# Hamburg Area School District

## Course Guide

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|---|---|
| Name: | Forensic Science II |
| Grade(s): | *9th-12th* |
| Length: | *Place an X next to the correct option* |
| | Full-Year (180 Sessions) |
| X | Semester (90 Sessions) |
| | Quarter (45 Sessions) |
| | Other (Specify): |
| Text: | Supplemental Materials |
| Approved on: | February 25, 2019 |

*Forensic Science II*

Unit: *Anthropology*
Unit Length: *5 weeks*

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| What is the role of a forensic anthropologist and how is it involved in creating a biological profile? | Define and understand the role of a forensic anthropologist and what goes into creating a biological profile. | |
| What distinguishing bony features on a skeleton are important clues toward proper creations of a biological profile? | Distinguish among growth plate stages, bone caps, bone types, shafts, sutures and explain their significance for forensic anthropology. | 1. Assessment: Bone Identification<br>2. Assessment: Skull Suture ID<br>3. Examination/Debate: Age of Epiphyseal closures |
| | Compare and contrast an adult's skeleton and a child's skeleton in terms of composition, numbers of bones, suture marks, growth plates, and dentition. | 1. Lab: Analysis of skeletal remains |
| | Apply knowledge of bone growth (ossification) to estimate the age of the deceased at the time of death based on remains. | 1. Lab: Interpreting skeletal remains<br>2. Lab: Analysis of skeletal remains<br>3. Case Study: Leavy Neck - Body in the Basement |
| | Apply appropriate formulas to estimate the height of a person based on individual bone length. | 1. Case Study: Jane of Jamestown<br>2. Case Study: Four of the Founders of Jamestown |

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| | Distinguish between male and female skeletal remains based on the structure, the size and shape of the skull, pelvis and long bones | 1. Lab: Interpreting skeletal remains<br>2. Lab: Analysis of skeletal remains |
| | Estimate the age, gender, race, and height of an individual via their skeletal remain, using proven anthropological techniques in regards to case studies. | 1. Research Paper: How King Bones Came to Hamburg - Complete identification of skeletal remains m along with identification causation of elongated styloid processes. |
| What can the mineralization and structure of bones and teeth tell about a person's lifetime? | Discuss the difference of isotopes and mineralization in skeletal remains to determine the diet and medical care someone acquired in their lifetime. | 1. Case Study: Leavy Neck - Body in the Basement<br>2. Case Study: Jane of Jamestown<br>3. Case Study: Four of the Founders of Jamestown |
| | | 1. Assessment: End of Unit Exam |

*Forensic Science II*

Unit: *Decomposition & Entomology*
Unit Length: *5 weeks*

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| How can insect evidence at a crime scene be helpful to solving a crime? | Describe several examples of the ways that forensic entomology is used to help solve crimes. | 1. Research Questions & Class Discussion |
| Why are insects the 'timekeepers' of death? | Compare and contrast the four stages of a blowfly's life cycle and describe the significance of blowflies in forensic entomology. | 1. Lab: Decomposition Simulation Lab (21 consecutive days) |
| | Visualize the main organs of a blowfly larvae and define the importance of each in the decomposition process. | 1. Visible Proof Activity from www.nlm.nih.gov<br>2. Dissection Lab: Blowfly Larvae & Adult Crop Dissection |
| | Explain how insect evidence is analyzed to provide evidence of the person's identity or drug, poison, and toxin exposure. | 1. Dissection Lab: Blowfly Larvae & Adult Crop Dissection |
| How long will an insect live on a decomposing body? | Relate the life cycles of insects and succession of various insects to the changing environmental conditions surrounding the decomposing remains. | 1. Visible Proof Activity from www.nlm.nih.gov<br>2. Lab: Decomposition Simulation Lab |
| How can investigators calculate the time of death from insect evidence and environmental factors? | Calculate the Post Mortem Interval using various data such as weather conditions, insect life stages and crime scene observations. | |
| | | 1. Assessment: End of Unit Exam |

*Forensic Science II*

Unit: *Serology and Blood Patterns*
Unit Length: *4 weeks*

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| How is the structure of biological composition of blood important to forensic investigation? | Describe the forensic significance of different types of blood cells. | 1. The Biology of Blood Brochure |
| | Outline the procedure used to determine blood type. | 1. The Biology of Blood Brochure<br>2. Assessment: Biology of Blood |
| | Describe how to screen for the presence of blood. Determine the difference between animal blood and human blood. | 1. Activity: Kastle -Meyer Reagent Lab<br>2. Lab: A Presumptive Blood Test |
| What safety precaution must be taken with human/animal blood? | Practice the proper procedures for handling blood evidence. | 1. Student demonstration: Correct identification, collection, and handling of blood evidence |
| What can blood markings at a crime scene tell about the actions of the crime? | Analyze blood spatter evidence using angle of impact, area of convergence, and area of origin | 1. Preview/Practice trigonometric calculation<br>2. Area of Convergence Activity<br>3. Lab: Effect of Height on Blood Drops<br>4. Lab: Blood Droplet Impact Angle Area of Origin Activity |
| | Compare and contrast different types of blood spatter. | Visual Case Study: Identification of blood patterns at crime scene as crucial evidence. |
| | | Assessment: Final Unit Exam |

*Forensic Science II*

Unit: *DNA Fingerprinting*
Unit Length: *4 weeks*

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| Why is DNA a crucial piece of evidence? | Explain how DNA can be important to criminal investigations. | |
| How sensitive is DNA? | Explain how evidence is collected and processed to obtain DNA. | 1. Student will be able to plan & teach a hands on lesson on how accurately acquire DNA evidence from a crime scene. |
| The important structure behind DNA. | Describe the structure of DNA. Compare and contrast a gene and a chromosome, and an intron, an exon and restriction enzymes. | 1. Assessment: Biology and Chemistry of DNA Quiz |
| | Explain what a Short Tandem Repeats (STR) is, and explain its importance to DNA profiling. | 1. Lab: STR Identification of a 9/11 Victim |
| How is DNA processed, tested, and analyzed for a match? | Describe the importance of PCR when working with trace samples of DNA. | |
| | Be able to read and interpret an electropherogram. | 1. Reading Gels Activity<br>2. Lab: DNA Electrophoresis Lab |
| | Explain how law enforcement agencies compare new DNA evidence to existing DNA evidence. | |

| ESSENTIAL QUESTION-<br>ESSENTIAL CONTENT | PERFORMANCE OBJECTIVES | LAB ACTIVITY/ASSESSMENTS |
|---|---|---|
| What role does DNA play in solving crimes? | Describe the use of DNA profiling using mtDNA and Y STRs to help identify a person using the DNA of family members. | 1. Case Study: Romanov Family<br>2. Case Study: Colin Pitchfork |
| | Explain how the organizations are working to free wrongfully convicted inmates using the newest DNA technology. | 1. Current Event Report using The Innocence Project as a research tool |
| | | 1. Assessment: Final Unit Exam |