

**Southern Cayuga Central School District – Curriculum Map**

**Subject: Forensics**

**School Year: 2021-2022**

Title or Topics w/ NYS Standards	Essential Questions & Vocabulary	Content Skills (Activities to cover Essential Questions)	Major Assessments (Tests, Project, etc.)	Time Frame
<p><b>History of Forensics and Observation Skills</b></p> <p>NGSS:                      HS-LS1-1                      HS-LS1-2                      HS-LS1-4                      HS-LS3-1                      HS-LS3-3                      HS-ETS1-2                      HS-PS1-1                      HS-PS1-2                      HS-PS1-3                      HS-PS1-4                      HS-PS1-5                      HS-PS1-7                      HS-PS2-1                      HS-PS3-4                      1-PS4-1</p>	<p>Define Forensic Science                      What individuals have been involved in the development of forensic science?                      What makes a good observation and what changes occur in the brain while observing?                      What factors influence eyewitness accounts of events?                      How reliable are eyewitness testimony to what actually happened?                      How can an individual improve his/her observation skills?</p> <p><b>Vocabulary:</b>                      Analytical skills                      Deductive Reasoning                      Eyewitness                      Fact                      Forensic                      Logical                      Observations                      Opinion                      Perception                      Motive                      Means                      Opportunity</p>	<p>History of Forensics Notes                      Dr. Henry Lee Website                      NYS Police Lab                      CSI Myths                      Biodetective Tapes:                      Histories Mysteries                      Wrongly Accused                      Innocenceproject.org – Roy Brown case                      Anthropometry Activity                      Will West v. William West                      Deadly Picnic                      Jane’s Restaurant                      You’re an eyewitness                      Youtube:                      Eyewitness                      What Influences our Observations Activity                      NPR.org – Forensic Artists Use Talent to Solve Crimes                      Facial Reconstruction DVD</p>	<p>Chapter Questions                      Quizzes/Test                      Completed Activities                      Labs/Activities</p>	<p>4 Weeks</p>

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<p><b>Crime Scene Investigation (CSI)</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3          HS-ETS1-2          HS-PS1-1          HS-PS1-2          HS-PS1-3          HS-PS1-4          HS-PS1-5          HS-PS1-7          HS-PS2-1          HS-PS3-4          1-PS4-1</p>	<p>What is Locard’s Principle of Exchange?          What are examples of trace evidence?          What is the difference between direct and circumstantial evidence?          What are the seven steps of a crime-scene investigation?          How is a crime scene documented?          How is evidence collected and packaged?          How is a crime scene mapped and analyzed?</p> <p><b>Vocabulary:</b>          Chain of Custody          Circumstantial Evidence          Class Evidence          Individual Evidence          Crime-Scene investigation          Crime-Scene Reconstruction          Direct Evidence          Primary Crime Scene          Secondary Crime Scene          Trace Evidence</p>	<p>CSI Notes</p> <p>Locard’s Principle of Exchange Lab</p> <p>Staged Crime Scene Investigation</p> <p>Student Activity – Documenting the Crime Scene</p> <p>Rough Sketch of Crime Scene</p> <p>Final Sketch of Crime Scene</p> <p>Crime Scene Search Activity</p> <p>Chain of Custody Procedure Activity</p> <p>Class vs. Individual Activity</p> <p>School Resource Officer (SRO)</p> <p>OJ Simpson Trial – Frontline Video</p> <p>Michael Boden Resource</p>	<p>Chapter Questions</p> <p>Quizzes/Tests</p> <p>Labs</p> <p>Final Sketches of Crime Scene</p>	<p>5 Weeks</p>
<p><b>Physical Evidence: Soil Examination</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3</p>	<p>What are some distinguishing characteristics and compositions of different soils?          How is soil analyzed using macroscopic and microscopic examination</p>	<p>Soil Examination Notes</p> <p>Collection of student’s own soil</p> <p>Soil Evidence Examination Lab</p>	<p>Chapter Questions</p> <p>Quizzes/Test</p> <p>Labs/Activities</p>	<p>2 Weeks</p>

<p>HS-ETS1-2  HS-PS1-1  HS-PS1-2  HS-PS1-3  HS-PS1-4  HS-PS1-5  HS-PS1-7  HS-PS2-1  HS-PS3-4  1-PS4-1</p>	<p>and chemical and physical testing?  How can soil analysis link a suspect, victim, tool or other evidence item to a crime scene?  How can soil profiles and different soil surfaces be used to locate a gravesite.  How is soil evidence collected and documented?</p> <p><b>Vocabulary:</b>  Clay  Humus  Mineral  Sand  Sediment  Silt  Soil  Soil profile  Weathering</p>			
<p><b>Physical Evidence: Glass</b></p> <p>NGSS:  HS-LS1-1  HS-LS1-2  HS-LS1-4  HS-LS3-1  HS-LS3-3  HS-ETS1-2  HS-PS1-1  HS-PS1-2  HS-PS1-3  HS-PS1-4  HS-PS1-5  HS-PS1-7</p>	<p>What are the three major components of glass?  How do scientists compare and contrast soda glass, lead glass and heat-resistant glass?  What are the physical properties of glass?  How do scientists calculate the density of glass samples?  How do scientists estimate the refractive index of glass using the submersion method and Becke lines?</p>	<p>Glass Notes</p> <p>Compare and Contrast Activities</p> <p>Glass Fracture Pattern Analysis</p> <p>Glass Density Lab</p> <p>Approximating the Refractive Index of Glass Using a Submersion Test</p> <p>Determining the Refractive Index of Liquids Using Snell's Law</p>	<p>Chapter 15 Questions</p> <p>Quizzes/Test</p> <p>Labs/Activities</p>	<p>2 Weeks</p>

<p>HS-PS2-1 HS-PS3-4 1-PS4-1</p>	<p>How are radial and concentric fractures formed and what is their location on fractured glass? What information can be learned from analysis of bullet holes in fractured glass? What are structural, use and fracture pattern differences between laminated, tempered or safety glass and bullet-resistant glass?</p> <p>How is glass evidence collected and documented?</p> <p>How do scientists determine whether two glass fragments are consistent?</p> <p><b>Vocabulary:</b> Amorphous Backscatter Bullet-resistant glass Concentric Fracture Density Glass Laminated glass Normal Line Radiating Fractures Refraction Refractive Index Tempered Glass</p>			
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<p><b>Physical Evidence: Pollen</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3          HS-ETS1-2          HS-PS1-1          HS-PS1-2          HS-PS1-3          HS-PS1-4          HS-PS1-5          HS-PS1-7          HS-PS2-1          HS-PS3-4          1-PS4-1</p>	<p>How can botanical evidence help solve crimes by linking a person or object to a crime scene, or establishing a postmortem interval or aiding in the location of gravesites?          What is a pollen fingerprint or pollen profile?          What is the correct procedure for collecting, labeling, and documenting botanical evidence?</p> <p><b>Vocabulary:</b>          Forensic Botany          Pollen Fingerprint – Pollen Profile          Pollen Grain          Postmortem Interval (PMI)</p>	<p>Pollen Notes</p> <p>Pollen Examination: Matching a suspect to a Crime Scene Lab</p>	<p>Chapter 5 Questions</p> <p>Quizzes/Test</p> <p>Pollen Lab</p>	<p>1 Week</p>
<p><b>Organic Compounds</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3          HS-ETS1-2          HS-PS1-1          HS-PS1-2          HS-PS1-3</p>	<p>What is matter made up of?          What are Atoms, Elements and Molecules?          What is Henry's Law and how does this apply to Forensic Science?</p> <p><b>Vocabulary:</b>          Henry's Law          Gas Chromatogram          Spectrophotometry</p>	<p>Organic Analysis Notes</p>	<p>Chapter Questions</p> <p>Quizzes/Tests</p>	<p>1 Week</p>

HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1				
<b>Inorganic Compounds</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1	What defines a trace element?  <b>Vocabulary:</b> Emission vs. Absorption Spectrums	Inorganic Compounds Notes  Chromatography Lab	Chapter Questions  Quizzes/Tests  Chromatography Lab	1 Week
<b>Forensics Toxicology</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5	What are examples of drugs, poisons, and toxins? What factors affect drug toxicity? What is the role of a toxicologist in analyzing substance evidence? What is the difference between presumptive testing and confirmatory testing? How do people get exposed to environmental	Toxicology Notes  WARD's Over the Counter Drug Lab (Drug Spot Test)  Analysis of Famous People's drug overdoses  Drugs Inc – National Geographic Video  Drug Dog – Andy Kalet  Blood Alcohol Concentration Lab	Chapter Questions  Quizzes/Tests  Drug Analysis Lab  BAC Lab  Presentations	2 Weeks

<p>HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1</p>	<p>toxins and what are their effects on the body? What are the signs and symptoms of overdose with specific substances?</p> <p><b>Vocabulary:</b> Addiction Controlled substance Controlled Substances Act Depressant Hallucinogen Illegal Drug Narcotic Poison Stimulant Tolerance Toxicity Toxicology Toxin Alcohol BAC Absorption Oxidation Excretion Breathalyzer Field Sobriety DRE</p>	<p>SRO Lecture – DWI and ETOH</p> <p>Student presentations on Poisons</p>		
<p><b>Hair Analysis</b></p> <p>NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1</p>	<p>What are the parts of a Hair? What are variations in the structure of the medulla, cortex, and cuticle? How does one distinguish between human and nonhuman animal hair? How can hair be used in a forensic investigation?</p>	<p>Hair Notes</p> <p>Trace Evidence: Hair Lab (human hair)</p> <p>Trace Evidence: Hair Lab (nonhuman hair)</p>	<p>Chapter Questions</p> <p>Quizzes/Tests</p> <p>Hair Labs – Human and Non-Human</p>	<p>2 Weeks</p>



<p>HS-PS1-2  HS-PS1-3  HS-PS1-4  HS-PS1-5  HS-PS1-7  HS-PS2-1  HS-PS3-4  1-PS4-1</p>	<p>How can one distinguish hairs from individuals belonging to broad racial categories?</p> <p><b>Vocabulary:</b>  Comparison Microscope  Cortex  Cuticle  Gas Chromatography  Hair Follicle  Hair Shaft  Keratin  Medulla  Melanin Granules  mtDNA  Nuclear DNA</p>			
<p><b>Analysis of Threads and Fibers</b></p> <p>NGSS:  HS-LS1-1  HS-LS1-2  HS-LS1-4  HS-LS3-1  HS-LS3-3  HS-ETS1-2  HS-PS1-1  HS-PS1-2  HS-PS1-3  HS-PS1-4  HS-PS1-5  HS-PS1-7  HS-PS2-1  HS-PS3-4  1-PS4-1</p>	<p>How can various types of fibers be compared and contrasted through physical and chemical analysis?  What are physical characteristics of common fibers?  What techniques are used to analyze fibers?</p> <p><b>Vocabulary:</b>  Amorphous  Crystalline  Direct Transfer  Fiber  Monomer  Natural Fiber  Polymer  Secondary Transfer  Synthetic Fiber</p>	<p>Threads and Fiber Notes  Microscopic Fiber Analysis Lab  Bedsheet Thread Count Lab  Weave Pattern Analysis Lab  Textile Identification Lab  Jollif Method Analysis  Behavior of Burned Fibers Lab</p>	<p>Chapter Questions  Quizzes/Tests  Labs/Activities</p>	<p>1 Week</p>

	Textile			
<b>Arson/Explosions</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1	How does fire behave? What is the fire tetrahedron? What is the difference between low and high explosives? What is black Powder?  <b>Vocabulary:</b> Fire Oxidation Reaction Arson	Arson Notes  Guest Lecture – Fire Investigator  Construct Fire Tetrahedron  PBS DVD – Inside the Mind of a Serial Arsonist  Bombing of Boston Marathon - 60 minutes	Arson and Explosion Chapter Questions  Quizzes/Tests  Labs/Activities	1 Week
<b>Fingerprints</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4	What is the history of fingerprints? What are the characteristics of fingerprints? What are the basic types of fingerprints and how do they compare and contrast with each other? How do criminals attempt to alter their fingerprints? What is the proper procedure for collecting fingerprint evidence? What are the latest identification technologies?	Fingerprint Notes  SRO training on collection of fingerprints  Study your Fingerprints Lab  Giant Balloon Fingerprint Activity  Studying Latent and Plastic Fingerprints Lab  How to Print a Ten Card Lab  Fingerprint Analysis Activity  Using Cyanoacrylate to Recover Latent Fingerprints	Chapter Questions  Quizzes/Tests  Labs/Activities	2 Weeks

<p>1-PS4-1</p>	<p>How is a fingerprint compared to a print on record?          What is the technique used to lift a latent print?          How is a ten card prepared and how is it analyzed?</p> <p><b>Vocabulary:</b>          Arch          Core          Delta          Fingerprint          IAFIS          Latent fingerprint          Loop          Minutiae          Patent fingerprint          Plastic fingerprint          Ridge count          Ridge pattern          Ten card          Whorl</p>			
<p><b>Serology (Blood and Blood Spatter)</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3          HS-ETS1-2          HS-PS1-1          HS-PS1-2          HS-PS1-3          HS-PS1-4</p>	<p>What is the forensic significance of the different types of blood cells?          What is the history of the use of blood and blood-spatter analysis in forensics?          Explain the procedure used to determine blood type.          What technique is used to screen for the presence of human blood?          What is the probability of a person having a specific</p>	<p>Serology Notes</p> <p>A Presumptive Test for Blood Lab</p> <p>Creating and Modeling Blood-Spatter Patterns</p> <p>Blood-Spatter Analysis: Effect of Height on Blood Drops Lab</p> <p>Area of Convergence Activity</p> <p>Blood-Droplet Impact Angle Lab</p>	<p>Chapter Questions</p> <p>Quizzes/Test</p> <p>Labs/Activities</p>	<p>2 Weeks</p>

<p>HS-PS1-5  HS-PS1-7  HS-PS2-1  HS-PS3-4  1-PS4-1</p>	<p>blood type, using data from population studies?  What is the proper procedure for handling blood evidence?  How is blood-spatter evidence analyzed using angle of impact, area of convergence, and area of origin?  What are the different types of blood-spatter patterns and how are they formed?</p> <p><b>Vocabulary:</b>  Agglutination  Angle of Impact  Antibodies  Antigen  Antigen-antibody response  Area of Convergence  Area of Origin  Cast-off Pattern  Passive Drop  Satellite  Spine  Swipe  Wipe</p>	<p>Area of Origin Lab   Crime Scene Investigation Lab</p>		
<p><b>Forensic Entomology</b></p> <p>NGSS:  HS-LS1-1  HS-LS1-2  HS-LS1-4  HS-LS3-1  HS-LS3-3</p>	<p>How is forensic entomology used to help solve crimes?  What are the four stages of blowfly metamorphosis and what is the significance of blowflies?</p>	<p>Entomology Notes   Observation of Blowflies or Houseflies Activities   Factors Affecting Postmortem Interval Estimates and Accumulated Degree Hours Lab</p>	<p>Chapter Questions   Quizzes/Test   Lab/Activities</p>	<p>3 Days</p>

<p>HS-ETS1-2  HS-PS1-1  HS-PS1-2  HS-PS1-3  HS-PS1-4  HS-PS1-5  HS-PS1-7  HS-PS2-1  HS-PS3-4  1-PS4-1</p>	<p>What is the effect of different environmental factors on insect development?  What are the five stages of decomposition?  What is the process of insect succession to the changing environment that occurs during the stages of decomposition?  How do entomologists interpret forensic evidence and environmental conditions to estimate a postmortem interval?  How is insect evidence analyzed to provide evidence of the deceased person's identity or drug, poison, or toxin exposure?  What are the procedures for documenting and collecting insect evidence from crime scene?</p> <p><b>Vocabulary:</b>  Accumulated degree hours (ADH)  Complete Metamorphosis  Entomology  Forensic Entomology  Grub  Insect Succession  Instar  Larva  Maggot  Pupa</p>			
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<p><b>Death: Manner, Mechanism, Cause</b></p> <p>NGSS:          HS-LS1-1          HS-LS1-2          HS-LS1-4          HS-LS3-1          HS-LS3-3          HS-ETS1-2          HS-PS1-1          HS-PS1-2          HS-PS1-3          HS-PS1-4          HS-PS1-5          HS-PS1-7          HS-PS2-1          HS-PS3-4          1-PS4-1</p>	<p>What is the difference between cellular death and death of an organism?          What are the four manners of death?          What is the difference between cause, manner and mechanism of death?          How do algor, rigor, and livor mortis develop following death?          What are the chemical and physical changes during decomposition?          What is the difference between medical examiners and coroners?          What is the procedure of an autopsy and how does it help to establish the cause of death, manner of death and postmortem interval?</p> <p><b>Vocabulary:</b>          Adipocere          Algor Mortis          Autolysis          Autopsy          Cause of Death          Coroner          Decomposition          Livor Mortis          Manner of Death          Mechanism of Death</p>	<p>Death Notes</p> <p>Calculating Postmortem Interval Using Rigor Mortis Activity</p> <p>Calculating Postmortem Interval Using Algor Mortis Activity</p> <p>Tommy the Tub Activity</p> <p>Analysis of Evidence from Death Scenes Activity</p> <p>WARDS Bone Lab</p>	<p>Chapter Questions</p> <p>Quizzes/Tests</p> <p>Activities</p>	<p>1 Week</p>

	Putrefaction Rigor Mortis			
<b>Tool Marks and Impressions</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1	How is evidence such as foot, shoe, and dental impressions, usually considered class evidence? What is the difference between latent, patent and plastic impressions? What are the features of tire impressions and skid marks used to help identify tire(s) or a vehicle's wheelbase, track width and/or turning diameter? How are skid marks produced, what do they look like and how can they be used to reconstruct events leading to a collision? What is the method used to produce an impression or cast? What are the three major types of tool marks and what types of tools produce those types of marks? What is the procedure for photographing, documenting, casting and collecting evidence from tools and tool marks?  <b>Vocabulary:</b> Groove (of a tire)	Tool Marks and Impression Notes  Making a Plaster of Paris Cast Lab  Shoe Size, Foot Size, and Height Activity  Tire Impressions and Analysis  Vehicle Identification Activity  Dental Impression Lab  Tool Marks: Screwdrivers and Chisels Lab  Hammers and Hammer Impressions Lab  Casting Impressions of Hammer Strikes on Wood in Silicone Lab	Chapter Questions  Quizzes and Tests  Lab/Activities	4 Days

	Latent Impression Patent Impression Plastic Impression Sole Track Width Tread Turing diameter Wheelbase Abrasion Mark Cutting Mark Indentation mark Tool Mark			
<b>Firearms and Ballistics</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1	What are the different types of firearms, including handguns, rifles and shotguns? How does a firearm discharge? How do forensic scientists estimate the trajectory of a projectile? What is the composition and formation of gunshot residue and how it plays a role as evidence? What is the difference between an entrance and an exit wound?  <b>Vocabulary:</b> Ballistics Breech Bullet Caliber Cartridge Firearm Gunshot Residue (GSR) Lands and Grooves	Firearms and Ballistics Notes  Bullet Trajectory Lab  Firing Pin Analysis Lab  Describing Spent Projectiles Lab  How good is your aim? Lab	Chapter Questions  Quizzes/Test  Labs/Activities	4 Days



	Pistol Revolver Rifle Rifling Trajectory			
<b>DNA Profiling</b>  NGSS: HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 HS-LS3-3 HS-ETS1-2 HS-PS1-1 HS-PS1-2 HS-PS1-3 HS-PS1-4 HS-PS1-5 HS-PS1-7 HS-PS2-1 HS-PS3-4 1-PS4-1	How is DNA important to criminal investigations? How and what crime scene evidence collected and processed for DNA analysis? What are short tandem repeats (STR) and how are they important to DNA profiling? How do law-enforcement agencies compare new DNA evidence to existing DNA evidence? How is using mtDNA and Y STRs used to help identify a person using the DNA of family members?  <b>Vocabulary:</b> Allele Chromosome CODIS DNA Fingerprint Electrophoresis Intron Karyotype PCR Polymorphism Primer Restriction enzyme Restriction Fragment	Chapter Notes  The Break-In Activity  Anna Anderson or Anastasia? STR Analysis Lab  STR Identification of a September 11 Victim Lab  Identification of the Romanovs Using STR Profiling Lab	Chapter Questions  Quizzes/Tests  Lab/Activities	1 Week

	Short Tandem Repeats			
<b>Cayuga County Sheriff's Office Visit</b>				
<b>Cayuga County Jail Visit</b>				