ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

DEPARTMENT
Science

COURSE TITLE
Forensics

Board of Education

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BOARD OF EDUCATION INITIAL ADOPTION DATE:

Course Philosophy

Every individual develops intellectually as they gain skills and knowledge in the area of forensic science; however, forensics is much more than a class about how to analyze evidence or determine a crime's perpetrator. Forensics opens up a world of curiosity and allows adolescents the opportunity to skepticize evidence, scrutinize facts, and create new stories as they find themselves delved into new mysteries waiting to be solved while rediscovering the joys of creativity, communicating with peers and building relationships in a supportive environment. Students will develop social skills and self-discipline, advance their abilities in creative problem solving, and learn how to understand and communicate their opinions. The forensic science course will allow students from all backgrounds with a variety of goals to take advantage of the benefits that forensics has to offer.

Course Description

Forensic Science is a laboratory-based course that involves scientific investigations using microscopy, chromatography, comparative analysis techniques, electrophoresis, spot tests, and qualitative examinations. Students are introduced to aspects of how science is applied to law. Forensic science is multidisciplinary, encompassing concepts in many areas such as biology, chemistry, zoology, anatomy, genetics, physics, medicine, math, statistics, Earth science, sociology, psychology, communications, and law. The focus is on problem solving, applying the scientific method to every piece of physical evidence analyzed, designing experiments, testing, and drawing conclusions based on their own empirical evidence. Laboratory research will involve scientific investigations into the following in-depth topics: DNA fingerprinting, skeletal remains, forensic toxicology, forensic anthropology, forensic entomology, arson and explosives, firearms, tool marks, impressions, document analysis and mock trials. Writing/notebook keeping is a vital part of the course as students are expected to communicate laboratory reports, results, and conclusions as well as analyzed case studies.

Core and Supplemental Instructional Materials

Core Materials	Supplemental Materials
• Textbook • Classroom notes • Handouts (worksheets & laboratory reports) • Google classroom	• Crime Scene Investigations Laboratory Manual • Case Studies • Various digital materials (Learn Genetics, Crash Course, Khan Academy, etc.)

Integration of 21st Century Themes and Skills

Educational Technology
Standards: 8.1.12.A.2, 8.1.12.C, 8.1.12.E

- **Technology Operations and Concepts:** Students can create a document using one or more digital applications to be critiqued by professionals for usability.

  Example: Students can electronically submit a draft of a final writing task as part of the culminating assignment for the Mock Trial Unit.

- **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

  Example: Students regularly communicate with their peers and myself using Google Classroom to plan and discuss forensic projects.

- **Research and Information Fluency:** Students apply digital tools to gather evidence, evaluate, and use information.

  Example: Students find crime-related articles; research the history of a forensic case, the details of a forensic career, or the application of a forensic tool throughout the course.

Career Ready Practices

Standards: CRP1, CRP2, CRP3

CRP1. Act as a responsible and contributing citizen and employee Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

Example: Students will demonstrate the responsibilities associated with being a member of a community when engaging collaboratively during sharing in pairs/trios, and participating in whole group discussions. Examples may include turn and talks, laboratory activities, and socratic seminar discussions.

CRP2. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

Example: While learning about the history of forensic scientists and their discoveries may not seem applicable in a real-world setting, students will make the connection that is not when or who made the discovery, but how the scientists used their resources to accomplish a real-life goal. Students will take the skills learned in class and apply those same skills to their everyday experiences.

CRP3. Attend to personal health and financial well-being. Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial wellbeing, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

Example: The scientist's body is their best tool. Healthy practices includes regularly attending to relaxation, healthy eating habits, regular sleeping patterns, and physical activity.

Robbinsville Ready 21st Century Skill Integration

The following skills will be embedded throughout the curriculum and instruction of this course.

Collaborative Team Member: Robbinsville students will learn more by working together than in isolation. As educational theorist Lev Vygotsky advocated, learning is a social process. Many workplaces today encourage employees to work in teams to solicit diverse perspectives, brainstorm new ideas and/or products, and solve problems. Further, collaboration fosters interpersonal relationships, self-management skills, cooperation, and a sense of collective responsibility. Collaborative team members are able to work with diverse groups of people who hold a variety of perspectives.

Effective Communicator: Robbinsville students must be able to clearly articulate their ideas orally, in writing, and across various media in order to successfully connect to the world around them. As the world becomes increasingly globalized, communication is more than just sharing one's ideas. Effective communicators are able to communicate their convictions, actively listen and analyze others' work to identify perspective and/or potential bias.

Emotionally Intelligent Learner: Robbinsville students who are emotionally intelligent learn to be empathetic, demonstrate integrity and ethical behavior, are kind, are self-aware, willing to change, and practice self-care. They are better able to cope with the demands of the 21st century digital society and workplace because they are reliable, responsible, form stable and healthy relationships, and seek to grow personally and professionally. Emotionally intelligent people are able to manage their emotions, work effectively on teams and are leaders who can grow and help to develop others.

Informed and Involved Citizen: Robbinsville students need to be digital citizens who are civically and globally aware. The concept of what it means to be "literate" has evolved along with 21st century technological and cultural shifts. Our progressive vision of literacy entails having our students explore real world problems in the classroom. Informed and involved citizens are able to safely and accurately communicate with people all around the world and are financially, environmentally and informationally literate.

Innovative Thinker: Robbinsville students must encompass innovative thinking skills in order to be successful lifelong learners in the 21st century world. As stated by Karl Fisch and Scott McLeod in the short film Shift Happens, "We are currently preparing students for jobs that don't yet exist . . . using technologies that haven't been invented . . . in order to solve problems we don't even know are problems yet." Innovative thinkers are able to think analytically, solve problems critically, creatively engage in curiosity and tinkering, and demonstrate originality.

Resilient and Self-Directed Learner: Robbinsville students need to take risks and ultimately make independent and informed decisions in an ever-changing world. Author of Life, the Truth, and Being Free, Steve Maraboli stated, "Life doesn't get easier or more forgiving, we get stronger and more resilient." Self-directed scholars of the 21st century are able to set goals, initiate resolutions by seeking creative approaches, and adjust their

thinking in light of difficult situations. Resilient students are able to take risks without fear of failure and overcome setbacks by utilizing experiences to confront new challenges. Resilient and self-directed scholars will consistently embrace opportunities to initiate solutions and overcome obstacles.

Robbinsville Public Schools
Scope, Sequence, Pacing and Assessment

Course Name
Forensic Science

Unit Title	Unit Understandings and Goals	Recommended Duration/ Pacing	Assessments			
			Formative	**Summative**	**Common Benchmark Assessments** (mid-course and end of course **only**)	**Alternative Assessments** (projects, etc. **when appropriate**)
Introduction to Forensics, Observational Skills, and Evidence Collection	• Definition of Forensic Science • History and Development of Forensic Science • Forensic Science as it Applies to the Law • Science Inquiry using the Scientific Method • Organization of a Crime Laboratory • Services of the Crime Laboratory	3 weeks	Class Discussion Slip/Trip CER Virtual Crime Lab Tour	Forensic History Quiz Forensic Career Project	Crime Scene Project Mock Trial	To be determined by teacher
Handwriting, Hair, and Fingerprint Analysis	• Types of Physical Evidence • Significance of Physical Evidence • Handwriting Comparisons • Collection of Handwriting Exemplars • Morphology of Hair • Identification and Comparison of Hair • History of Fingerprinting • Fundamental Principles of Fingerprints • Classification of Fingerprints • Automated Fingerprint Identification Systems • Methods of Detecting Fingerprints • Preservation of Developed Prints	6 weeks	Class Discussions Handwriting Analysis Hair Stations Cat Caper Fingerprint Lifting Stolen Candle	Evidence/Handwriting/Hair Quiz Case Study Project	Crime Scene Project Mock Trial	Individual Presentations or To be determined by teacher

DNA Fingerprinting	• DNA Structure-Function Relationships • DNA Replication • Recombinant DNA • DNA Typing • Mitochondrial DNA • The Combined DNA Index System (CODIS)	4 weeks	Class Discussion PCR Virtual Lab Gel Electrophoresis Virtual Lab & Demo DNA Exoneration Who Ate the Cheese?	DNA Structure & Replication Quiz PCR & Gel Electrophoresis Quiz	Crime Scene Project Mock Trial	To be determined by teacher
Death Investigation	• Role of the Forensic Pathologist • Determining the Cause, Manner, and Mechanism of Death • Role of the Forensic Anthropologist • Role of the Forensic Entomologist	4 weeks	Class Discussion Timeline of Death Case Studies Forensic Files Bits and Pieces	Cause, Manner, and Mechanism of Death Quiz Forensic Entomology Quiz	Crime Scene Project Mock Trial	To be determined by teacher
Forensic Serology (Blood Evidence)	• The Nature of Blood • Blood-Typing Techniques • Forensic Characterization of Bloodstains • Stain Patterns of Blood • Principles of Heredity	7 weeks	Blood Webquest Blood Typing Lab The Case of the Missing Raven Lab Blood Spatter Experiments	The Case of the Missing Raven CER Crime Scene Projects	Crime Scene Project Mock Trial	Individual Presentations or To be determined by teacher

Drugs & Toxicology	• Drug Dependence • Different Types of Drugs • Drug Identification • Collection and Preservation of Drug Evidence • The Role and Techniques of a Forensic Toxicologist • Significance of Toxicological Findings	5 weeks	Class Discussion Forensic Toxicology Webquest Mystery Powder Lab	Pick Your Poison Project	Crime Scene Project Mock Trial	Individual Presentations or To be determined by teacher
Impressions & Soil	• Tool Marks, Shoeprints, and Other Impressions • Soil Characteristics • Collection and Preservation of Soil Evidence	3 weeks	Class Discussion Soil & Impression Webquest The Debacle on the Beach (Sand Analysis Lab) Shake N'Cast Lab	Soil & Impressions Quiz	Crime Scene Project Mock Trial	To be determined by teacher
Mock Trial	• Science Inquiry/Investigative Science Learning Environment • Application of the Scientific Method • Drawing Conclusions Based on Empirical Evidence • Defense and Justification of Conclusions	4 weeks	Class Discussion Evidence Collection Presentations (Review) Mock Trial Preparations	Mock Trial (Final Exam)	Crime Scene Project Mock Trial	Individual Presentations or To be determined by teacher

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Unit #1: Introduction to Forensics, Observational Skills, and Evidence Collection

Enduring Understandings:	**Essential Questions:**
● Forensic Scientists use evidence to reconstruct the events of a crime. ● The principles of scientific method are required in all forensic scientific analysis. ● Forensic science utilizes concepts from all scientific disciplines. Comprehensive crime laboratories provide a variety of services including, but not limited to, a physical science unit, biology unit, firearms unit, document examination unit, photography unit, toxicology, fingerprint analysis, polygraph administration, voiceprint analysis, and crime-scene investigation.	● Discuss the historical development of key concepts and principles in forensic science. ● What is forensic science and how does it apply to the law? ● How can forensics foster analytical thinking and problem solving?

Interdisciplinary Connection

6.2.12.A.6.a: Evaluate the role of international cooperation and multinational organizations in attempting to solve global issues.

Students explore forensic science as a world-wide discipline that applies science to law to solve crimes and serve justice. It's advancement required international cooperation in order to evolve and touch every corner of the world.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-ETS1-1, HS-LS1-2	What is forensic science, how does it apply to the law, and how has it evolved over time?	Recognize the major contributors to the development of forensic science.	Class Discussion, Mini-Lessons	Handouts, Notes, Textbook	History Quiz
HS-ETS1-1, HS-LS1-2	How have scientific advancements contributed to the evolution of forensic science?	Define forensic science and list the major disciplines it encompasses.	Class Discussion, Mini-Lessons	Handouts, Notes, Textbook	Forensic Career Project

HS-ETS1-1, HS-LS1-2	How does forensic science utilize the scientific method? What is the importance of evidence?	Describe the application of the scientific method in all disciplines, including and especially in forensic science.	Class Discussion, Mini-Lessons	Handouts, Notes, Textbook	CER (Claim, Evidence, Reasoning) Assignment

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Unit #2: Handwriting, Hair, and Fingerprint Analysis

Enduring Understandings:	**Essential Questions**
• Forensic Scientists use evidence to reconstruct the events of a crime. • Physical evidence is crucial and can link specific persons or objects to a crime scene, or may contain class characteristics linking a type of object to a crime scene. • Physical evidence collected from crime scenes (i.e. fingerprints and DNA) are shared on national databases. This dramatically enhances the role of forensic science in criminal investigation. • Documents can be authenticated using specific unique and identifiable handwriting characteristics as well as the types of ink and paper and other artifacts from the creation process. • Questioned documents and other collected documents can be analyzed for handwriting comparisons to determine if the author of each is the same. • Human hair is a form of class evidence if no follicle is present. • The follicle of a human hair contains DNA. • Explain the history and development of fingerprints as identifying features for civil and law enforcement agencies. • Fingerprints are unique to individuals and can be used as evidence in arguing which individuals were present at a crime scene	• What is a crime scene? • What is the significance of physical evidence? • How can handwriting samples identify a person? • How is hair used in a criminal investigation? • What is the history of fingerprinting? • How do fingerprints identify a criminal with absolute certainty?

Interdisciplinary Connection

7.1.AL.C.1: Create a research-based multimedia-rich presentation to be shared virtually with a target language audience.

Students create a research-based presentation on a specific criminal case of their choosing that involves either handwriting, hair, or fingerprinting (or a combination) as a piece of evidence for conviction. This presentation will be presented in class to their fellow forensic science students.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-LS1-2, HS-LS-2-7	What are the different types of evidence? What is the significance of evidence?	Students will be able to classify types of physical evidence and explain their significance in forensic investigation.	Notebook/Journal Writing (Note taking) Discussion/Questions Direct Instruction	Classroom activities Textbook/Notes Handouts Tour – New Jersey State Police Forensic Laboratory in Hamilton, NJ	Types of Evidence, Handwriting, and Hair Quiz

HS-LS1-2, HS-LS1-3, HS-LS1-5, HS-LS1-6	How does handwriting evidence play a role in forensics and conviction?	Define exemplar, explain some of the techniques document examiners use to uncover alterations, erasures, obliterations, and variations in pen inks Identify what common characteristics are associated with handwriting and list important guidelines for collecting known writings for comparison to a questioned document.	Laboratory ● Compare forged signatures with a number of exemplars ● Observe and analyze documents from different typewriters and digital machines ● Detect and identify a number of alterations, erasures, and obliterations Notebook/Journal Writing (Note taking and Reflection) Guest Speaker – (TBA) Team Learning Direct Instruction	Laboratory Exercise: Document Analysis Guest Speaker – (TBA) Handouts Textbook Notes	Types of Evidence, Handwriting, and Hair Quiz
HS-LS1-1, HS-LS1-2	How does hair evidence play a role in forensics and conviction?	Identify the various parts of hair Describe variations in the structure of the medulla, cortex, and cuticle Distinguish between human and nonhuman animal hair Explain how hair can be used in a forensic investigation. Calculate the medullary index for a hair. Distinguish hairs from individuals belonging to the broad racial categories.	Laboratory: Observe hair morphology via light microscope Identify selected samples of hair Notebook/Journal Writing (Note taking Team Learning Direct Instruction	Laboratory Exercise: Hair and Fiber Analysis Compound Light Microscope Handouts Textbook Notes	Types of Evidence, Handwriting, and Hair Quiz
HS-ETS1-1, HS-ETS1-2, HS-ETS1-3, HS-LS1-1,	How does fingerprint evidence play a role in forensics and conviction?	Analyze the common ridge characteristics of a fingerprint. Identify and compare the three major fingerprint patterns and their respective subclasses. Distinguish between visible, plastic and latent fingerprints.	Laboratory: ● Determine ridge characteristics from selected samples ● Identify ridge patterns ● Determine the classification of various	Laboratory Exercise: Fingerprint Analysis Handouts Textbook Invited speaker	Case of the Stolen Candle CER Case Study Project

HS-LS1-2		Describe the concept of an automated fingerprint identification system (AFIS) and its importance to forensic investigation. List and demonstrate the techniques for developing latent fingerprints on porous and nonporous objects. Describe and demonstrate the proper procedures for preserving a developed latent fingerprint.	fingerprints ● Detect fingerprints with the method of choice Notebook/ Journal Writing (Note taking) Team Learning Discussion/Questions Direct Instruction	(TBA)	

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Unit #3: DNA Fingerprinting

Enduring Understandings:.	**Essential Questions**
• Apply the principles of DNA as a means to identifying one person with a reasonable certainty. • Describe the differences in nuclear DNA, mitochondrial DNA • DNA evidence is highly important as, upon proper handling, it can directly link an individual to a crime scene. • Understand the significance of the development of DNA technology to forensic science and will be able to compare segments of DNA and describe the use of DNA profiling in the CODIS database.	• How is DNA and how is unique to each individual? • What is the significance or value of DNA evidence to forensic investigation? • How has DNA profiling contributed to the development of the field of forensic science? • What DNA technologies have been developed that can be used to isolate and identify evidence?

Interdisciplinary Connection

8.1.12.B.2: Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

Students can explore online websites while on a quest for knowledge about the discovery of DNA and its importance to forensics. Students will also play online virtual games demonstrating the processes of PCR and Gel Electrophoresis.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-LS1-1, HS-LS3-1 , HS-LS3-2 , HS-LS3-3	What is the structure and function of DNA? How is it used in forensic science?	Review the discovery of DNA, and describe the structure of DNA. Explain DNA replication and protein synthesis. Compare mitochondrial DNA versus nuclear DNA.	Laboratory: Isolate and observe DNA from teacher's choice of plant cells(strawberry, banana, onion, etc) Describe the appearance and physical characteristics of isolated DNA Invited speaker Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction	Laboratory Exercise: DNA Extraction Digital Devices for Webquests/Virtual Labs Invited Speaker – (TBA) Tour – Molecular Biology Department, Princeton University Handouts/Review Packets	DNA Function, Structure, & Replication Quiz

				Textbook/Notes	
HS-LS1-1, HS-LS3-1 , HS-LS3-2 , HS-LS3-3	What is the importance of DNA replication? How is DNA analyzed in forensic science?	Describe the technique known as polymerase chain reaction (PCR), define recombinant DNA, and compare restriction fragment length polymorphisms (RFLPs) versus short tandem repeat (STR).	Tour at Princeton University in the Department of Molecular Biology to observe DNA extraction, gel electrophoresis, and PCR or Gel Electrophoresis Demonstration	Digital Devices for Webquests/Virtual Labs Invited Speaker – (TBA) Gel Electrophoresis Materials for Laboratory Activity Tour – Molecular Biology Department, Princeton University Handouts/Review Packets Textbook/Notes	PCR & Gel Electrophoresis Quiz
HS-LS1-1, HS-LS3-1 , HS-LS3-2 , HS-LS3-3	How does DNA evidence help to solve crimes and convict criminals?	Describe The Combined DNA Index System (CODIS) and its importance. Identify procedures used in the collection and preservation of biological evidence for DNA analysis.	Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction	Digital Devices for Webquests/Virtual Labs Invited Speaker – (TBA) Tour – Molecular Biology Department, Princeton University Handouts/Review Packets Textbook/Notes	DNA Structure, Function, and Replication Quiz PCR & Gel Electrophoresis Quiz

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Unit #4: Death Investigation

Enduring Understandings:	**Essential Questions:**
● There are several definitions of death, including the cessation of the heartbeat and brain function. ● An autopsy is performed if a death is suspicious or unexplained. ● A forensic entomologist studies the development of insect larvae in a body to estimate the time of death.	● How is death defined? ● How can an autopsy help to solve a crime? ● Why is time of death important? ● How can environmental factors influence the time estimate?

Interdisciplinary Connection

1.3.12.D.2: Produce an original body of artwork in one or more art mediums that demonstrates mastery of visual literacy, methods, techniques, and cultural understanding.

Students collaborate in groups to create a visual timeline that demonstrates the stages of algor, rigor, and livor mortis, the stages of decomposition, and the stages of insect arrival to the corpse. Students will participate in a gallery walk to see their classmates' artworks.

Duration of Unit: 4 weeks

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-LS1-1, HS-LS1-2	What is the difference between cause, manner, and mechanism of death? What is the role of the forensic pathologist? How do various environmental factors influence the estimated time of death?	Distinguish between four manners of death: natural, accidental, suicidal, homicidal. Distinguish between cause, manner, and mechanisms of death. Explain how the development of rigor, algor and livor mortis occur. Employ evidence of rigor, algor and livor mortis to calculate the approximate time of death. Employ autopsy report regarding stomach contents to estimate time of death. Describe how various environmental	Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction Invited speaker (TBA) Tour of Mercer County Medical Examiner/Coroner Office or Morgue	Digital Devices for Webquests/Virtual Labs Invited Speaker – (TBA) Tour – Mercer County Medical Examiner/Coroner Office Handouts/Review Packets Textbook/Notes	Death Investigations Quiz

		factors may influence the estimated time of death.			
HS-LS1-1, HS-LS1-2	How can insects help forensic specialists solve a crime? What is the role of the forensic entomologist?	Explain how time of death estimates may be linked to insect evidence. Provide an example of the succession of different types of insects that are found on a body as it decomposes.	Laboratory: Observe various insects and their stages of growth via light microscope. Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction Bits and Pieces Activity	Digital Devices for Webquests/Virtual Labs Insects in various stages of growth Compound Light Microscope Handouts/Review Packets Bits and Pieces Handout Textbook/Notes	Forensic Entomology Quiz
HS-LS1-1, HS-LS1-2	What are the stages of decomposition of a corpse? How can forensic scientists determine time of death using insect evidence, rigor, algor, and livor mortis date?	Describe the stages of decomposition in a corpse. Estimate time of death given insect evidence, rigor, algor and livor mortis data	Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction When Did She Die? Death Timeline	Handouts/Review Packets Textbook/Notes When Did She Die? Handout Large Poster Paper	Timeline of Death

Robbinsville Public Schools

Unit #5: Forensic Serology

Enduring Understandings:	**Essential Questions: :**
• Serology involves a broad scope of laboratory tests that use specific antigen and serum antibody reactions. • Blood type is an inherited trait that is a permanent feature of a person's biological makeup. • Blood may link a criminal to crime. • Individual blood stains can convey the directionality and angle of impact of the blood when it struck a surface. • Crime scene reconstruction helps to sort out the events surrounding the occurrence of a crime.	• How is blood analyzed by forensic investigators? • How can information be inferred based on blood spatter patterns? • How can crime scene reconstruction assist forensic scientists in solving crimes?

Interdisciplinary Connection

G-CO-D.12: Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

Students use a variety of tools and methods (rulers, string, protractors, etc.) in order to determine the point of origin and velocity of a bloodstain pattern.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-LS1-1, HS-LS1-2, HS-LS3-2	What is the composition of blood? What does "blood type" designate about an individual? How can blood evidence be used by forensic serologists?	Explain the composition and function of blood cells. Describe how to determine blood type, given a sample. Describe how to screen for the presence of human blood. Calculate the probability of certain blood types within a population.	Blood Webquest Laboratory: Identify the ABO-Rh blood type of simulated blood samples Determine compatibility from one sample to another Calculate genotypic and phenotypic ratios Detect the presence of blood using selected analytical techniques	Digital Devices for Webquests/Lab Reports Laboratory Exercise: ABO-Rh Blood Group Determination Handouts Textbook/Notes Tour – Our Lady of Lordes Medical	Blood Typing Quiz Case of the Missing Raven CER Crime Scene Project

			Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction	Center in Camden, NJ	
HS-PS1-2, HS-ETS1-1, HS-ETS1-2	What can bloodstain pattern analysis tell forensic specialists?	Describe the history of the use of blood and blood-spatter analysis in forensic science Conduct a blood spatter analysis	Interpret and reconstruct the events that occurred from selected stain patterns Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction	BloodStain Pattern Laboratory Exercise Handouts Textbook/Notes	Bloodstain Pattern Analysis/Evidence Quiz
HS-LS1-1, HS-LS1-2, HS-LS3-2, HS-PS1-2, HS-ETS1-1, HS-ETS1-2	How does crime reconstruction help forensic investigators to solve a crime?	Use blood spatter evidence (and any other evidence learned thus far) to recreate the events of a crime scene	Case of the Missing Raven (Scavenger Hunt) Crime Scene Project Notebook/Journal Writing (Note taking and Reflection) Team Learning Direct Instruction	Handouts Textbook/Notes Crime Scene Reconstruction Materials	Case of the Missing Raven CER Crime Scene Project

Enduring Understandings:	**Essential Questions: :**
• Toxicology has a long historical presence and many applications in assessing possible cause of death. • Chemical compounds are classified in the Controlled Substances Act are regulated by the United States government. • Understand the significance of drug analysis and toxicology to forensic investigations and will be able to identify various drugs and describe methods drug analysts and toxicologists use in identifying substances. • Describe techniques that forensic toxicologists use to isolate and identify drugs and poisons. • Different types of drugs affect the body differently and require specific dosages to cause fatal poisoning.	• What laboratory tests do forensic scientists rely on to identify unknown chemicals? • What methods are available to determine the level of sobriety in a suspected individual? • How is toxicity determined? • What are the different groups of drugs? • How do drugs and poison affect the body?

Interdisciplinary Connection

1.3.12.D.2: Produce an original body of artwork in one or more art mediums that demonstrates mastery of visual literacy, methods, techniques, and cultural understanding.

Students create a poster that demonstrates the main details of an assigned drug including visuals and brief descriptions.
Students will participate in a gallery walk to see their classmates' artworks.

7.1.AL.C.1: Create a research-based multimedia-rich presentation to be shared virtually with a target language audience.

Students create a research-based presentation on a specific criminal case of their choosing that involves drugs or poisons as a piece of evidence for conviction. This presentation will be presented in class to their fellow forensic science students.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-PS1-1, HS-PS1-2, HS-PS1-5, HS-PS1-6, HS-LS1-2, HS-LS1-3	How can drug evidence be used in forensic science? What is the role of the forensic toxicologist? What are the different types of drugs and their effects on the body?	Describe the role of the forensic toxicologist Define a drug, and distinguish narcotics, depressants, stimulants, and hallucinogens Define club drugs & anabolic steroids Explain the Controlled Substances Act	History of Forensic Toxicology Webquest Tour – Medical Center in NJ Notebook(Note taking) Discussion/Questions Direct Instruction	Digital Devices for Webquests Handouts Textbook/Notes Digital Media/Video Tour – Medical Center in NJ	Forensic Toxicology & Drugs History Quiz Pick Your Poison Project

HS-PS1-1, HS-PS1-2, HS-PS1-5, HS-PS1-6, HS-LS1-2, HS-LS1-3	What tests can be used to identify different substances?	Identify tests used for drug identification	Laboratory: Identify an Unknown Substance Lab Notebook(Note taking) Discussion/Questions Direct Instruction	Laboratory Materials for Mystery Powder Lab Handouts Textbook/Notes	Forensic Toxicology & Drugs History Quiz Pick Your Poison Project
HS-PS1-1, HS-PS1-2, HS-PS1-5, HS-PS1-6, HS-LS1-2, HS-LS1-3	What are the most common drugs and poisons? How does an individual overdose? What is a forensic case related to a specific drug?	Identify some commonly abused drugs based on their effect on the body Compare psychological and physical dependence	Pick Your Poison Project Notebook(Note taking) Discussion/Questions Direct Instruction	Chart Paper (For Posters) Digital Devices for Presentations Handouts Textbook/Notes	Forensic Toxicology & Drugs History Quiz Pick Your Poison Project

Robbinsville Public Schools

Unit #7: Impressions & Soil Evidence

Enduring Understandings:	**Essential Questions: :**
• Many objects leave impressions that can be used as trace evidence • Guns, tools, teeth, and other weapons leave unique microscopic impressions that can be analyzed and matched to reconstruct a crime scenario. • There are unique and important forensic properties of soil that can be used to reconstruct a crime. •	• How can scientists tell that a specific tool created a mark, not one like it? • How are different types of impressions used in forensic investigations? • How could footprints be used to reconstruct a crime scene? • How can soil evidence be used in forensic science? • What are the important properties of soil?

Interdisciplinary Connection

HSN-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Using a pre-made mold, students must create a cast of the impression left behind at the crime scene. Students must use accurate measurements in order to compare the impression from the crime scene to two suspect's shoeprints to solve the crime.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-ETS1-2, HS-PS1-2, HS-PS1-3	How can impression and soil evidence be used by forensic specialists to solve crimes?	Define soil and describe various soil profiles Explain how various types of impressions can be used as trace evidence Discuss the significance of tool mark impressions in criminal investigations	Impressions & Forensic Geology WebQuest Notebook/Journal Writing (Note taking) Team Learning/Discussions Direct Instruction	Digital Devices for Impressions & Forensic Geology Webquest Handouts Textbook/Notes	Impressions & Forensic Geology Quiz
HS-ETS1-2, HS-PS1-2, HS-PS1-3	What are the different properties of sand and soil? How can forensic scientists identify the origin of different sands and soils?	Describe the different physical and chemical properties of soil Describe techniques for collecting and preserving soil samples	Laboratory: Compare different sands and soils via dissecting microscopes Notebook/Journal Writing (Note taking)	Laboratory Exercise: Analysis of Sand and Soil Handouts Textbook/Notes	Impressions & Forensic Geology Quiz

			Team Learning/Discussions Direct Instruction		
HS-ETS1-2, HS-PS1-2, HS-PS1-3	How are impressions made? What are the unique characteristics forensic specialists look for when analyzing impression evidence?	Describe how tool mark evidence is collected, preserved and documented Describe three major types of tool mark impressions Describe variations in tool surface characteristics that are used to identify individual tools Match tool marks with the instrument used to create same mark	Laboratory: Create shoe print and fingerprint impressions via casting material Notebook/Journal Writing (Note taking) Team Learning/Discussions Direct Instruction	Laboratory Exercise: Shake N' Cast Impressions BioFoam or other mold materials for impressions lab Handouts Textbook/Notes	Impressions & Forensic Geology Quiz

Robbinsville Public Schools

Unit #8: Mock Trial

Enduring Understandings:	**Essential Questions: :**
• Forensic evidence can be used in a court of law, either as part of the defense or prosecution's case. • The quality of the questions asked in the courtroom can have a huge impact on a case based on evidence. • Each individual in a courtroom has an important, specific role.	• Develop questions for investigation that can be answered empirically. • Describe some empirical tests. • Design and conduct scientific investigations. • Reconstruct previously learned knowledge. • Draw conclusions or explanations based on a theoretical or empirical basis.

Interdisciplinary Connection

6.3.12.D.1 Analyze the impact of current governmental practices and laws affecting national security and/or individual civil rights/privacy.

Students explore the proceedings of a courtroom and analyze evidence while building a case. By participating in a mock trial, students analyze the impact of current judicial practices and laws on an individual.

Guiding / Topical Questions with Specific Standards		**Content, Themes, Concepts, and Skills**	**Teaching Strategies**	**Instructional Resources and Materials**	**Assessment Strategies**
HS-LS1-1, HS-LS1-2, HS-LS3-2, HS-ETS1-2	How can evidence be used in court? What are the roles of the different individuals in the courtroom? What is the importance of proper courtroom etiquette?	Process a crime scene Observe and search for evidence Collect evidence and request samples from suspects Perform analysis on evidence and compare with suspects Select two top suspects and interview suspects Confer and request further information or samples from suspects Identify and prepare case against one suspect and conduct a jury trial	Project: Explore scientific principles through forensic investigation of a crime scene Participate in a mock trial Invited speaker – Courtroom etiquette Notebook/ Journal Writing (Note taking and Reflection Team Learning Direct Instruction	Project: Forensic Investigation and Mock Trial Invited Speaker – (TBA) on Courtroom Procedure Handouts Textbook/Notes	Courtroom Proceedings/ Etiquette Quiz Mock Trial Project

General Differentiated Instruction Strategies	
• Leveled texts • Chunking texts • Choice board • Socratic Seminar • Tiered Instruction • Small group instruction • Guided Reading • Sentence starters/frames • Writing scaffolds • Tangible items/pictures • Adjust length of assignment	• Repeat, reword directions • Brain breaks and movement breaks • Brief and concrete directions • Checklists for tasks • Graphic organizers • Assistive technology (spell check, voice to type) • Study guides • Tiered learning stations • Tiered questioning • Data-driven student partnerships • Extra time

Possible Additional Strategies for Special Education Students, 504 Students, At-Risk Students, and English Language Learners (ELLs)			
Time/General	**Processing**	**Comprehension**	**Recall**
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers

notes/outline		learning	
Assistive Technology	**Assessments and Grading**	**Behavior/Attention**	**Organization**
• Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books	• Extended time • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

The goal of Enrichment is to provide learners with the opportunity to participate in extension activities that are differentiated and enhance the curriculum. All enrichment decisions will be based upon individual student needs.

- Show a high degree of intellectual, creative and/or artistic ability and demonstrate this ability in multiple ways.
- Pose questions and exhibit sincere curiosity about principles and how things work.
- The ability to grasp concepts and make real world and cross-curricular connections.
- Generate theories and hypotheses and pursue methods of inquiry.
- Produce products that express insight, creativity, and excellence.
- Possess exceptional leadership skills.
- Evaluate vocabulary
- Elevate Text Complexity
- Inquiry based assignments and projects
- Independent student options
- Tiered/Multi-level activities
- Purposeful Learning Center
- Open-ended activities and projects
- Form and build on learning communities
- Providing pupils with experiences outside the 'regular' curriculum
- Altering the pace the student uses to cover regular curriculum in order to explore topics of interest in greater depth/breadth within their own grade level
- A higher quality of work than the norm for the given age group.

- The promotion of a higher level of thinking and making connections.
- The inclusion of additional subject areas and/or activities (cross-curricular).
- Using supplementary materials in addition to the normal range of resources.

English Language Learner (ELL) Resources

- Learning style quiz for students- http://www.educationplanner.org/students/self-assessments/learning-styles-quiz.shtml
- "Word clouds" from text that you provide-http://www.wordle.net/
- Bilingual website for students, parents and educators: http://www.colorincolorado.org/
- Learn a language for FREE-www.Duolingo.com
- Time on task for students-http://www.online-stopwatch.com/
- Differentiation activities for students based on their Lexile-www.Mobymax.com
- WIDA-http://www.wida.us/
- Everything ESL - http://www.everythingESL.net
- ELL Tool Box Suggestion Site http://www.wallwisher.com/wall/elltoolbox
- Hope4Education - http://www.hope4education.com
- Learning the Language http://blogs.edweek.org/edweek/learning-the-language/
- FLENJ (Foreign Language Educators of NJ) 'E-Verse' wiki: http://www.flenj.org/Publications/?page=135
- OELA - http://www.ed.gov/offices/OBEMLA
- New Jersey Department of Education- Bilingual Education information http://www.state.nj.us/education/bilingual/

Special Education Resources

- Animoto -Animoto provides tools for making videos by using animation to pull together a series of images and combining with audio. Animoto videos or presentations are easy to publish and share. https://animoto.com
- Bookbuilder -Use this site to create, share, publish, and read digital books that engage and support diverse learners according to their individual needs, interests, and skills. http://bookbuilder.cast.org/
- CAST -CAST is a non-profit research and development organization dedicated to Universal Design for Learning (UDL). UDL research demonstrates that the challenge of diversity can and must be met by making curriculum flexible and responsive to learner differences. http://www.cast.org
- CoSketch -CoSketch is a multi-user online whiteboard designed to give you the ability to quickly visualize and share your ideas as images.

http://www.cosketch.com/

- Crayon -The Crayon.net site offers an electronic template for students to create their own newspapers. The site allows you to bring multiple sources together, thus creating an individualized and customized newspaper. http://crayon.net/ Education Oasis -Education Oasis offers a collection of graphic organizers to help students organize and retain knowledge – cause and effect, character and story, compare and contrast, and more! http://www.educationoasis.com/printables/graphic-organizers/
- Edutopia -A comprehensive website and online community that increases knowledge, sharing, and adoption of what works in K-12 education. We emphasize core strategies: project-based learning, comprehensive assessment, integrated studies, social and emotional learning, educational leadership and teacher development, and technology integration. http://www.edutopia.org/
- Glogster -Glogster allows you to create "interactive posters" to communicate ideas. Students can embedded media links, sound, and video, and then share their posters with friends. http://edu.glogster.com/?ref=personal
- Interactives – Elements of a Story -This interactive breaks down the important elements of a story. Students go through the series of steps for constructing a story including: Setting, Characters, Sequence, Exposition, Conflict, Climax, and Resolution. http://www.learner.org/interactives/story/index.html
- National Writing Project (NWP) -Unique in breadth and scale, the NWP is a network of sites anchored at colleges and universities and serving teachers across disciplines and at all levels, early childhood through university. We provide professional development, develop resources, generate research, and act on knowledge to improve the teaching of writing and learning in schools and communities. http://www.nwp.org
- Pacecar -Vocab Ahead offers videos that give an active demonstration of vocabulary with audio repeating the pronunciation, definition, various uses, and synonyms. Students can also go through flash cards which give a written definition and visual representation of the word. http://pacecar.missingmethod.com/