



GREAT NECK PUBLIC SCHOOLS

"Where Discovery Leads to Greatness"

#DiscoverGreatness

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Course Profile- Forensic Science

<u>Department</u>	Science		
<u>Course Name</u>	Forensic Science		
<u>Course Length</u>	1 Year		
<u>High School Credits</u>	1 Unit of Credit		
<u>Description</u>	This course will provide students with an overview of forensic science. Forensic Science is the application of science (chemistry, physics, biology and earth science) to the criminal and civil laws that are enforced by police agencies in a criminal justice system. It includes the investigation of fingerprinting, fiber and hair analysis, ballistics, arson, trace evidence analysis, poisons, drugs, counterfeiting, blood spatters, and blood samples. Students are taught the proper collection, preservation, and laboratory analysis of various samples. Students are also taught how human observation and perception affects our objectivity in analyzing evidence. Students will study the innocent project and understand current issues within our legal system and how it may affect wrongful convictions. This course also studies the psychology and traits of serial killers throughout history. These are just some of the content we will cover in this course, as it evolves to keep up with current events.		
<u>Target/eligible students</u>	High School Students		
<u>State Learning Standards Link(s)</u>	HS. Structure and Properties of Matter HS. Chemical Reactions HS. Forces and Interactions HS. Waves and Electromagnetic Radiation HS. Structure and Function HS. Inheritance and Variation of Traits HS. Earth's Systems HS. Engineering Design		pg. 54 pg. 56 pg. 58 pg. 62 pg. 64 pg. 69 pg. 77 pg. 83
<u>Primary texts and materials</u>	-Forensic Science: Fundamentals and Investigations, 3rd Edition. Anthony "Bud" Bertino and Patricia Nolan Bertino. Cengage Learning or Criminalistics: An Introduction to Forensic Science, 7th Edition. Richard Saferstein -Explore Learning -Breakout.Edu -Various online materials		
<u>Scope/Sequence</u>	<u>Standards</u>	<u>Key Ideas, Terms, Concepts.</u>	
<u>Unit 1: Forensic Science and Observation Skills</u>	HS-PS1-9 HS-LS3-1 HS-LS3-1 HS-LS3-3 HS-ETS1-2	Observation is how you perceive your surroundings. Your brain affects your observations by filtering the information you take in from your environment. It is important to understand the differences between observation and perception. Many factors affect eyewitness accounts of a crime. Investigators must understand these factors when determining the accuracy of a witness's testimony. With practice and patience, you can train yourself to be a good observer. Forensic Science attempts to uncover evidence in order to discover the facts of a crime. Forensic scientists do not try to prove whether someone is innocent or guilty. They are only interested in collecting and examining evidence. Discuss the Innocence Project and understand why a person may have been wrongfully convicted.	pg. 54 pg. 69 pg. 69 pg. 83
<u>Unit 2: Crime Scene Investigation and Evidence Collection</u>	HS-ETS1-2	Crime-scene investigators recognize, document, collect, and organize evidence left at the scene of a crime. Investigators apply specific procedures and techniques to collect trace evidence. It is extremely important to preserve both direct and indirect evidence so that professionals can recreate as complete a picture as possible of what took place before, during and after a crime. Investigators must secure the crime scene; separate witnesses; take photographs and sketch the scene; and search, secure and properly package	pg. 83

		evidence. Students will study the different types of evidence: physical and biological and understand the differences between types of evidence and categories: individual, class and trace evidence. Apply this to different examples of evidence and real-life scenarios.	
<u>Unit 3: Hair & Fiber Analysis</u>	HS-PS1-1 HS-LS1-1 HS-LS3-3 HS-ETS1-2	Hair is an important structure found on mammals, including humans. While all hairs have the same basic structure, differences in the specific characteristics of an individual's hair can help an investigator determine general characteristics of that individual. Fibers also have unique characteristics and can help an investigator determine the type of fiber and in some cases its source. Forensic investigators rely on their knowledge of hair and fiber structure, function, and variation when they use hair and fibers from a crime scene as evidence. Hairs and fibers can be transferred between people and between people and their environments. A close study of these hairs and fibers can prove contact between a person and a crime scene. Yarns are made of fibers. Textiles are created by weaving perpendicular yarns. Weave patterns vary depending on the number of threads that wind over and under each other. Weave patterns can be used to identify sources of textiles at crime scenes. Fiber types can be identified by physical and chemical analysis.	pg. 54 pg. 64 pg. 69 pg. 83
<u>Unit 4: Fingerprint Analysis</u>	HS-LS1-2 HS-ETS1-2	Describe the history and origins of fingerprinting. Describe the characteristics of fingerprints. Compare and contrast the basic types of fingerprints. Describe how criminals attempt to alter their fingerprints. Evaluate arguments that question fingerprint evidence reliability. Summarize the proper procedures for collecting fingerprint evidence. Describe the latest identification technologies. Determine if a fingerprint is consistent with a fingerprint on record. Lift a latent print. Prepare a ten card and analyze the ridge patterns of the prints. Practice using different techniques and powders to dust and lift prints off various surfaces. Understand the limitations of fingerprinting.	pg. 54 pg. 83
<u>Unit 5: DNA Profiling</u>	HS-LS1-2 HS-ETS1-2	Explain how DNA can be important to criminal investigations. Explain how crime scene evidence is collected for DNA analysis. Describe how crime scene evidence is processed to obtain DNA. Explain what short tandem repeat (STR) is, and explain its importance to DNA profiling. Explain how law enforcement agencies compare new DNA evidence to existing DNA evidence. Describe the use of DNA profiling using mtDNA and Y STRs to help identify a person using the DNA of family members. Compare and contrast a gene and a chromosome. Understand how DNA evidence is being used to exonerate those wrongfully convicted; innocence project.	pg. 64 pg. 83
<u>Unit 6: Blood and Blood Spatter</u>	HS-PS1-1 HS-LS3-3 HS-ETS1-2	Describe the forensic significance of the different types of blood cells. Summarize the history of the use of blood and blood-spatter analysis in forensics. Outline the procedure used to determine blood type. Describe how to screen for the presence of human blood. Calculate the probability of a person having a specific blood type, using data from population studies. Describe the proper procedures for handling blood evidence. Analyze blood-spatter evidence using angle of impact, area of convergence, and area of origin. Compare and contrast different types of blood-spatter patterns. Describe how different types of blood-spatter patterns are formed.	pg. 54 pg. 69 pg. 83
<u>Unit 7: Toxicology</u>	HS-LS1-2 HS-ETS1-2	Provide examples of drugs, toxins and poisons. List factors that affect drug toxicity. Describe the role of toxicologist in analyzing substance evidence. Compare and contrast presumptive testing and confirmatory testing. Describe how people get exposed to environmental toxins (e.g., pesticides, carbon monoxide), and describe their effects on the body. Distinguish among the terms tolerance, addiction, dependence, and withdrawal. Relate the signs and symptoms of overdose with specific substances or combinations of substances. Show the relationships between the law, crime and the use of	pg. 64 pg. 83

		drugs. Learn how to test for the presence of different drugs and the signs that someone has been poisoned.	
<u>Unit 8: Document Analysis</u>	HS-PS1-2 HS-ETS1-2	Explain how a sample of handwriting evidence is compared with an exemplar using both qualitative and quantitative characteristics. Describe some of the limitations of handwriting analysis. Identify a historical case of document fraud and explain how the fraudulent document(s) was/were created. Describe recent developments in technology for use in handwriting analysis. List and describe several ways in which businesses prevent check forgery. Describe features of new paper currency that protect against counterfeiting. Compare and contrast older paper currencies with new currencies, including those on plastic stock. Identify historical cases involving counterfeiting and forgery.	pg. 56 pg. 64
<u>Unit 9: Serial Killer and Criminal Profiling</u>	HS-LS1-2 HS-ETS1-2	Provide examples of serial killers throughout history. Study their psychological and physical traits that may have led them to become serial killers. Understand the types of serial killers. Provide evidence as to what led this person to become a serial killer. Compare and contrast him/her to other serial killers. Analyze the role DNA may have played in their serial killer tendency. Study nature vs. nurture and provide evidence based on the serial killer in question.	pg. 64 pg. 69 pg. 83
<u>Unit 10: Casts, Impressions and Tool Marks</u>	HS-PS1-2 HS-LS1-1 HS-ETS1-2	Provide examples of how impression evidence gives clues about the crime scene, person(s) at the scene, and events that occurred at the scene. Provide well-supported arguments that evidence such as foot, shoe, and dental impressions is usually considered class evidence. Distinguish among latent, patent, and plastic impressions. Summarize the significance of foot and shoe impression evidence, and outline procedures for collecting impression evidence from different types of surfaces. Describe 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. Compare and contrast skid marks, including how they are produced, when they are produced, what they look like, and how they can be used to reconstruct events leading to a collision. Summarize the methods used to produce an impression or cast. Analyze impression evidence to determine if it is consistent with evidence from a crime scene. Describe how forensic investigators analyze evidence from tools and tool marks to help solve crimes. Describe variations in tool surfaces that could be used to identify specific tools. Compare and contrast the three major types of tool marks and provide examples of tools that produce those types of marks. Provide examples of foreign materials found in tool marks, and elaborate on how this evidence can be used to link a suspect to a crime scene.	pg. 56 pg. 64 pg. 83
<u>Unit 11: Cause of death, time of death autopsy and analysis</u>	HS-PS1-5 HS-LS1-2 HS-ETS1-2 HS-ESS2-5.	Distinguish between cellular death and death of an organism. Distinguish among four manners of death: natural, accidental, suicidal, and homicidal. Explain the fifth classification, undetermined. Distinguish among cause, manner, and mechanism of death. Outline the sequence of events that occurs in the first few minutes after death. Explain how algor, rigor, and livor mortis develop following death and describe how their development is affected by environmental factors. Sequence and describe the chemical and physical changes during decomposition, including autolysis, putrefaction, marbling, and adipocere formation. Analyze the evidence from algor, livor, and rigor mortis, stomach contents, and decomposition, along with environmental factors to estimate a postmortem interval. Compare and contrast the roles of medical examiners and coroners. Describe the procedures of an autopsy, and give examples of how an autopsy helps establish the cause of death, manner of death, and postmortem interval. Support the claim that it is often difficult to pinpoint the postmortem interval.	pg. 56 pg. 64 pg. 64 pg. 77

<u>Unit 12: Ballistics</u>	HS-PS2-1 HS-PS4-1 HS-ETS1-2	Compare and contrast the different types of firearms, including handguns, rifles, and shotguns. Put in order the sequence of events that result in a firearm discharging. Estimate the trajectory of a projectile. Discuss the composition and formation of gunshot residue and its reliability as a source of evidence. Compare and contrast entrance and exit wounds, including size, shape, gunshot residue, and the presences of burns. Distinguish among the various forms of firearms evidence, including rifling, markings on cartridges, marks on projectiles, and gunshot residue. Discuss how technology has improved the ability to obtain, compare, analyze, store, and retrieve firearm and ballistics evidence. Process and/or analyze a crime scene for firearm and ballistics evidence. Understand what type of evidence bullet casings and guns are.	pg. 58 pg. 62 pg. 64
<u>Additional Information</u>		Please note that the sequence and specific details of each unit may vary from year to year and school to school.	