Science		
Unit 3: Types of Physical Evidence		
Related Phenomena: Lockerbie Bombing Crime Scene Case Evidence- See Chp 2 in Spencer Textbook Mincy vs. Arizona Case study- Read and discuss search and seizure https://supreme.justia.com/cases/federal/us/437/385/		
Pacing: Approximately 2 weeks		
New Jersey Student Learning Standards (NJSLs)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically	ETS1.A: Defining and Delimiting Engineering Problems Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and</u>

testable questions and design problems using models and simulations. - Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. - Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. PS2.B: Types of Interactions - Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	<u>benefits is a critical aspect of decisions about technology.</u> Structure and Function Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What can a forensic scientist determine from the different types of physical evidence? - Why is individual evidence more probative than class evidence? - How is physical evidence used to reconstruct a crime scene?	<u>The students will be able to:</u> - Analyze, describe and compare different types of physical evidence - Compare Individual and Class evidence and provide examples of each - Reconstruct crime scenes using different types of physical evidence - Model different types of pattern evidence and interpret to solve crime	<u>Laboratory Investigations:</u> <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> <u>Tire Tread Examination Lab:</u> Students use toy cars to make pattern evidence, then analyze and compare the prints to reconstruct the crime scene. <u>Lip Print Lab:</u> Students given a set of lipstick prints; one crime scene and the others are suspects in a jewelry robbery. They record data,, analyze and compare prints to determine who stole the diamonds. <u>Shoe Print Lab:</u> Students practice making their own shoe prints and then are given crime scene prints. They make prints of the suspects shoes, compare and determine who robbed the pizza parlour.	<u>Formative and Summative:</u> - Analyzing, describing and comparing different types of physical evidence - Comparing Individual and Class evidence and provide examples of each - Reconstructing crime scenes using different types of physical evidence - Modeling different types of pattern evidence and interpret to solve crime - Demonstrating mastery through: - Summative Assessments - Laboratory activities

Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
- When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. - Provide models of completed homework assignments, projects, etc. - Assign a native language partner. - Use sentence/paragraph frames to assist with writing peer review. - Provide extended time for written responses and reports. Spanish for Law Enforcement	- Use scaffolds, such as prompting to assist with the design process. - Provide extended time for written responses and reports. - Use a graphic organizer to categorize concepts. - Get a written list of instructions. - Receive large project as smaller tasks with individual deadlines. - Work or take a test in a different setting, such as a quiet room with few distractions. - Sit where they learn best (for example, near the teacher). - Use an alarm to help with time management. - Work with a partner.	- Use a graphic organizer to categorize concepts. - Provide an outline for research and design tasks. - Provide extended time for written responses and reports. - Incorporate student choice - Provide peer mentoring to improve techniques - Use effort and achievement rubrics - Assure students they can be successful - Allow students many opportunities for practice and learning - Use scaffolding for complex tasks - Evaluate students on the basis of mastery and not one another.	- Take on an additional or more complex crime scene challenge. - Interview someone in the field of forensic science about how they use the analysis in their profession. - Offer choices, once finished with a basic task, with personal interest being the key.

Honors Forensic Science		
Unit 4: Physical Properties of Glass and Soil		
Related Phenomena: Show students bullet holes in windowpane. What do you notice? What information can you get about what happened here?		
Pacing: Approximately 3 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.		
HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. - Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Analyzing and Interpreting Data Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. Using Mathematics and Computational Thinking <u>Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</u>	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. PS2.A: Forces and Motion - Newton's second law accurately predicts changes in the motion of macroscopic objects. PS4.A: Wave Properties - The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Cause and Effect - Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

• <u>Use mathematical representations of phenomena or design solutions to describe and/or support claims and/or explanations.</u> Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena • Theories and laws provide explanations in science. • Laws are statements or descriptions of the relationships among observable phenomena.			
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
• How can the chemical and physical properties of glass and soil be used as evidence? • How can glass fracture patterns be used to reconstruct a crime scene?	The students will be able to: • Describe different types of glass and soil • Distinguish glass and soil samples using various techniques like density, refractive index, fracture patterns, and Becke line analysis. • Measure and calculate the density of various glass samples • Compare the flotation and immersion method for determining density • Calculate refractive index as a means for distinguishing glass samples	Laboratory Investigations: <i>Application of scientific and technical skills and Inquiry investigation where students will analyze data and construct claims:</i> • Glass Density Lab: Students will use the principle of density to distinguish between glass samples and eventually match a known glass to solve a crime. • Refractive Index of Glass Lab: Students will calculate the refractive index of glass and plastic specimens using Snell's Law. • Big Glass Lab: This culminating activity allows students to tie together all aspects of glass analysis including density, refractive index, and fracture patterns. • Murder on the Beach Lab: Students will examine the gross analysis of soil samples for their color, texture, luster, and crystalline structure.	Formative and Summative: • Analyzing, describing and comparing different types of glass and soil • Comparing glass and soil evidence and provide examples of each • Reconstructing crime scenes based on glass fracture patterns • Demonstrating mastery through: ○ Summative Assessments ○ Laboratory activities

Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. A.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics). 8.2.12.D.5 Explain how material processing impacts the quality of engineered and fabricated products.		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
- When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. - Provide models of completed homework assignments, projects, etc. - Assign a native language partner. - Use sentence/paragraph frames to	- Use scaffolds, such as prompting to assist with the design process. - Provide extended time for written responses and reports. - Use a graphic organizer to categorize concepts. - Get a written list of instructions - Receive large project as smaller tasks with individual deadlines	- Use a graphic organizer to categorize concepts. - Offer choices beyond standard learning activities, with personal interest being the key. - Provide an outline for research and design tasks. - Provide extended time for written responses and reports.	- Take on an additional or more complex crime scene challenge. - Interview someone in the field of forensic science about how they use the analysis in their profession. - Offer choices beyond standard learning activities, with personal interest being the key.

assist with writing peer review. • Provide extended time for written responses and reports.	• Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner	• Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	
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Honors Forensic Science		
Unit 5: Analysis of Hair and Fiber		
Related Phenomena: What can hair tell forensic scientists? Napoleon Bonaparte Case - see Chp 7 in Spencer Textbook Discuss		
Pacing: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. • Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats	ETS1.A: Defining and Delimiting Engineering Problems • Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. PS2.B: Types of Interactions • Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	Influence of Science, Engineering, and Technology on Society and the Natural World • <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Structure and Function • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

(including orally, graphically, textually, and mathematically).			
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What are the differences between animal and human hair? - How can one distinguish between different types of hair? - How can one differentiate fiber and fabric types? - Besides microscopic examination, how would a forensic scientist analyze fibers?	The students will be able to: - Microscopically examine, compare and distinguish the morphological characteristics of various types of animal hair and human hair in order to identify what type of hair is at the crime scene - Microscopically analyze, compare and distinguish the morphological characteristics of fibers to identify what type of fiber is at the crime scene - Perform various chemical and physical tests to determine types of fabric samples and interpret results for crime scene analysis	Laboratory investigations: <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> Analysis of Hair Lab: This lab has several activities. Including: -Creating slides of their own hair -Observing prepared slides of other types of animals -Comparing, recording data and determining type of hair found at two different crime scenes Fiber Analysis Lab: Students create slides of a fiber from their clothes, observe prepared slides of different types of fibers and fabric types using the microscope Fiber and Fabric Chemical Analysis BIG Lab: This lab has a combination of tests that allow students to chemically and physically observe, analyze and record data about different types of fibers and fabrics. Then use this data to determine crime scene fabrics.	Formative and Summative: - Microscopically examining, comparing and distinguishing the morphological characteristics of hair and fibers. - Performing various chemical and physical tests to determine types of fabric samples and interpret results for crime scene analysis - Demonstrate mastery through: - Summative Assessments - Laboratory activities
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text		

	selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals).		
	SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.		
	SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
- When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. - Provide models of completed homework assignments, projects, etc. - Assign a native language partner. - Use sentence/paragraph frames to assist with writing peer review. - Provide extended time for written responses and reports.	- Provide additional time for project development. - Work with a peer - Break the assignment into smaller pieces. - Utilize graphics to support learning. - Provide an outline of lessons - Get a written list of instructions - Receive large project as smaller tasks with individual deadlines - Work or take a test in a different setting, such as a quiet room with few distractions - Sit where they learn best (for example, near the teacher)	- Break the investigation process into smaller pieces. - Conference with the teacher during the process. - Provide a detailed framework for the project design. - Incorporate student choice - Provide peer mentoring to improve techniques - Use effort and achievement rubrics - Assure students they can be successful - Promote mastery or challenging tasks - Allow students many opportunities for practice and learning - Use scaffolding for complex tasks - Evaluate students on the basis of mastery and not one another.	- Offer choices, once finished with a basic task, with personal interest being the key. - Develop and research more complex cases both individually and in collaboration with peers.

Honors Forensic Science		
Unit 6: Forensic Chemistry and Toxicology		
Related Phenomena: Scenario: A student brings a white powder to school claiming it's a crushed energy mint. A teacher sees it and reports it. The school calls in a resource officer. Now it's up to forensic analysts (your students) to determine what the substance really is. <i>How can forensic scientists tell the difference between harmless substances and illegal drugs in the lab?</i>		
Pacing: Approximately 2-3 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. - Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Planning and Carrying Out Investigations Planning and carrying out in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. - Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. -----	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. LS1.A: Structure and Function - Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Stability and Change - Feedback (negative or positive) can stabilize or destabilize a system. Structure and Function - Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of

Connections to Nature of Science Scientific Investigations Use a Variety of Methods - Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings. Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. - Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	PS2.B: Types of Interactions Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	components to reveal its function and/or solve a problem.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What are the physiological and neurological effects of drugs on the body? - How are the negative short term and long term effects of drugs directly related to their physiological function in the body? - How can drugs and poisons be identified?	The students will be able to: - Describe chromatography and compare the different types - Identify and analyze GC Mass spectrograms of various drugs - Explain how drugs are analyzed using GC Mass Spec and Infrared Spectrophotometry - Describe different chemical spot tests that are used to analyze drugs	Laboratory Investigations: <i>Effective Communication Skills:</i> Drug Presentations: Students will research and present the physiological and neurological effects of drugs on the body. The goal is to understand how the desired effects of the drug lead to the negative short term and long term effects. <i>Application of scientific and technical skills and Inquiry investigation where students will analyze data and construct claims:</i> White Powder Lab: Students will perform various chemical tests to distinguish drug samples from each other culminating in identifying an unknown white powder. Over the Counter Drug Lab:	Formative and Summative: - Performing various chemical and physical tests to determine types of drugs and poisons and interpret results for crime scene analysis - Research and present the effects of drugs in the body - Demonstrate mastery through: - Summative Assessments - Laboratory activities - Presentation

		Students will perform various chemical tests to distinguish drug samples from each other culminating in identifying unknown pills. ● Coroner’s Report Lab: Students will read coroner’s reports to identify the time, cause, and manner of death of different individuals.	
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
● When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc.	● Use scaffolds, such as prompting to assist with the design process. ● Provide extended time for written responses and reports.	● Use a graphic organizer to categorize concepts. ● Provide an outline for research and design tasks.	● Take on an additional or more complex crime scene challenge. ● Interview someone in the field of forensic science about how they

• Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner	• Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	use the analysis in their profession. • Offer choices, once finished with a basic task, with personal interest being the key.
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Honors Forensic Science		
Unit 7: Serology		
Related Phenomena: Scenario: Crime scene investigators are called to a home where a person is found unconscious at the bottom of the stairs. Blood is splattered on the wall, but there are no witnesses. Was it a fall... or was it foul play? The only clue? The bloodstain pattern on the wall and floor. <i>What can blood spatter patterns tell us about what really happened at a crime scene?</i> Jodi Arias Case what does the blood spatter tell you Nicole Brown Simpson blood on steps- what does the blood spatter tell you		
Pacing: Approximately 2 -3 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-PS2-1 Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Analyzing and Interpreting Data Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.	PS2.A: Forces and Motion • Newton’s second law accurately predicts changes in the motion of macroscopic objects. PS2.A: Forces and Motion • Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. • If a system interacts with objects outside itself, the total momentum of the system can change; however, any such	Cause and Effect • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. Systems and System Models • When investigating or describing a system, the boundaries and

----- Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena - Theories and laws provide explanations in science. - Laws are statements or descriptions of the relationships among observable phenomena. Using Mathematics and Computational Thinking Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. - Use mathematical representations of phenomena to describe explanations.	change is balanced by changes in the momentum of objects outside the system.	initial conditions of the system need to be defined.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What are the characteristics of the various components of blood? - Can one distinguish between different people's blood? - How can blood spatter be used to reconstruct a crime scene?	<u>The students will be able to:</u> - Investigate and interpret ABO blood type data in a crime scene scenario - Examine the component characteristics of blood - Calculate the distance and angle of blood spatter patterns - Measure blood spatter data to in order to determine the point of origin of blood spatter and reconstruct the crime scene	<u>Laboratory Investigations::</u> <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> <u>Microscopic Examination of Blood Activity</u>: Students observe prepared blood smears under the microscope. Record and label <u>ABO Blood Type Lab</u>: Students perform blood typing tests using simulated blood and antibodies. Record, compare and determine whose blood was found at crime scene burglary.	<u>Formative and Summative:</u> - Investigating and interpreting ABO blood type data in a crime scene scenario - Examining the component characteristics of blood - Calculating the distance and angle of blood spatter patterns - Measuring blood spatter data to in order to determine the point of origin of blood spatter and reconstruct the crime scene - Demonstrate mastery through: - Summative assessments

		● Blood Spatter Pattern Lab: Using simulated transfer blood, students explore blood spatter patterns at different heights and angles. Then using this data and calculation, they determine the height and angle of different crime scene spatter patterns.	○ Laboratory activities ○ Class participation
Interdisciplinary Connections	A.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
● When possible, modify assignments	● Provide additional time for project	● Break the design process into	● Offer choices, once finished with a

so the student writes less, has simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	development. • Work with a peer • Break the assignment into smaller pieces. • Utilize graphics to support learning. • Provide an outline of lessons • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher)	smaller pieces. • Conference with the teacher during the process. • Provide a detailed framework for the project design. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	basic task, with personal interest being the key. • Develop and research more complex scenarios both individually and in collaboration with peers.
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Honors Forensic Science		
Unit 8: Analysis of DNA Evidence		
Related Phenomena: Students compare data of people who have been convicted of a crime and exonerated using DNA evidence. Show Gel Electrophoresis results and ask students to determine whose DNA matches. Have students examine data that show number of individuals who were exonerated using DNA- Innocence Project		
Pacing: Approximately 2-3 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.	LS1.A: Structure and Function • Systems of specialized cells within organisms help them perform the essential functions of life. • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i>	Structure and Function • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

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

Asking Questions and Defining Problems

Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

- Ask questions that arise from examining models or a theory to clarify relationships.

Analyzing and Interpreting Data

Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.

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LS1.A: Structure and Function

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. *(secondary)*
(Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)

LS3.A: Inheritance of Traits

- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.

LS3.B: Variation of Traits

- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

Connections to Nature of Science

Science is a Human Endeavor

- Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3)
- Science and engineering are influenced by society and society is influenced by science and engineering.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- What are the characteristics of DNA that are unique to every individual? - How is DNA tested and analyzed?	The students will be able to:: - Explain how nuclear DNA is extracted from cells - Compare coding and non-coding regions of DNA - Describe methods used to separate and differentiate DNA - Explain how a DNA profile is developed - Analyze results of STR report	Laboratory Investigations: <i>Application of scientific and technical skills:</i> DNA Extraction from Strawberries: Students will extract and purify DNA from strawberries as a demonstration of how DNA can be obtained from any cells. <i>Inquiry investigation where students will analyze data and construct claims:</i> Electrophoresis Lab: Students will use micropipettes to load DNA samples into an agarose gel and then run electrophoresis. They will then do DNA fingerprinting to identify a suspect from a crime scene. Elephant DNA Simulation: Students will cut segments of DNA to determine if the sample is African elephant or woolly mammoth DNA	Formative and Summative: - Ability to extract DNA from strawberries - RFLP analysis of simulated elephant and mammoth DNA - Demonstrate mastery through: - Summative Assessments - Laboratory activities
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals).		

	SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. A.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics). 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
• When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Use scaffolds, such as prompting to assist with the design process. • Provide extended time for written responses and reports. • Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time	• Use a graphic organizer to categorize concepts. • Provide an outline for research and design tasks. • Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities	• Take on an additional or more complex crime scene challenge. • Interview someone in the field of forensic science about how they use the analysis in their profession. • Offer choices, once finished with a basic task, with personal interest being the key.

	management • Work with a partner	for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	
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Honors Forensic Science			
Unit 9: Fingerprint Analysis			
Related Phenomena: Scenario: Over the weekend, someone entered your classroom without permission. Nothing major is missing, but your teacher's desk drawer was opened and a snack is gone. The only clue? A partial fingerprint on the desk surface . Campus security pulls a list of possible suspects — people with access over the weekend — but there's no surveillance footage. <i>How can forensic scientists use fingerprints to identify who was present at a scene — and who wasn't?</i>			
Pacing: Approximately 2-3 weeks			
New Jersey Student Learning Standards (NJSLS)			
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.			
Science & Engineering Practices	Disciplinary Core Ideas		Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Analyze complex real-world problems by specifying criteria and constraints for successful solutions.	ETS1.A: Defining and Delimiting Engineering Problems • Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.		Influence of Science, Engineering, and Technology on Society and the Natural World • <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u>
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
• How do forensic scientists analyze fingerprints? • What is the probative value of	<u>The students will be able to:</u> • Create a clear fingerprint;	<u>Laboratory Investigations:</u> <i>Application of Scientific and technical skills as well as Inquiry investigation where students</i>	<u>Formative and Summative:</u> • Creating a clear fingerprint; examining and determining the

fingerprints when reconstructing a crime scene?	examine and determine the type and location of minutiae on their prints - Analyze and compare fingerprints by matching ridge characteristics - Developing and analyzing latent prints off of porous and nonporous surfaces using methods: Dusting with magnetic powder; ninhydrin solution and fuming with cyanoacrylate liquid - Determine the identity of an suspects by using their fingerprints	<i>will analyze data and construct claims:</i> Inking and Rolling Fingerprint Lab: Students ink and roll their all 10 of their fingerprints onto a fingerprint card, then classify and calculate their FBI Classification Fraction. Classification and Minutiae of Fingerprints Activity: Students given other students fingerprints to classify and identify minutiae. Dusting for Latent Fingerprint Lab: Students practice leaving, dusting and lifting latent prints from paper, plastic and glass. Developing latent prints using Ninhydrin and Cyanoacrylate: Students practice leaving, developing and lifting latent prints from paper, plastic and glass using ninhydrin and cyanoacrylate Who stole the poisonous pathogen? Latent Fingerprint lab: Students are given paper and plastic evidence and they must develop, lift and analyze against prints of suspect teachers to determine who stole the poison from Mr.Shields.	type and location of minutiae on their prints - Analyzing and comparing fingerprints by matching ridge characteristics - Developing and analyzing latent prints off of porous and nonporous surfaces using methods: Dusting with magnetic powder; ninhydrin solution and fuming with cyanoacrylate liquid - Determining the identity of an suspects by using their fingerprints - Demonstrate mastery through: - Summative Assessments - Laboratory activities
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		

Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
- When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. - Provide models of completed homework assignments, projects, etc. - Assign a native language partner. - Use sentence/paragraph frames to assist with writing peer review. - Provide extended time for written responses and reports.	- Provide additional time for project development. - Work with a peer - Break the assignment into smaller pieces. - Utilize graphics to support learning. - Provide an outline of lessons - Get a written list of instructions - Receive large project as smaller tasks with individual deadlines - Work or take a test in a different setting, such as a quiet room with few distractions - Sit where they learn best (for example, near the teacher)	- Break the design process into smaller pieces. - Conference with the teacher during the process. - Provide a detailed framework for the project design. - Incorporate student choice - Provide peer mentoring to improve techniques - Use effort and achievement rubrics - Assure students they can be successful - Promote mastery or challenging tasks - Allow students many opportunities for practice and learning - Use scaffolding for complex tasks - Evaluate students on the basis of mastery and not one another.	- Offer choices, once finished with a basic task, with personal interest being the key. - Develop and research more complex scenarios both individually and in collaboration with peers.

Honors Forensic Science		
Unit 10: Arson and Explosion Investigation		
Related Phenomena: Students will examine burn patterns to determine the cause of a house fire.		
Pacing: Approximately 2-3 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts

Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. Analyze complex real-world problems by specifying criteria and constraints for successful solutions.	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u>
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	PS2.B: Types of Interactions Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	Structure and Function Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- Why do certain chemicals burn with very specifically colored flames? - How can the presence of an accelerant be analyzed to determine if a fire was an accident or not?	The students will be able to: Distinguish accelerants in arson investigation	Laboratory Investigations: <i>Inquiry investigation where students will analyze data and construct claims:</i> <u>Flame Testing of Metal Salts Lab:</u> Students will conduct flame tests of metal salts as part of an arson investigation to identify an accelerant left at the crime scene.	Formative and Summative: - Ability to flame test different metal salts - Analyzing different types of arson evidence to solve a crime - Demonstrate mastery through: - Summative Assessments - Laboratory activities - Class participation

Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept).
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	W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
• When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Use scaffolds, such as prompting to assist with the design process. • Provide extended time for written responses and reports. • Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management	• Use a graphic organizer to categorize concepts. • Provide an outline for research and design tasks. • Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning	• Take on an additional or more complex crime scene challenge. • Interview someone in the field of forensic science about how they use the analysis in their profession. • Offer choices, once finished with a basic task, with personal interest being the key.

	• Work with a partner	• Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	
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Honors Forensic Science		
Unit 11: Ballistics, Firearms and Tool Marks		
Related Phenomena: Scenario: Police respond to a loud bang in a neighborhood. A window is shattered, and a bullet is found lodged in a wall. But no gun is found , and no one saw the shooter. The bullet is intact, and the question now is: <i>Can this bullet lead us to the weapon—and the shooter—without the gun itself? How can forensic scientists match bullets and shell casings to specific firearms and reconstruct shooting events?</i>		
Pacing: Approximately 2 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Analyzing and Interpreting Data Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.	ETS1.A: Defining and Delimiting Engineering Problems • Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. PS2.A: Forces and Motion • Newton's second law accurately predicts changes in the motion of macroscopic objects. PS2.B: Types of Interactions • Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	Influence of Science, Engineering, and Technology on Society and the Natural World • <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Cause and Effect • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. Structure and Function • Investigating or designing new systems or structures requires a detailed examination of the

----- Connections to Nature of Science Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena - Theories and laws provide explanations in science. - Laws are statements or descriptions of the relationships among observable phenomena. Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating the validity and reliability of the claims, methods, and designs. - Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).			properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
Essential Questions		Student Learning Objectives	Evidence of Learning (Assessment)
- How do forensic scientists analyze bullets? - How are different types of firearms that are analyzed by forensic scientists? - How can bullets be used to reconstruct a crime scene? - When and how are tool marks examined by a forensic scientist?	<u>The students will be able to:</u> - Examine and identify different types of bullets and cartridges - Measure the caliber of bullets and bullet holes - Research the different types of firearms that are seen at crime scenes - Calculate angle and point of origin of a bullet trajectory - Analyze the rifling of crime scene gun barrels and determine which was the one that fired the shot based on the bullets found	<u>Laboratory Investigations:</u> <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> Bullet Analysis Lab: Students observe, compare, measure and record different types of bullets. Cartridge Analysis Lab: Students observe, compare, measure and record different types of cartridge cases Ballistics Lab: Students analyze the rifling of crime scene gun barrels and identify the direction and number of lands and grooves. Then determine	<u>Formative and Summative:</u> - Examining and identifying different types of bullets and cartridges - Measuring the caliber of bullets and bullet holes - Researching the different types of firearms that are seen at crime scenes - Calculating angle and point of origin of a bullet trajectory - Analyzing the rifling of crime scene gun barrels and determining which was the one that fired the shot based on the

	Examine and recreate various tool marks and use to interpret the mark found at the crime scene	the type of bullet that may have been fired from the gun of that barrel based on the bullets found. <u>Gunshot Distance Lab</u>: Students analyze and measure the patterns from shots fired from at different distances. <u>Tool Mark Analysis Lab</u>: Examine and recreate various tool marks and use to interpret which screw driver could have made the mark found at the crime scene	bullets found - Examining and recreating various tool marks and use to interpret the mark found at the crime scene - Demonstrate mastery through: - Summative Assessments - Laboratory activities - Class participation
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
When possible, modify assignments so the student writes less, has simpler questions to answer, fewer	- Provide additional time for project development. - Work with a peer	- Break the design process into smaller pieces. - Conference with the teacher during	Offer choices, once finished with a basic task, with personal interest being the key.

spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Break the assignment into smaller pieces. • Utilize graphics to support learning. • Provide an outline of lessons • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher)	the process. • Provide a detailed framework for the project design. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	• Develop and research both individually and in collaboration with peers.
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Honors Forensic Science		
Unit 12: Document Analysis		
Related Phenomena: Show them the Anthrax letter and ask what kind evidence can be obtained from it. Jon Benet Ramsey case- note left at scene- what can it tell them?		
Pacing: Approximately 1-2 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. • Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 9–12 builds on K–8 and progresses to evaluating	ETS1.A: Defining and Delimiting Engineering Problems • Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. PS2.B: Types of Interactions	Influence of Science, Engineering, and Technology on Society and the Natural World • <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Structure and Function • Investigating or designing new systems or structures requires a detailed examination of the

the validity and reliability of the claims, methods, and designs. Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.	properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.	
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- How can class and individual characteristics of handwriting be used to identify a suspect? - How are chemical and physical tests used to distinguish paper and ink from each other?	The students will be able to:: - Identify an individual by their handwriting - Distinguish different types of ink and paper	Laboratory Investigations: <i>Inquiry investigation where students will analyze data and construct claims:</i> Document Analysis Lab: Students analyze handwriting, paper, ink, erasures, obliterations, and indented writing to determine if a document was forged. Ink Chromatography: Students will conduct paper chromatography on different types of black ink to determine which suspect left a threatening note at a crime scene Art Forgery Lab Kit: Students test “artwork” for evidence of forgery.	Formative and Summative: - Analyzing and comparing different types of ink and paper - Paper Chromatograms of different types of black ink - Analyzing handwriting to identify an individual - Demonstrate mastery through: - Summative Assessments - Laboratory activities
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals).		

	SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
• When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Use scaffolds, such as prompting to assist with the design process. • Provide extended time for written responses and reports. • Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner	• Use a graphic organizer to categorize concepts. • Provide an outline for research and design tasks. • Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques. • Use effort and achievement rubrics • Assure students they can be successful. • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	• Take on an additional or more complex crime scene challenge. • Interview someone in the field of forensic science about how they use the analysis in their profession. • Offer choices, once finished with a basic task, with personal interest being the key.

Honors Forensic Science		
Unit 13: Human Remains		
Related Phenomena: Students will examine the data collected during an autopsy and try to determine the cause of death.		
Pacing: Approximately 4 -6 weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. - Analyze complex real-world problems by specifying criteria and constraints for successful solutions. Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. - Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Planning and Carrying Out Investigations Planning and carrying out in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. - Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. LS1.A: Structure and Function - Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. LS1.A: Structure and Function - Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u> Systems and System Models - Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. Stability and Change - Feedback (negative or positive) can stabilize or destabilize a system.

needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
- How do forensic anthropologists analyze skeletal remains? - How do forensic pathologists determine the cause and manner of death? - What happens during an autopsy? - How does a forensic entomologist calculate the post-mortem interval? - Why are insects used by forensic scientists? - What kinds of information can be found from examining the stomach contents of the decedent? - How does an odontologist examine teeth and what kinds of information can be derived?	The students will be able to - Measure and analyze the physical characteristics of skulls, hips and long bones - Interpret the measurements of crime scene bones to determine the identity of the victim - Measure and calculate PMI of several descendents using insect larvae - Describe how a pathologist would perform an autopsy - Explain how a body would decompose - Analyze the stomach contents and bodily fluids of the decedent and determine cause of death - Examine teeth impressions for determining the identification of remains	Laboratory Investigations: <i>Application of Scientific and technical skills as well as Inquiry investigation where students will analyze data and construct claims:</i> No Bones About It Lab: Students measure their actual height and compare this height to the calculated height using the lengths of their humerus and femur. Sherlock Bones Lab: Students measure and record characteristics of skull, pelvis, humerus and femur. Comparing characteristics of age, sex, height, race. Using data determine this information for crime scene skeleton Of Maggots and Murder Entomology Lab: Students measure lengths of “pipe cleaner” maggots and using data from entomologist chart determine the post mortem interval	Formative and Summative: - Measuring and analyzing the physical characteristics of skulls, hips and long bones - Interpreting the measurements of crime scene bones to determine the identity of the victim - Measuring and calculating PMI of several descendents using insect larvae - Describing how a pathologist would perform an autopsy - Explaining how a body would decompose - Analyzing the stomach contents and bodily fluids of the decedent and determine cause of death - Examining teeth impressions for determining the identification of remains - Demonstrate mastery through:

		of 4 different crime scenes ● <u>Preserved Maggots Mini Lab:</u> Students observe preserved maggots, measure and record. Determine PMI ● <u>Interactive Autopsy Lab:</u> https://www.le.ac.uk/pa/teach/va/ti/tpag1.html students investigate different cases and based on the data determine the cause of death. ● <u>Murder and Meal Lab:</u> Students investigate the “stomach contents” of the decedent by performing biochemical tests and based on these results determine where the decedent might have eaten their last meal. ● <u>Coroner’s Report Lab-</u> simulated blood and urine is used and analyzed performing biochemical tests. Students use this data to determine how the decedent could have died. ● <u>Odontology Lab-</u> Students use styrofoam cups or sticks of gum to make teeth impressions. They observe and record data. Then students create crime scenes where one the impressions are used and must be analyzed.	○ Tests/Quizzes ○ Laboratory activities ○ Class participation
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals).		

	SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
- When possible, modify assignments so the student writes less, has simpler questions to answer, fewer spelling words, etc. - Provide models of completed homework assignments, projects, etc. - Assign a native language partner. - Use sentence/paragraph frames to assist with writing peer review. - Provide extended time for written responses and reports.	- Provide additional time for project development. - Work with a peer - Break the assignment into smaller pieces. - Utilize graphics to support learning. - Provide an outline of lessons - Get a written list of instructions - Receive large project as smaller tasks with individual deadlines - Work or take a test in a different setting, such as a quiet room with few distractions - Sit where they learn best (for example, near the teacher)	- Break the design process into smaller pieces. - Conference with the teacher during the process. - Provide a detailed framework for the project design. - Incorporate student choice - Provide peer mentoring to improve techniques - Use effort and achievement rubrics - Assure students they can be successful - Promote mastery or challenging tasks - Allow students many opportunities for practice and learning - Use scaffolding for complex tasks - Evaluate students on the basis of mastery and not one another.	- Offer choices, once finished with a basic task, with personal interest being the key. - Develop and research both individually and in collaboration with peers.

Honors Forensic Science			
Unit 14: Forensic Psychology			
Related Phenomena: Students are asked to list the characteristics of a serial killer. Then, in groups collaborate, design a poster that lists them. Finally, the teacher then shows what forensic psychologists would list as the most common traits.			
Pacing: Approximately 2-3 weeks			
New Jersey Student Learning Standards (NJSLS)			
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.			
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts	
Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. Analyze complex real-world problems by specifying criteria and constraints for successful solutions.	ETS1.A: Defining and Delimiting Engineering Problems - Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. - Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.	Influence of Science, Engineering, and Technology on Society and the Natural World <u>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</u>	
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)

- Why do people engage in criminal behaviors? - Are serial killers born or made?	The students will be able to: - Explain why people engage in criminal behaviors - Analyze the components of the MacDonald Triad	Laboratory Investigations: <i>Effective Communication Skills:</i> <u>Serial Killer Friday</u>: Students will examine the field of forensic psychology by attempting to understand the minds of some of the world's most twisted individuals... serial killers. Students will research and present information about a serial killer of their choice and will attempt to explain why they committed the acts they did.	Formative and Summative: - Research and present the life and crimes of a serial killer - Demonstrate mastery through: - Class participation - Presentation
Interdisciplinary Connections	RI.MF.11–12.6. Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept). W.SE.11–12.6. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (MLA or APA Style Manuals). SL.II.11–12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. SL.PI.11–12.4. Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.		
Career Readiness, Life Literacies and Key Skills	9.1.12.PB.2 Prioritize financial decisions by considering alternatives and possible consequences. 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).		
Computer Science & Design Thinking	8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).		
Modifications			
Multi-Lingual Learners	Students with Special Needs	At-Risk	Gifted and Talented
When possible, modify assignments so the student writes less, has	Use scaffolds, such as prompting to assist with the design process.	Use a graphic organizer to categorize concepts.	Take on an additional or more complex crime scene challenge.

simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports.	• Provide extended time for written responses and reports. • Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner	• Provide an outline for research and design tasks. • Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another.	• Interview someone in the field of forensic science about how they use the analysis in their profession. • Offer choices, once finished with a basic task, with personal interest being the key.
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Course Resources

- 2026 New Jersey Student Learning Standards for Science – <https://www.nj.gov/education/standards/science/2026/>
- New Jersey Student Learning Standards (All Content Areas) – <https://www.nj.gov/education/standards/>
- New Jersey Department of Education Climate Change Resources – <https://www.nj.gov/education/climate/>
- FBI Crime Laboratory – <https://www.fbi.gov/services/laboratory>
- FBI Handbook of Forensic Services – <https://www.fbi.gov/services/laboratory/handbook-of-forensic-services>
- National Institute of Justice (NIJ) Forensics – <https://nij.ojp.gov/topics/forensics>
- National Institute of Standards and Technology (NIST) Forensic Science – <https://www.nist.gov/forensics>
- Organization of Scientific Area Committees (OSAC) for Forensic Science – <https://www.nist.gov/osac>
- American Academy of Forensic Sciences – <https://www.aafs.org/>
- National Center for Forensic Science – <https://ncfs.ucf.edu/>
- Forensic Technology Center of Excellence – <https://forensiccce.org/>
- International Association for Identification – <https://www.theiai.org/>
- Crime Scene Investigator Network – <https://www.crime-scene-investigator.net/>
- Forensic Magazine – <https://www.forensicmag.com/>
- National Missing and Unidentified Persons System (NamUs) – <https://namus.nij.ojp.gov/>
- Innocence Project – <https://innocenceproject.org/>
- The National Registry of Exonerations – <https://www.law.umich.edu/special/exoneration/>
- O.J. Simpson Trial Archive (Court TV) – <https://www.courtstv.com/>
- Supreme Court of the United States Opinions – <https://www.supremecourt.gov/opinions/opinions.aspx>
- Justia U.S. Supreme Court Cases – <https://supreme.justia.com/>
- National Center for State Courts – <https://www.ncsc.org/>
- FBI Uniform Crime Reporting Program – <https://www.fbi.gov/services/cjis/ucr>

- Bureau of Justice Statistics – <https://bjs.ojp.gov/>
- Centers for Disease Control and Prevention (CDC) – <https://www.cdc.gov/>
- National Institutes of Health (NIH) – <https://www.nih.gov/>
- National Library of Medicine – <https://www.nlm.nih.gov/>
- PubMed – <https://pubmed.ncbi.nlm.nih.gov/>
- MedlinePlus – <https://medlineplus.gov/>
- National Human Genome Research Institute – <https://www.genome.gov/>
- Genetics Home Reference (MedlinePlus Genetics) – <https://medlineplus.gov/genetics/>
- DNA Learning Center (Cold Spring Harbor Laboratory) – <https://www.dnalc.org/>
- HHMI BioInteractive – <https://www.biointeractive.org/>
- OpenStax Biology 2e – <https://openstax.org/details/books/biology-2e>
- OpenStax Chemistry 2e – <https://openstax.org/details/books/chemistry-2e>
- Khan Academy Biology – <https://www.khanacademy.org/science/biology>
- Khan Academy Chemistry – <https://www.khanacademy.org/science/chemistry>
- ExploreLearning Gizmos – <https://gizmos.explorelearning.com/>
- POGIL (Process Oriented Guided Inquiry Learning) – <https://pogil.org/>
- Crash Course Forensic Science Playlist – https://www.youtube.com/results?search_query=crash+course+forensic+science
- Crash Course Chemistry – <https://www.youtube.com/playlist?list=PL8dPuuaLjXtPHzzYuWy6fYEaX9mOO8oGr>
- Crash Course Biology – <https://www.youtube.com/playlist?list=PL3EED4C1D684D3ADF>
- National Weather Service – <https://www.weather.gov/>
- American Chemical Society – <https://www.acs.org/>
- Royal Society of Chemistry – <https://edu.rsc.org/>
- National Fire Protection Association – <https://www.nfpa.org/>
- Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) National Center for Explosives Training and Research – <https://www.atf.gov/>
- Radiopaedia – <https://radiopaedia.org/>
- Visible Body – <https://www.visiblebody.com/>
- BioDigital Human – <https://human.biodigital.com/>
- University of Utah Learn Genetics – <https://learn.genetics.utah.edu/>
- Smithsonian Human Origins Program – <https://humanorigins.si.edu/>
- U.S. Bureau of Labor Statistics Occupational Outlook Handbook – <https://www.bls.gov/ooh/>
- O*NET OnLine – <https://www.onetonline.org/>
- CareerOneStop – <https://www.careeronestop.org/>
- ExploreHealthCareers.org – <https://explorehealthcareers.org/>
- New Jersey Career Assistance Navigator (NJCAN) – <https://portal.njcis.intocareers.org/>
- New Jersey Department of Labor and Workforce Development – <https://www.nj.gov/labor/>
- New Jersey State Police Office of Forensic Sciences – <https://www.njsp.org/division/investigations/office-of-forensic-sciences.shtml>
- Bergen County Sheriff's Office Bureau of Criminal Identification – <https://www.bcsonj.org/>
- FBI Famous Cases – <https://www.fbi.gov/history/famous-cases>
- Forensic Science: An Insider's Guide (YouTube) – <https://www.youtube.com/watch?v=PbEVwQdWdAQ>
- About Forensics – Case Studies – <http://aboutforensics.co.uk/case-studies/>
- Science.gov Forensic Case Studies – <https://www.science.gov/topicpages/f/forensic+case+study.html>
- Murderpedia – <https://murderpedia.org/>
- ExploreLearning Gizmos – <https://www.explorelearning.com/>
- Innocence Project – <https://innocenceproject.org/>

- Forensic Files
- Blackboard Learn
- Spanish for Law Enforcement – https://www.123teachme.com/learn_spanish/spanish_for_law_enforcement