

**FORENSICS COURSE OUTLINE**

**2019**

<b>Quarter</b>	<b>Content</b>	<b>NGSS</b>	<b>Essential Skills</b>	<b>Assessment</b>	<b>Vocabulary</b>
1	<b>Unit 1: The Crime Scene</b> A. Processing the crime scene B. Legal Considerations C. Chain of Custody D. Physical Evidence	<b>HS-PS2-1</b> Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	<ol style="list-style-type: none"> <li>1. Recognize and practice evidence search patterns.</li> <li>2. Perform the steps to process a crime scene.</li> <li>3. Determine if evidence is class or individual.</li> <li>4. Evaluate the quality of physical and eyewitness evidence.</li> <li>5. Create and interpret a non-scaled drawing crime scene sketch.</li> <li>6. Demonstrate proper search methods and documentation procedures when given a crime scene</li> <li>7. Differentiate between criminal and civil law and types of evidence admissible in each.</li> <li>8. Understand the 4<sup>th</sup> and 5<sup>th</sup> Amendments of the US Constitution and apply them to criminal investigations.</li> <li>9. Relate the Frye Standard and the Daubert ruling to the admissibility of evidence in a criminal trial.</li> <li>10. Interpret evidence as direct, indirect and circumstantial.</li> <li>11. Compare markings on crime scene bullets and cartridge cases with test-fired standards</li> </ol>	<b>Lab:</b> Crime scene diagram  <b>Written exam</b>  <b>Practical Exam:</b> Search and document a crime scene	chain of custody physical evidence class evidence individual evidence circumstantial indirect evidence direct evidence Locard's exchange principle Striations Firing pin Cartridge case
1 <sup>st</sup> Quarter	<b>Unit 2: Document Analysis</b> A. Handwriting comparisons B. Exemplars C. Typescript D. Paper E. Forgeries	<b>HS-PS4-5</b> Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with	<ol style="list-style-type: none"> <li>1) Analyze and compare handwriting samples for twelve characteristics</li> <li>2) Analyze and compare type of ink via paper chromatography</li> <li>3) Analyze and compare various types of paper</li> <li>4) Accurately collect and preserve document and handwriting evidence</li> </ol>	<b>Labs:</b> Handwriting analysis (ransom note analysis) Lab	Exemplar Diacritic Chromatography Watermark Questioned document Blind Forgery Simulated Forgery

	F. Collection and Preservation of documents/handwriting evidence	matter to transmit and capture information and energy.	<p>5) Analyze and compare paper currency, recognizing forgery</p> <p>6) Identify several kinds of documents that can be used as evidence</p> <p>7) Analyze typescript evidence and exemplars</p> <p>8) Understand the importance of document analysis in the following case studies: Lindberg Kidnapping, Hitler's Diaries.</p> <p>9) Discuss the development and history of the U.S. Secret Service</p> <p>10) Know your money, explain the security features in modern currency</p>	<p>Paper Chromatography Lab</p> <p>Paper Analysis Lab</p> <p>Know your money Lab</p> <p><b>Written Exam</b></p>	<p>Traced Forgery</p> <p>Obliteration</p> <p>microprinting</p> <p>color shifting ink</p> <p>security thread</p> <p>Ultraviolet light</p>
1	<p><b>Unit 3: Fingerprints</b></p> <p>A. Anatomy/physiology</p> <p>B. History</p> <p>C. Ridge patterns</p> <p>D. Classification of fingerprints</p> <p>E. Automated fingerprint identification systems</p> <p>F. Collecting fingerprint evidence</p> <p>G. Preservation of fingerprint evidence</p>	<p><b>C1.1A</b> Generate new questions that can be investigated in the laboratory or field.</p> <p><b>C1.1C</b> Conduct scientific investigations using appropriate tools and techniques</p> <p><b>C1.1E</b> Describe a reason for a given conclusion using evidence from an investigation.</p> <p><b>C1.1g</b> Based on empirical evidence, explain and critique the reasoning used to draw a scientific conclusion or explanation</p> <p><b>C1.1h</b> Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables.</p>	<ol style="list-style-type: none"> <li>1. Discuss the origin, anatomy and physiology of fingerprints.</li> <li>2. State the 3 fundamental principles of fingerprints that make them good evidence.</li> <li>3. List and describe the 3 types of prints found at a crime scene. (visible, plastic, latent)</li> <li>4. Identify fingerprint patterns and Galton characteristics on a given print.</li> <li>5. Accurately evaluate a 10 print card.</li> <li>6. Describe the substances that create latent fingerprints and understand how to use this knowledge to develop prints with iodine, ninhydrin, cyanoacrylate, magnetic powders, and dusting powders.</li> <li>7. Evaluate the best developing method for different types of surfaces.</li> <li>8. Accurately collect and preserve crime scene and exemplar fingerprint evidence.</li> <li>9. Determine the NCIC classification for a given set of prints.</li> <li>10. Match an unknown print with an example using pattern recognition and Galton characteristics.</li> </ol>	<p><b>Written Test</b> over types and characteristics of fingerprints and classification of prints.</p> <p>Quiz over NCIC classification and identifying individual characteristics</p> <p><b>Lab Practical</b> involves dusting and lifting prints, also, developing latent prints</p>	<p>Latent print</p> <p>Plastic print</p> <p>Visible print</p> <p>Negative impression</p> <p>Minutiae</p> <p>Galton characteristics</p> <p>Bifurcation</p> <p>AFIS</p> <p>Cyanoacrylate</p> <p>Loop</p> <p>Whorl</p> <p>Arch</p>

		<p><b>SI.1.1 C</b> Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics.</p>			
2	<p><b>Unit 4: Forensic Serology- Blood</b></p> <p>A. Composition of Blood</p> <p>B. Antigens and antibodies</p> <p>C. Blood typing</p> <p>D. Blood spatter &amp; stains</p>	<p><b>HS-PS2-1</b> Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.</p> <p><b>HS-PS3-2</b> Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).</p> <p><b>HS-LS3-1</b> Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parent to offspring.</p>	<ol style="list-style-type: none"> <li>List the chemical and cellular components of blood.</li> <li>Relate blood type to antigen/antibody reactions.</li> <li>Evaluate results of blood typing tests.</li> <li>Perform both presumptive and confirmatory tests for presence of blood.</li> <li>Distinguish between human and animal blood.</li> <li>Mathematically determine the angle of impact using a protractor and meter stick.</li> <li>Scientifically determine the origin of impact and directionality based on blood spatter pattern and size.</li> <li>Relate velocity of impact to spatter characteristics.</li> <li>Relate blood spatter evidence to crime scene reconstruction (type of weapon, number of blows, angle of impact, volume of blood loss, etc.)</li> <li>Accurately organize, collect and preserve blood spatter evidence.</li> <li>Evaluate blood evidence in key case studies (OJ Simpson, Sam Shepherd)</li> </ol>	<p><b>Written Test</b></p> <p><b>Lab Practical</b> analyzing a blood spatter</p> <p>Blood spatter labs</p>	<p>Plasma</p> <p>Serum</p> <p>Antibody</p> <p>Antigen</p> <p>ABO classification</p> <p>Erythrocyte</p> <p>Leukocyte</p> <p>Platelet</p> <p>Precipitin</p> <p>Antiserum</p> <p>Kastle- Meyer Solution</p> <p>Presumptive test</p> <p>Color Test</p> <p>Indicator</p> <p>Phenolphthalein</p> <p>Hydrogen Peroxide</p> <p>Allele</p> <p>Genotype</p> <p>Serology</p> <p>Agglutination</p> <p>Paternity Test</p> <p>Secretor</p> <p>Homozygous</p> <p>Heterozygous</p> <p>Area and point of convergence</p> <p>Point of origin</p> <p>Angle of impact</p>

		<p><b>HS-LS3-3</b> Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.</p> <p><b>HS-F-TF</b> Use special triangles to determine geometrically the values of sine, cosine, and tangent.</p>			Luminol
2nd Quarter	<p><b>Unit 5: DNA</b></p> <p>A. Structure of DNA</p> <p>B. Collection and Preservation of DNA evidence</p> <p>C. DNA Analysis</p>	<p><b>HS-LS1-1</b> Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <p><b>HS-LS1-2</b> Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p><b>HS-LS3-1</b> Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parent to offspring.</p> <p><b>HS-LS3-3</b> Apply concepts of statistics and probability to</p>	<p>1. Recognize the various components of DNA</p> <p>2. Understand the structure and function of DNA, including roles of nucleotides, tandem repeat sequences, and variable number tandem repeats (VNTR)</p> <p>3. Explain the procedure for creating a DNA fingerprint using electrophoresis</p> <p>4. Interpret the results of a DNA fingerprint when given examples from paternity cases and criminal cases</p> <p>5. Describe the steps in the proper collection and preservation of DNA evidence.</p> <p>6. Explain the difference between nuclear DNA and mitochondrial DNA and how they are used differently in forensic science</p>	<p>Written Test</p> <p>Blackett Family DNA project</p> <p>Freedom Project</p> <p>Blood typing lab</p>	<p>Nuclear DNA,</p> <p>Mitochondria DNA,</p> <p>Tandem repeat sequence,</p> <p>Variable number tandem repeat (VNTR),</p> <p>Polymerase chain reaction (PCR),</p> <p>Restriction enzyme,</p> <p>Short tandem repeat markers (STR),</p> <p>Combined DNA Index System (CODIS)</p> <p>Nucleotide</p> <p>Deoxyribose</p> <p>Phosphate group</p> <p>Adenine</p> <p>Guanine</p> <p>Cytosine</p> <p>Thymine</p> <p>Double Helix</p> <p>Complementary base pair,</p> <p>Hydrogen bond</p> <p>Electrophoresis</p> <p>Locus</p> <p>Cathode</p> <p>Anode</p>

		explain the variation and distribution of expressed traits in a population.			
2	<b>Unit 6: Tool marks and other Impressions</b> A. Tool marks B. Shoeprints and tire marks C Odontology D. Collection and preservation of impression evidence		1) Follow the steps in proper documentation and collection of toolmark evidence found at a crime scene. 2) Describe how tool mark evidence is analyzed in a forensic lab, including comparison of questioned toolmark with known standards 3) Analyze bite mark impressions. <ul style="list-style-type: none"> <li>● identify each tooth by name and number on a bite impression</li> <li>● Compare and contrast child dentition and adult dentition.</li> <li>● Explain the significance of bite mark evidence in the Ted Bundy case study</li> </ul> 3) Collect shoe print evidence <ul style="list-style-type: none"> <li>● positive prints</li> <li>● casts</li> </ul> 4) Analyze and compare shoe prints and casts 5) Analyze and compare tire tread markings 6) accurately collect and preserve all impression evidence	Bite mark lab tool mark lab written exam Shoe cast lab tire tread lab	incisor canine molar premolar cuspid bicuspid mold cast imprint (2-dimensional) impression (3-dimensional) negative impression
2	<b>Unit 7: Forensic Medicine</b>  <b>A. Forensic Anthropology</b> 1. Bones of the human body 2. Animal or human bones? 3. Size, age, sex, race of victim 4. “The Body Farm”  <b>B. Forensic Pathology</b> 1. Time of death 2. Cause of death		<b>A. Forensic Anthropology</b> 1) Name and identify bones of the human skeleton 2) Examine bones for clues helpful in determining age, gender, and height of person. 3) Examine bones for premortem and postmortem injuries. 4) Estimate post mortem interval using clues from bones. 5) Compare and contrast samples of human and animal bones 6) Discuss the questions forensic anthropologists ask when examining human remains. 7) Identify the step needed to pursue a career in forensic anthropology	<b>Comparing Bone length vs. height</b>  <b>Identify Bone Quizzes</b>  <b>Estimate Time of Death Problems</b>  <b>Case Studies</b>  <b>Written Exam</b>	Rigor mortis Livor mortis Algor mortis Autopsy Postmortem interval Adipocere Mummification Anthropophagia

			<p>8) Understand how the “The Body Farm,” has applied the scientific method to increased our understanding of forensic anthropology</p> <p><b>B. Forensic Pathology</b></p> <p>1) Understand the role of medical examiner, forensic pathologist, and coroner</p> <p>2) Differentiate between the cause of death and manner of death</p> <p>3) Discuss the changes that occur in the human body after death</p> <p>4) Estimate the time of death based on external conditions, body conditions and internal body conditions</p> <p>5) Discuss what happens during an autopsy</p> <p>6) Identify the steps necessary for a career in forensic pathology.</p>		
	<i>If time permits we may also study.....</i>				
	<p><b>Unit 8: Arson/Explosives</b></p> <p>A. Chemistry of fire</p> <p>B. The fire scene</p> <p>C. Collection and preservation of arson evidence</p> <p>D. Types of explosives</p> <p>E. Collection and preservation of arson evidence</p>		<p>1) Understand the chemistry of fire and be able to label and explain components of the “FireTriangle”</p> <p>2) Describe the different types of physical evidence found at fire scenes</p> <p>3) Understand how an investigator determines point of origin, cause of fire and whether an accelerant is present</p> <p>4) Understand the different fire burn patterns found at fire scenes</p> <p>5) Discuss procedures for collecting and preserving evidence from a fire scene</p> <p>6) Understand the basic analysis of solid and liquid samples found at a fire scene</p>		<p>Arson</p> <p>Accelerant</p> <p>Combustion</p> <p>Endothermic reaction</p> <p>Exothermic reaction</p> <p>Explosion</p> <p>Energy</p> <p>Flash point</p> <p>Ignition temperature</p> <p>Charring pattern</p> <p>Point of origin</p> <p>Gas Chromatography</p> <p>Thin layer chromatography</p> <p>Pyrolysis Gas chromatography</p> <p>Head Space</p>