

FREEHOLD REGIONAL HIGH SCHOOL DISTRICT

OFFICE OF CURRICULUM AND INSTRUCTION

SCIENCE DEPARTMENT

LAB FORENSIC SCIENCE

Grade Level: 11-12

Credits: 2.5

BOARD OF EDUCATION ADOPTION DATE:

AUGUST 30, 2010

[SUPPORTING RESOURCES AVAILABLE IN DISTRICT RESOURCE SHARING](#)

APPENDIX A: ACCOMMODATIONS AND MODIFICATIONS

APPENDIX B: ASSESSMENT EVIDENCE

APPENDIX C: INTERDISCIPLINARY CONNECTIONS

Course Philosophy

Lab Forensic Science is the application of inquiry-based laboratory science skills to criminal and civil law. In criminal cases, forensic science examines physical evidence that can be used to establish connections between individuals and criminal events and circumstances. The application of the scientific method is essential to Forensic Science – observation, collection of data, classification of evidence, examining relationships, forming and testing hypotheses and drawing conclusions are useful for determining the evidential value of crime scene and related evidence. Students will learn to work in teams and utilize forensic science techniques, critical thinking skills, problem-solving skills, and technology in order to analyze crime scene evidence. The ultimate goal is to provide the students with 21st Century Learning skills and an overall view of Forensic Science which has been subject to increased interest and popularity in recent years.

Course Description

This half-year laboratory course for juniors and seniors provides an introduction to the field of forensic science. The course of study includes the applications of forensic science concepts (which involves biology, chemistry, and physics) to analyze and investigate evidence that may be discovered in a criminal investigation. Classroom activities include: laboratory investigations and activities, research projects, famous case studies, lab practicums, career exploration, and the infusion of technology throughout the scope of the course.

**Freehold Regional High School District
Curriculum Map
Lab Forensic Science**

Relevant Standards ¹	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic (before)	Formative (during)	Summative (after)
5.1.12 B1-4 ; C1-3; D1-3 8.1.12 F1-2 9.1.12 A1, A4 9.1.12 F2, F6	Forensic Science is the integration of core scientific disciplines.	How has Forensic Science developed over time due to advances in science, technology and society? How has science become integrated into the practice of law? How do fictitious portrayals of Forensic Science compare to real-world Forensic Science?	Pretest Student Survey Oral Questions and Discussion Anticipatory Set Questions	Quizzes Chapter Test Written Assignments Oral Presentations Research Assignments Laboratory Investigations	Lab Practicum Projects Final Exam
5.1.12 B1-4 ; C1-3; D1-3 8.1.12 F1-2 9.1.12 A1, A4 9.1.12 F2, F6	Forensic science involves a variety of careers.	What services does a crime lab provide to law enforcement personnel? Which professionals make up a crime scene unit? What contributions do the forensic scientists make to an investigation? What are the differences between perceived and actual roles of forensic scientists?	Pretest Student Survey Oral Questions and Discussion Anticipatory Set Questions	Quizzes Chapter Test Written Assignments Oral Presentations Research Assignments Laboratory Investigations	Lab Practicum Projects Final Exam
5.1.12 A1-3 5.1.12 B1-4 ; C1-3; D1-3 8.1.12 F1-2 9.1.12 A1, A4 9.1.12 F2, F6	Crime scenes must be processed in a procedural manner.	Why must a crime scene be secured and processed in a methodical and procedural manner? How is the location and handling of evidence essential to crime scene investigation?	Pretest Student Survey Oral Questions and Discussion Anticipatory Set Questions	Quizzes Chapter Test Written Assignments Oral Presentations Research Assignments Laboratory Investigations	Lab Practicum Projects Final Exam
5.1.12 A1-3 5.1.12 B1-4 ; C1-3; D1-3 5.2.12 E1-3 5.3.12 A1-6 ; B1-2 ; D1 8.1.12 F1-2 9.1.12 A1, A4 9.1.12 F2, F6	Evidence determines the method by which a crime has been committed.	How is evidence used to determine whether a crime has been committed? How are various types of evidence tested and analyzed? What is the value of different types of evidence?	Pretest Student Survey Oral Questions and Discussion Anticipatory Set Questions	Quizzes Chapter Test Written Assignments Oral Presentations Research Assignments Laboratory Investigations	Lab Practicum Projects Final Exam

**Freehold Regional High School District
Course Proficiencies and Pacing
LAB FORENSIC SCIENCE**

Unit Title	Unit Understandings and Goals	Recommended Duration
Unit #1: Introduction to Forensic Science	Forensic Science is the integration of core scientific disciplines. Forensic science involves a variety of careers. <ol style="list-style-type: none"> 1. Students will recognize the major contributors to the development of Forensic Science including the advancements in tools, techniques, and crime lab services. 2. Students will identify various specialty professions within the field of Forensic Science. 3. Students will explain the differences between the perceived and actual roles of a forensic scientist. 	2 weeks
Unit #2: Crime Scene Investigation and Evidence Collection	Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed. <ol style="list-style-type: none"> 1. Students will explain the procedures used to process a crime scene. 2. Students will explain the proper way to classify and process evidence. 	3 weeks
Unit #3: Fingerprints and other Pattern Evidence	Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed. <ol style="list-style-type: none"> 1. Students will identify patterns and characteristics of various types of pattern evidence. 2. Students will demonstrate various procedures used by the forensic scientist when collecting and preserving impression evidence. 3. Students will explain the importance of impression databases available to forensic scientists. 	2 weeks
Unit #4: Trace Evidence	Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed. <ol style="list-style-type: none"> 1. Students will identify trace evidence characteristics that are most useful in forensic comparisons. 2. Students will demonstrate procedures used by the forensic scientist when processing trace evidence. 3. Students will explain the importance of trace evidence databases available to forensic scientists. 	2 weeks

Unit Title	Unit Understandings and Goals	Recommended Duration
Unit #5: Document Examination	<p>Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed.</p> <ol style="list-style-type: none"> 1. Students will identify the characteristics of questioned documents that are most useful in forensic comparisons. 2. Students will demonstrate procedures used by forensic scientists to process questioned documents. 3. Students will explain the importance of evidence databases available to forensic scientists. 	2 weeks
Unit #6: Serology and Blood Pattern Analysis	<p>Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed.</p> <ol style="list-style-type: none"> 1. Students will identify characteristics of body fluids that are most useful in forensic comparisons. 2. Students will demonstrate procedures used by forensic scientists when processing blood evidence. 3. Students will explain the importance of evidence databases available to forensic scientists. 	2 weeks
Unit #7: DNA	<p>Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed.</p> <ol style="list-style-type: none"> 1. Students will identify the characteristics of DNA that is most useful in forensic comparisons. 2. Students will demonstrate procedures used by the forensic scientist when processing DNA evidence. 3. Students will explain the importance of DNA databases available to forensic scientists. 	2 weeks
Unit #8: Forensic Pathology and Anthropology	<p>Crime scenes must be processed in a procedural manner. Evidence is needed to determine the method by which a crime has been committed.</p> <ol style="list-style-type: none"> 1. Students will identify the characteristics of human remains that are most useful in forensic comparisons. 2. Students will demonstrate procedures used by the forensic scientist when processing human remains. 	2 weeks

Freehold Regional High School District
Lab Forensic Science
Unit #1: Introduction to Forensic Science

Enduring Understandings: Forensic Science is the integration of core scientific disciplines.
 Forensic science involves a variety of careers.

Essential Questions: How has Forensic Science developed over time due to advances in science, technology and society?
 How has science become integrated into the practice of law? How do fictitious portrayals of Forensic Science compare to real-world Forensic Science? What services does a crime lab provide to law enforcement personnel?
 Which professionals make up a crime scene unit? What contributions do the forensic scientists make to an investigation?
 What are the differences between perceived and actual roles of forensic scientists?

Unit Goals: Students will recognize the major contributors to the development of Forensic Science including the advancements in tools, techniques, and crime lab services.

Students will identify various specialty professions within the field of Forensic Science.

Students will explain the differences between the perceived and actual roles of a forensic scientist.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 B1-4, C1-3, D1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is forensic science and why has science become integrated into the practice of law?	Historical timeline of forensic science advancements and development of early crime labs Locard's Exchange Principle Admissibility of evidence (Frye and Daubert decisions) Role and responsibilities of the expert witness	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools and Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: create a 'table for 2' mini crime scene that tests student powers of observation and objectivity; use a white t-shirt and magnifying glass to demonstrate Locard's Evidence Exchange Principle	Written tests and quizzes Worksheets Lab; Activity Project assessments Research activities such as famous case studies using trutv.com Webquests
Who are the major contributors to the development of forensic science?	Historical timeline of forensic science advancements and development of early crime labs Locard's Exchange Principle Admissibility of evidence (Frye and Daubert decisions) Role and responsibilities of the expert witness	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools and Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: create a 'table for 2' mini crime scene that tests student powers of observation and objectivity; use a white t-shirt and magnifying glass to demonstrate Locard Evidence Exchange Principle	Written tests and quizzes Worksheets Lab; Activity Project assessments Research activities such as "famous forensic scientists and their contributions" or "careers in forensic science"

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the various specialty fields included within the broad realm of forensic science?	<p>Services of a typical comprehensive crime laboratory and comparison of modern labs due to demographics</p> <p>Specialty areas: pathology, entomology, anthropology, toxicology, serology, medical examiner/coroner, botany, odontology, podiatry, psychiatry, engineering, and other expert fields relating to forensics</p>	<p>Current textbook</p> <p>Notes; Handouts</p> <p>Internet; Mobile computer lab centers</p> <p>Laboratory Tools, Appropriate hands-on materials, Safety Equipment</p> <p>Video; Multimedia resources</p> <p>Community resources; Guest Speakers</p>	<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: match forensic professionals to job descriptions</p>	
How do real world roles and responsibilities of forensic professionals compare to fictitious versions portrayed on film?	<p>Actual versus fictitious examples</p> <p>CSI Effect</p>	<p>Current textbook</p> <p>Notes; Handouts</p> <p>Internet; Mobile computer lab centers</p> <p>Laboratory Tools and Safety Equipment</p> <p>Video; Multimedia resources</p> <p>Community resources; Guest Speakers</p> <p>Current Event Articles</p>	<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: student dissection of a fictitious portrayal of forensic professionals (such as seen on CSI) to highlight accuracy and embellishment as seen through their inexperienced eyes</p> <p>Video such as: “Anderson Cooper 360 The CSI Effect”</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab; Activity</p> <p>Project assessments</p> <p>Research activities such as “careers in forensic science” or “CSI inaccuracies or myths” or “CSI Effect examples”</p> <p>Webquests such as: csitheexperience.org</p>

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #2: Crime Scene Investigation and Evidence Collection

Enduring Understandings: Crime scenes must be processed in a procedural manner.
 Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: Why must a crime scene be secured and processed in a methodical and procedural manner?
 How is the location and handling of evidence essential to crime scene investigation?
 How is evidence used to determine whether a crime has been committed?
 What is the value of different types of evidence?

Unit Goals: Students will explain the procedures used to process a crime scene.
 Students will explain the proper way to classify and process evidence.

Duration of Unit: 3 weeks
NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 5.3.12 A1-6, B1-2, D1; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the responsibilities of the first responder and scene technicians at a crime scene?	Steps in securing, preserving, and processing a crime scene	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: Create a crime scene for students to process, (indoor and/or outdoor) including take notes/description of scene, search/locate evidence, evidence marking, measurements, drawings, photography, sketches, evidence evaluation and/or collection	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Webquest
How do investigators systematically search for crime scene evidence?	Primary/Secondary crime scenes Staged crimes Search patterns	Current textbook Notes; Handouts Internet; Mobile computer lab centers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: Create a crime scene for students to process, (indoor and/or outdoor) including take notes/description of	Written tests and quizzes Worksheets Lab / Activity Project assessments

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What steps should be taken to thoroughly document, diagram, and reconstruct the crime scene?	Observations about crime scene environment Evidence marking Crime Scene and evidence Photography Crime scene sketches			
How is evidence properly recognized, collected, and packaged?	Crime scene and evidence contamination Examples of evidence packaging materials Chain of custody			
How is evidence classified?	Direct versus circumstantial Individual versus class Types of evidence (biological, chemical, etc.) Probative value Eyewitness testimony		Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: staged disruption of class and subsequent questioning of students for eye witness details	

Suggestions on how to differentiate in this unit:

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- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #3: Fingerprints and Other Pattern Evidence

Enduring Understandings: Crime scenes must be processed in a procedural manner.
 Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation?
 How is evidence used to determine whether a crime has been committed?
 How are various types of evidence tested and analyzed?
 What is the value of different types of evidence?

Unit Goals: Students will identify patterns and characteristics of various types of pattern evidence.
 Students will demonstrate various procedures used by the forensic scientist when collecting and preserving impression evidence.
 Students will explain the importance of impression databases available to forensic scientists.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How is a fingerprint created?	Physical development and structure of human fingerprints Secretions that make a fingerprint on surfaces Class versus individual evidence Fingerprints do not change over time; altering or disguising fingerprints	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: create fingerprints on various surfaces and compare	Written tests; quizzes Worksheets Lab / Activity Research activities such as John Dillinger Webquest
What are the three major fingerprint patterns and their respective sub-classes?	Loop, whorl, arch characteristics Common ridge characteristics (minutiae)	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: ink transfer a print onto a balloon and enlarge to view ridge characteristics; identify various fingerprint examples by pattern	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as sciencespot.net
What are the three basic types of fingerprint impressions?	Latent, patent (visible), plastic	Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: ink transfer or pencil smudge method to create a ten card; teacher demo or student creation of latent, patent, and plastic prints for comparison	Famous Case Study to research such as: The Night Stalker (Richard Ramirez) Webquests

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What methods are used to locate, collect or develop fingerprints?	<p>Techniques used to collect fingerprint exemplars</p> <p>Latent print techniques: powders, iodine, ninhydrin, cyanoacrylate (super glue), silver nitrate, etc.</p>		<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: inking and rolling of prints and identification of ridge patterns; press a hand to plain white paper and then dust to determine if student is a 'secretor' or not; dusting and lifting prints from various surfaces</p> <p>Teacher Demo such as: print rolling, dusting and lifting techniques</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities such as the Assassination of Martin Luther King, Jr.</p> <p>Webquests</p>
What methods are used to compare and store fingerprint records?	<p>Bertillion System of Classification (Biometrics)</p> <p>AFIS and IAFIS</p> <p>Criteria for inclusion in databases</p>	<p>Current textbook</p> <p>Notes; Handouts</p> <p>Internet; Mobile computer lab centers</p> <p>Laboratory Tools, Appropriate hands-on materials, Safety Equipment</p>	<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: students create a "Bertillion Measurement Card"</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities</p> <p>Webquests</p>
What are other types of pattern evidence?	<p>Types: shoe prints, foot prints, lip prints, palm prints, bite marks, tool marks, tire marks, firearms/ballistics, voice prints, etc.</p>	<p>Video; Multimedia resources</p>	<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p>
How are other types of pattern evidence analyzed and preserved and what do they reveal?	<p>Casting, comparison microscopy</p> <p>Other impression databases</p>	<p>Community resources; Guest Speakers</p> <p>Current Event Articles</p>	<p>Hands-on lab activities and cooperative group work such as: use of baby powder to create and evaluate 2D shoe prints; casting/evaluation of impression evidence in 3D using dental stone/"dough" etc. ; comparison of tool marks made in hobby candle wax blocks by 'unknown' tools to a set of 'known' tools; fracture matching under stereoscope</p>	<p>Project assessments</p> <p>Research activities</p> <p>Famous Case Study to research such as: Ted Bundy; The Beltway Snipers</p> <p>Webquests</p>

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #4: Trace Evidence

Enduring Understandings: Crime scenes must be processed in a procedural manner.
Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation?
How is evidence used to determine whether a crime has been committed?
How are various types of evidence tested and analyzed?
What is the value of different types of evidence?

Unit Goals: Students will identify trace evidence characteristics that are most useful in forensic comparisons.
Students will demonstrate procedures used by the forensic scientist when processing trace evidence.
Students will explain the importance of trace evidence databases available to forensic scientists.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is the structure of hair?	Morphology: cuticle, cortex, medulla, cortical fusi, ovoid bodies, root, follicle, pigment granules, follicular tag Medulla and scale patterns	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: microscopic examination of human hair, other animal species hair; clear nail polish to cast human hair scale patterns	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as sciencespot.net Webquests
What key pieces of information can be obtained from microscopic examination of hair?	Human versus animal species determination Race determination Origin of location on the body Manner of removal DNA and toxicology analysis Hair comparisons / collection of controls Probative value of hair evidence	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: students collect and examine hair from a “crime scene” for comparison using a microscope	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Famous Case Study Research such as: Napoleon’s hair toxicology Webquests

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How can different types of fibers be distinguished and identified?	<p>Synthetic versus natural fibers</p> <p>Test methods used for identification</p> <p>Probative value of fiber evidence</p>		<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: microscopic examination/comparison of natural and synthetic fibers; students collect and examine fibers from a “crime scene” for comparison using a microscope</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities</p> <p>Famous Case Study to research such as: Wayne Williams (Atlanta Child Murders) ; Jeffrey MacDonald</p> <p>Webquests (sciencespot.net)</p>
How are other types of trace evidence collected, analyzed and used in an investigation?	<p>Examples may include: soil/dust, plant material, paint, glass, metal</p>	<p>Current textbook</p> <p>Notes; Handouts</p> <p>Internet; Mobile computer lab centers</p> <p>Laboratory Tools, Appropriate hands-on materials, Safety Equipment</p> <p>Video; Multimedia resources</p> <p>Community resources; Guest Speakers</p> <p>Current Event Articles</p>	<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: microscopic examination of soil types/plant material/dust/metal/glass etc.; students collect and examine other types of trace evidence from a “crime scene” for comparison using a microscope; fracture matching using stereoscopes</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities</p> <p>Webquests</p>

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #5: Document Examination

Enduring Understandings: Crime scenes must be processed in a procedural manner.
 Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation?
 How is evidence used to determine whether a crime has been committed?
 How are various types of evidence tested and analyzed?
 What is the value of different types of evidence?

Unit Goals: Students will identify the characteristics of questioned documents that are most useful in forensic comparisons.
 Students will demonstrate procedures used by forensic scientists to process questioned documents.
 Students will explain the importance of evidence databases available to forensic scientists.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3 ; 8.1.12 F1-2 ; 9.1.12 A1, A4 ; 9.1.12 F2

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
Define “questioned document” and give examples.	Questioned document (types): letters/notes, contracts, wills, identity theft (checks, passports, licenses, birth/death cert., and credit cards), autographs, diaries, artwork, paper money, etc. Document and handwriting experts	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: self-evaluation of student created writing sample; evaluation of student created writing sample exemplars in order to match to unknowns (word lists or paragraphs); determine the author of a secret admirer letter written using ‘disguised’ writing; ink chromatography; test grades of paper for starch content; microscopic examination of currency and/or license security features	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Webquests
What are the common individual characteristics associated with handwriting?	Use of handwriting exemplars when analyzing documents Handwriting analysis: line quality, spacing, size consistency, pen lifts, connecting letters, pen pressure, slant, line habits, embellishments, diacritics, etc.	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: self-evaluation of student created writing sample; evaluation of student created writing sample exemplars in order to match to unknowns (word lists or paragraphs); determine the author of a secret admirer letter written using ‘disguised’ writing; ink chromatography; test grades of paper for starch content	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Famous Case Study to research such

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the techniques that document examiners use to identify a forgery?	Forgery and fraudulence Comparisons: ink, paper, typescript (photocopiers, printers, faxes, typewriters) Uncovering alterations, erasures, obliterations, impressions, and variations in a questioned document			
What databases are available for comparison and storage of questioned document information?	Databases: FISH , ink			
What are features of paper currency that are used to detect counterfeit bills?	Security features in money	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: examination of currency and/or license security features using a microscope and a black light; test real and “counterfeit” bills using an iodine security pen	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as: www.ustreas.gov/topics/currency or www.treas.gov/education or moneyfactory.gov Webquests

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #6: Serology and Blood Pattern Analysis

Enduring Understandings: Crime scenes must be processed in a procedural manner.
 Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation?
 How is evidence used to determine whether a crime has been committed?
 How are various types of evidence tested and analyzed?
 What is the value of different types of evidence?

Unit Goals: Students will identify characteristics of body fluids that are most useful in forensic comparisons.
 Students will demonstrate procedures used by forensic scientists when processing blood evidence.
 Students will explain the importance of evidence databases available to forensic scientists.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 5.2.12.E1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What is the composition of blood and the functions of the blood components?	Plasma, platelets, white blood cells, red blood cells ABO blood types and probability of each, Rh factor Human versus other animal species blood characteristics Secretors	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: blood typing using simulated blood; microscopic examination of blood from various species Teacher Demo such as: presumptive and/or confirmatory blood testing (examples: Kastle-Meyer Test, Hemastix, Luminol/ALS)	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as sciencespot.net Webquests such as: prenhall.forensics.com Ch 8
What information can be obtained from serological screening and testing?	Blood, saliva, semen, and other body fluids DNA analysis using body fluids; Toxicology; Paternity Testing; Blood typing; Blood borne diseases Presumptive tests used to characterize a stain as blood (may include): Kastle-Meyer Test, Leuco-Malachite Green, Luminol, Hemastix Confirmatory testing for heme / species blood (may include): Precipitin Test, Takayama Crystals, Teichmann Test	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: blood typing using simulated blood; microscopic examination of blood from various species Teacher Demo such as: presumptive and/or confirmatory blood testing (examples: Kastle-Meyer Test, Hemastix, Luminol/ALS)	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Webquests

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How can blood spatter patterns be used to reconstruct a crime scene?	<p>Explore blood stain patterns as a function of velocity, direction, and height of fall:</p> <ul style="list-style-type: none"> • high, medium, and low velocity spatter • passive, transfer, arterial, cast-off, exhaled, blow-back, forward spatter • shapes of blood drops • effect of height on blood drops • angle of impact • examination of directionality of blood • area of convergence , point of origin 		<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities and cooperative group work such as: blood spatter samples using simulated blood- evaluation and/or creation (impact angle, height, velocity), blood stringing; 'spatter head' kit</p> <p>Teacher Demo such as: blood spatter patterns</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities</p> <p>Famous Case Studies to research such as: Dr. Sam Sheppard; Shasta Groene (C'ouere d'Alene, ID)</p> <p>Webquests</p>

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #7: DNA

Enduring Understandings: Crime scenes must be processed in a procedural manner.
 Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation?
 How is evidence used to determine whether a crime has been committed?
 How are various types of evidence tested and analyzed?
 What is the value of different types of evidence?

Unit Goals: Students will identify the characteristics of DNA that is most useful in forensic comparisons.
 Students will demonstrate procedures used by the forensic scientist when processing DNA evidence.
 Students will explain the importance of DNA databases available to forensic scientists.

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How is crime scene evidence collected and processed to obtain DNA for analysis?	Structure and function of DNA Nuclear versus mitochondrial DNA Sources of DNA Collection and preservation of DNA evidence Prevention of DNA contamination DNA typing and probability: PCR, gel electrophoresis, STR, RFLP	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities, cooperative group work, or teacher demo: (activities such as) create a model of DNA; gel electrophoresis; RFLP simulation, isolation of DNA from liver, onion, strawberries, banana, etc.	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities Webquests such as: www.pbs.org/wgbh/nova/shepard/labwave.html (make a DNA profile)
How is DNA evidence compared for matching?	DNA profile, DNA fingerprint Database: CODIS	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities, cooperative group work, or teacher demo: (activities such as) gel electrophoresis; RFLP simulation; comparison of DNA profiles; isolation of DNA from liver, onion, strawberries, banana, etc.	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as: identification of remains from the World Trade Center, Hurricane Katrina, tsunami etc. Webquests such as: www.pbs.org/wgbh/nova/shepard/labwave.html (make a DNA profile)

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
What are the applications of DNA fingerprinting?	Applications: identity potential suspects and victims of crime, paternity testing, identification of victims of mass disasters, exonerate the wrongfully convicted, match organ donors		<p>Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion</p> <p>Hands-on lab activities, cooperative group work, or teacher demo: (activities such as) gel electrophoresis; comparison of DNA profiles from crime scene evidence, for missing children, or paternity; RFLP simulation; DNA fingerprinting simulation activity using dyes</p>	<p>Written tests and quizzes</p> <p>Worksheets</p> <p>Lab / Activity</p> <p>Project assessments</p> <p>Research activities such as projectinnocence.com or pbs.org ("Justice Delayed") or sciencespot.net</p> <p>Famous Case Study to research such as: The Green River Killer (Gary Rideway)</p> <p>Webquests such as: "Virtual DNA Extraction" http://learn.genetics.utah.edu/content/labs/extraction/</p>

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

Freehold Regional High School District
Lab Forensic Science
Unit #8: Forensic Pathology and Anthropology

Enduring Understandings: Crime scenes must be processed in a procedural manner.

Evidence is needed to determine the method by which a crime has been committed.

Essential Questions: How is the location and handling of evidence essential to crime scene investigation? How is evidence used to determine whether a crime has been committed? How are various types of evidence tested and analyzed? What is the value of different types of evidence?

Unit Goals: Students will identify the characteristics of human remains that are most useful in forensic comparisons.
 Students will demonstrate procedures used by the forensic scientist when processing human remains

Duration of Unit: 2 weeks

NJCCCS: 5.1.12 A1-3, B1-4, C1-3, D1-3; 8.1.12 F1-2; 9.1.12 A1, A4; 9.1.12 F2, F6

Guiding / Topical Questions	Content, Themes, Concepts, and Skills	Instructional Resources and Materials	Teaching Strategies	Assessment Strategies
How are the manner, mechanism, cause, and time of death determined?	Responsibilities of the Medical Examiner/Forensic Pathologist, Forensic Toxicologist, Forensic Entomologist Autopsy procedure and report Manners, causes and mechanisms of death Time of death: rigor mortis, livor mortis, algor mortis, stages of human decomposition, changes of the eye, stomach contents, insect activity	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Video such as: Dr. Baden video series "Autopsy" Hands-on activities and cooperative group work such as: comparison of insect larvae/adult species using a stereomicroscope; comparison of "stomach contents" from different "victims"; calculating time of death using rigor, algor, and livor mortis data	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as "The Body Farm" and Dr. Bill Bass Famous Case Study to research such as: John Wayne Gacy Webquests such as: www.hbo.com/autopsy
What can be determined by analyzing skeletal remains?	Skeletal development and bone structure Forensic Anthropology: age, gender, race, height determination, facial reconstruction, skeletal trauma analysis, DNA evidence	Current textbook Notes; Handouts Internet; Mobile computer lab centers Laboratory Tools, Appropriate hands-on materials, Safety Equipment Video; Multimedia resources Community resources; Guest Speakers Current Event Articles	Class notes via lecture, PowerPoint, Smartboard, overhead projector, and class discussion Hands-on lab activities and cooperative group work such as: determine sex, race, age, and height of unidentified skeletal remains (source a forensic supply company for a bone evaluation kit, like WARD's activity called 'Sherlock Bones')	Written tests and quizzes Worksheets Lab / Activity Project assessments Research activities such as: the work of Clyde Snow Famous Case Study to research such as: The Romanovs Webquests

Suggestions on how to differentiate in this unit:

- Students with individual learning styles can be assisted through one-to-one teacher support, additional testing time, peer to peer coaching, and use of visual and auditory teaching methods
- A wide variety of assessments and strategies complement the individual learning experience.

1. Web resources:

- a. trutv.com
- b. school.cengage.com/forensicscience
- c. prenhall.forensics.com
- d. projectinnocence.com
- e. sciencespot.net
- f. pbs.org
- g. investigationdiscovery.com/investigation/forensics/forensics
- h. fbi.gov
- i. High School Teachers of Forensic Science (www.HSTOFS.org)
- j. www.forensicdentistryonline.com/
- k. eskeletons.org
- l. forensicartist.com/index.html

2. Text resources:

- a. Forensics for Dummies by Douglas P. Lyle
- b. Forensic DNA Typing: Biology, Technology and Genetics of STR Markers by John M. Butler