Options EHS Forensics: Using Science to Solve a Mystery	Scope and Sequence
Unit Lesson	**Objectives**
HISTORY OF FORENSICS SCIENCE AND DNA ANALYSIS	
Science Goes to Court	
	Develop a personal definition of forensic science.
	Identify the importance of crime-scene evidence in the courtroom.
	Describe ancient methods and techniques used in historic forensic science.
	Name major developments early on in forensic science.
	Understand the relationship between the introduction of forensic science methods and the development of science and medicine.
	Understand the place of ethics in forensic science as it works alongside the legal system.
	Differentiate between forensic technician and specialist career training.
	Understand the early use of testimony of witnesses, fingerprinting, and document examination as a means of obtaining physical evidence.
History of Physical Evidence Investigation Methods	
	Establish an overview of methods developed for the forensic investigation of physical evidence from 1800–1970.
	Understand the developments of medicine and science that paved the way for key forensic methods and tools.
	Identify key contributors in the developmental history of forensic science.
	Explain the importance of physical evidence investigation to law enforcement and the legal system.
	Analyze the role of fingerprinting and personal identification in crime investigation both in the past and present.
	Determine the place of toxicology and pathology as a part of investigation of crimes.
	Distinguish the various uses of blood in forensic-science investigations.
	Identify historical roots of some of the forensic-science careers.
	Enjoy some of the colorful historical events in forensic science.

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Unit	**Lesson**	**Objectives**
		Develop a timeline depicting key forensic methods used in the investigation of physical evidence.
		Align important historic medical and scientific contributions with the forensic timeline events.
	Project: Creating a Timeline, Part One	
	Identity Is Key	
		Identify applications of both historical and present-day photography in forensic science.
		Comprehend the importance of accurately making personal identification of both suspects and victims in forensic science and how that necessity led to the development of fingerprinting, photography, and DNA profiling.
		Trace the development of DNA analysis and profiling as a tool used by forensic scientists.
		Name major developments early on in forensic science.
		Analyze the interaction of technology and forensic science.
		Recognize the developing applications of molecular biology and biochemistry in medicine and forensic science.
		Recognize overlap of the various fields of forensic science and medicine.
		Develop an awareness of legal regulations and ethics of forensic science.
		Define bioinformatics and its place in forensic science.
		Differentiate the responsibilities of and preparation for several forensic and medical careers.
		Explain the recent technological developments in forensic science as related to medicine, recognizing some of the important contributors in the field.
	Project: Creating a Timeline, Part Two	
	History of DNA Analysis and Forensics	
		Explain the introduction of DNA evidence to forensic science.
		Trace the development of knowledge regarding the function of DNA.

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Unit	**Lesson**	**Objectives**
		Describe the various fields of application for biotechnology.
		Recognize that the Human Genome Project required bioinformatics in order to be accomplished.
		Explore the use of the Human Genome online gene database.
		Identify new sciences and careers that have developed around the Human Genome Project.
		Explore the use of DNA profiling and identification in mass disasters such as September 11, 2001.
		Recognize that new tests and databases had to be developed for identification of the victims of the Twin Towers.
	Project: Investigating Careers in Genomics	
	DNA at Work in Forensics	
		Explain the importance of DNA to personal identity.
		Explore the basic structure of the DNA molecule.
		Relate the base sequences to their functions.
		Explain that 99.9% of the human genome is the same across the population. It is the .1% of the human genome that is distinctly different and is used for DNA profiling.
		Describe the importance of the paired nucleotide bases, guanine, cytosine, thymine, and adenine.
		Describe the important concept of repeating bases as related to genes and repeating base sequences of the chromosome.
		Relate the significance of base sequences to DNA profiling.
		Realize that genes occur in pairs—one on each of the chromosome pair. One member of each pair comes from each parent.
		List the steps involved in the process of DNA profiling and the interpretation of results.
		Explain the importance of STR and PCR to DNA analysis.
	Project: Creating a DNA Digital Gallery	

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Unit	**Lesson**	**Objectives**
	DNA Ethics and Legalities	
		Describe the contribution agencies make to the fields of medicine and forensic genomics.
		Identify how ethical and legal issues have impacted the use of DNA analyses and databases.
		Continue to trace the role of DNA analysis in forensics.
		Differentiate legal responsibilities for both staff and business and professional groups.
		Appreciate the need for accurate documentation procedures and record keeping.
		Identify ethical and legal issues impacting health care and related businesses such as insurance and biotechnology.
		Appreciate the necessity of respectful and empathetic treatment of all patients and clients considering DNA testing or results.
		Discuss legal and ethical considerations regarding the use of biotechnology and its implications on society.
		Use information-technology tools to access, manage, integrate, and create information.
		Discuss bioethical issues related to biogenetic products.
	Test	
CSI AND FORENSIC MEDICAL AND DENTAL PROFESSIONALS		
	Role of CSI Crime Scene Investigation	
		Explain the similarities between police and medical first responders.
		Explain the securing of a crime scene.
		Describe the steps of the police first responders and the CSI person in charge at a crime scene.
		Outline the responsibilities of emergency and police personnel as they arrive at the crime scene.
		Identify key information which could be crime scene evidence.
		Define and identify examples of physical evidence.

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Unit	**Lesson**	**Objectives**
		Associate types of physical evidence with the specialists who process it.
		Identify key forms of documentation used early in the crime scene investigation.
		Develop a systematic investigation strategy for a given crime scene.
		Identify a crime scene and develop a systematic investigation strategy.
		State the Locard Exchange Principle.
		Differentiate between physical evidence and circumstantial evidence.
		Describe the career paths of both a crime scene technician and an investigator.
		Identify personal traits that are needed by a CSI worker.
	Project: Processing the Scene	
	Evidence Collection and Processing	
		Explain and identify the different types of evidence.
		Describe the importance and use of control evidence.
		Relate the concept and importance of team work at the crime scene.
		Illustrate the importance of discipline and protocol at the crime scene.
		Outline the steps of evidence collection and preserving evidence.
		Understand that the goal of good evidence handling protocol is to bring evidence to court that will stand.
		Describe the importance and application of chain of custody.
		Relate personal ethics and skill to good crime laboratory work.
		Explain the use of controls when studying evidence.
	Project: Protecting the Crime Scene and Evidence	
	Documenting a Crime	

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Unit	**Lesson**	**Objectives**
		Identify similarities between medical and forensic fields.
		Explain the importance of appropriate and sufficient documentation in a criminal case. A crime lab is only as good as its documentation.
		Explain that valid and complete forensic documentation (including tags and chain of custody) of physical evidence is necessary to stand the scrutiny of the court and bring a criminal case to justice.
		Describe the role of the second walk-through, along with the inspector's sketch pad, case notes, photography, and videos in providing a visual record for the court.
		Describe how the detective's interviews of witnesses and those present at the crime scene produced leads to more physical evidence.
		Recognize the use of document forms and the computer in forensic science.
		Explain crime scene reconstruction and the place of real and demonstrated evidence.
		Understand that the investigation leading to the resolution of a crime generally follows the scientific method.
		Understand that during the analysis of the evidence, what is thought by the investigators is not part of the investigative data. The lead investigator usually works through the reconstruction of the crime.
	Medical Examiner and Forensic Pathologist	
		Explain the history of the coroner's office and its responsibilities.
		Compare and contrast the current professional standards of forensic pathology.
		Describe the changes which have taken place leading to the profession of medical examiner and forensic pathologist.
		Identify the career preparation of a forensic pathologist.
		Observe the daily function of a forensic pathologist.
		Describe the career preparation of both a forensic pathology assistant and technician.
	Project: Forensic Pathology	
	Odontology	

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Unit	**Lesson**	**Objectives**
		Identify forensic odontology landmarks in history.
		Explain the place of computers in forensic odontology.
		Describe the importance of teeth in the process of digestion and energy production.
		Describe the development of the two sets of teeth in a human.
		Describe the use of personal dental records by both the personal dentist and the field of forensics.
		Identify the uses of forensic odontology.
		Analyze the use of bite marks and dental records for forensic identification.
		Compare the use of dental forensic evidence with that of DNA and fingerprinting.
		Explore the training and careers for forensic odontologists.
	Project: Teeth as Evidence	
	Forensic Psychiatry	
		Outline the historical treatment of the mentally ill and its relationship to the legal system.
		Define mental illness.
		Describe situations where forensic psychiatry is needed in the courts of law.
		Explain sanity and competency evaluation.
		Describe the place of a forensic psychiatrist and malingering in the courts.
		Identify the training and certification needed by both a forensic psychiatrist and a forensic psychologist.
		Identify other related workers in the field of forensic psychiatry.
		Compare the patient rights of forensic and non-forensic patients.
		Define risk management and its place in forensic psychiatry.
	Test	
FORENSIC BIOLOGIST, FORENSIC CHEMIST, PHYSICAL ANTHROPOLOGIST		

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Unit	**Lesson**	**Objectives**
	Forensic Biology	
		Explain the relevance of human biology to the study of forensic science.
		Explain the importance of digital technology to the development of new means of forensic and medical study.
		Describe the various fields of biology and medicine that also relate to forensic investigations.
		Identify personal traits and training paths associated with various biology and medical careers.
		Utilize technology and logical reasoning to solve scientific and forensic questions.
		Discuss the use of DNA profiling to identify origins of marijuana plant tissues.
		Explain the importance of forensic botany.
	Project: Forensic Genetics Using Technology	
	Entomology	
		Explain the career path of a forensic entomologist.
		Explain the succession of insects on a decomposing body.
		Describe the history of forensic entomology.
		Illustrate the life cycle of the blowfly.
		Apply understanding of forensic entomology to a real case study.
		Draw your own conclusions regarding the value of forensic entomology evidence.
	Project: Using Insects to Solve a Case	
	Chemistry	
		Explain the side-by-side development of medicine and chemistry, including forensic chemistry and pharmaceuticals.
		Explain the career path and professional demands of a forensic chemist.

Options EHS Forensics: Using Science to Solve a Mystery		Scope and Sequence
Unit	**Lesson**	**Objectives**
		Describe the importance of metrology to the work of a forensic chemist.
		Discuss quantitative and qualitative analysis using chromatography methods.
		Define tandem mass spectrometry.
		Relate the legal and ethical implications involved in analytical chemistry.
		Recognize the various types of spectrometry and the variety of applications.
		Appreciate the value of modern technology coupled with analytical instrumentation.
	Anthropology	
		Define anthropology.
		Explain the professional code of ethics in the field of anthropology in both forensic and non-forensic applications.
		Describe major events in the history of forensic anthropology.
		Explain the career path and job description of a forensic anthropologist.
		Identify the various responsibilities of a forensic anthropologist at a crime scene.
		Explore careers and attitudes of some specific forensic anthropologists.
		Appreciate the contribution of forensic anthropologists to the resolution of some important crimes and mass disasters.
		Identify situations where there has been a need for the anthropologist to adhere to the code of ethics and respect for human life.
		Distinguish forensic anthropology techniques and methods used to gain specific forensic evidence.
	Project: An Anthropologist's Field Trip	
	Osteology and Archeology	
		Define anthropology.
		Explain that study of the bones and teeth can supply significant information about the deceased and assist in identification.

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Unit	**Lesson**	**Objectives**
		Explain that human skeletons are unique to the individual but have many characteristics that relate to age, sex, ethnic background, diet, and trauma.
		Identify the use of osteology in fields of anthropology, archeology, and medicine.
		Describe and name the major bones of the skull, pectoral girdle, and pelvic girdle.
		Relate forensic anthropology/osteology and medicine.
		Compare the work of a forensic pathologist and a forensic osteologist.
		Describe the career path and possibilities for a forensic osteologist.
		Identify the part played by osteologists on the identification response team called to mass disasters.
		Identify specific skeletal traits found on the deceased used to predict age, sex, occupation, size, and trauma.
	Project: The Secret in the Cellar	
	Taphonomy	
		Explain that decomposition is a predictable, step-by-step process.
		Explain the work of the Body Farm.
		Describe taphonomy and its application to forensic science.
		Describe the career and those who work in forensic taphonomy and its relationship to the fields of archeology and anthropology.
		Relate the importance of clandestine graves to the work of taphonomy and to forensics.
		Determine the importance of the gravesite survey as evidence.
		Define the steps of decomposition as seen in a human body.
		Describe the relationship between mass-grave study with forensics and political history.
		Appreciate the magnitude of work related to the exhumation of a mass grave.
		Develop an objective yet compassionate attitude toward death and dead bodies.
		Recognize the importance of archeological techniques in the excavation of a grave scene.

Unit	Lesson	Objectives
		List good excavation techniques.
	Test	
FORENSIC TOXICOLOGIST, COMPUTER FORENSICS AND FORENSIC ENGINEERING		
	Toxicology	
		Explain the requirements of the career of forensic toxicology.
		Identify some of the current issues confronting toxicology professionals.
		Explain the history of forensic toxicology and its relationship to frequency of crime-related poisoning.
		Compare and contrast poison and toxic substances in relationship to dosage.
		Identify the most common means of identifying both presence and identity of specific toxins.
		Identify some common poisons as products found in nature, industry, and home and garden.
		Compare and contrast the various means of sampling to identify the presence and identity of toxins.
		Interpret toxicology tests according to level and LD50 dosage.
		Apply medical math skills relating to LD50 dosages.
		Apply some of the ethical and professional principles to a real toxicology case.
	Project: The Uncommon Scents Incident	
	Alcohol	
		Explain the impact of alcohol on the criminal and driving-related forensic incidents.
		Explain the basics of the alcohol-making process and the variety of types of alcohol.
		Describe the chemistry of alcohol and the way alcohol content is usually expressed.
		Relate the various effects of alcohol on the body at the time of drinking and long-term health issues.
		Describe the metabolic processes related to alcohol consumption.

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Unit	**Lesson**	**Objectives**
		Understand how blood alcohol content is measure and expressed.
		Understand that alcohol is a toxin to the body and that LD50 principles apply to alcohol as it does to other toxins.
		Demonstrate the use of a BAC calculator by manipulating some variables related to gender, weight, time, and consumption rate.
		Differentiate between impairment and intoxication and identify the symptoms.
		Describe the various tests for intoxication and impairment.
		Relate how alcohol affects the brain and its function related to driving.
	Project: Solve an Alcohol Case	
	Drugs	
		Compare and contrast drug-classification groups and schedules.
		Differentiate between different CSA drug schedules and representative members.
		Understand that drug epidemiology studies the frequency, distribution, cause of drug disorders, and control of drugs in populations.
		Utilize some of the drug databases to identify quantitative and qualitative properties of substances.
		Understand the place of drug pharmacology and pharmacokinetics in medical and forensic fields.
		Understand the place of the interaction of portions of the brain and substance abuse leading to addiction.
		Identify the various abused drug types.
		Comprehend the epidemiology of drug use.
		Identify the driving impairment resulting from the combined use of alcohol and drug use.
	Computer Forensics	
		Explain the importance of the growing field of computer forensics.
		Differentiate between an investigation involving a computer used to commit a crime and a computer that was the target of a crime and those who commit the crimes.

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Unit	**Lesson**	**Objectives**
		Describe the different types of cybercrime.
		Describe the various career paths of computer-forensic professionals.
		Recognize the developmental phases of computer forensics.
		Explain how many organizations are developing computer-security strategies that include both defensive computer forensics and proactive information assurance.
		Recognize that computer forensics includes the public and private sector as well as law enforcement.
		Describe the goals and methods of digital evidence collection.
		Explain that in order for evidence to be court acceptable, it must also follow established protocol including a demonstrable chain of custody.
		Compare and contrast some of the computer forensic tools and techniques used to collect evidence.
		Compare and contrast the various types of computer crime and criminals.
	Project: Online Crime and Establishing Personal Security	
	Legal and Ethical Issues of Computer Forensics	
		Explain the significance of identity theft.
		Discuss the confidentiality of digital records and liability in case of loss.
		Describe the HIPAA-informed consent regulations regarding digital medical records.
		Explain the value of health-information management tools.
		Describe security concerns related to electronic medical systems.
		Describe the related development of digital technology and medical recordkeeping methods.
		Understand the Eric electronic medical system used by many medical organizations.
		Observe the use of powerful computer forensics investigation tools.
		Comprehend the expanding computer forensic needs which could only be met by developers who understood

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Unit	**Lesson**	**Objectives**
		both the law and technology.
		Identify the impact of confidentiality laws upon the way in which forensic evidence is collected.
	Project: Solving a Real Crime with a Real Computer Forensic Investigator	
	Forensic Engineer	
		Explain that the focus of engineers is to use math, science, and basic mechanical principles in order to solve problems and study failures.
		Describe the career path of a forensic engineer, relating it to the forensic careers of engineers, toxicologists, and computer scientists.
		Know that the forensic toxicology, computer security, and engineering fields study problems and failures in order to offer solutions to problems.
		Identify the difference between disagreement, dispute, different opinions, and malpractice among professional engineers.
		Relate malpractice to negligence and liability.
		Know that failures and accident investigations can lead to standards and regulation changes across the industry.
		Identify tools and methods used by forensic engineers.
		Relate accident reconstruction with the utilization of vital facts and probable cause.
		Know that fire-investigation studies fires and exposition including the cause and source of the fires.
	Test	
ADDITIONAL CAREERS IN FORENSICS		
	What is Forensic Nursing?	
		Explain the unique function of a forensic nurse in the emergency room.
		Define domestic violence.
		Identify the types of cases in which forensic-nurse participation is most beneficial.

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Unit	**Lesson**	**Objectives**
		Identify that the forensic nurse serves as a bridge between the medical and forensic fields.
		Recognize important personal traits needed by this profession.
		Understand the application of abuse and neglect as used in Standards of Harm.
		Describe the function and training of the SART and SANE teams.
		Understand the variety of career paths available in order to perform forensic nursing tasks.
		Identify in which work environments a forensic nurse functions.
	Project: Forensic Intake Forms	
	History of Forensic Nursing	
		Explain the development of the forensic nursing specialty.
		Compare forensics of the dead and forensics of the living.
		Describe the relationship of the development of forensic nursing and criminal violence toward women and children.
		Identify other types of victims cared for by forensic nurses.
		Compare and contrast characteristics of the different types of abuse and neglect inflicted on children and adults.
		Define domestic violence.
		Identify traits that cause one to be at higher risk of receiving maltreatment.
		Describe the Jane Doe Kit, its use, and how prosecution of the rapist takes place.
		Describe the future of forensic nursing.
	Human Trafficking	
		Explain human trafficking and slavery as human-rights issues.
		Compare and contrast human trafficking in the United States and throughout the world.
		Compare and contrast slavery of today with that prior to the American Civil War.

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Unit	**Lesson**	**Objectives**
		Describe the different types of slavery seen today.
		Identify "severe" human trafficking.
		Discuss the use of sexual assault as a weapon of war.
		Compare and contrast smuggling and human trafficking.
		Identify the various categories of slavery.
		Describe the presence of human trafficking in the United States.
		Describe the role of law enforcement and medical first responders in the control of human trafficking.
		Explain the legal status of a victim of human trafficking.
		Describe some identifying marks of a victim and a suspect involved in human trafficking.
		Describe the epidemiology of human trafficking.
		Explain the role of the TVPA and UN-GIFT in combating human trafficking.
	Project: Violence Against Women Act	
	Linguistics	
		Describe the work of forensic linguists.
		Explain why the field of forensic linguistics is blossoming.
		Describe some specific cases where forensic linguistic evidence has been helpful in resolving crimes.
		Describe the career path of forensic linguists.
		Compare the fields of speech pathology and forensic linguistics.
		List areas of law enforcement in which forensic linguistics is able to make a positive contribution.
		Describe the impact of forensic linguistics on legal language.
		Relate the IAFL Code of Ethics Purpose and Aim Statement to the work done by those in this career.
		Identify specific types of communications that are usually studied by forensic linguists.

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Unit	**Lesson**	**Objectives**
		Describe the relationship between technology and forensic linguistics.
	Project: Communications Training	
	Forensic Animation, Art, Photography	
		Explain the value and purpose of photographing or videoing a crime scene.
		List essential crime-scene photographic equipment.
		Explain how to prepare photograph and video evidence that will be admissible in the court room.
		Describe the potential use of photographic evidence.
		Explain the different types of shots taken of one specific piece of evidence.
		Discuss the pros and cons of using digital photographic evidence.
		Explain good crime-scene videography techniques.
		Explain the uses of surveillance and security video images as evidence.
		Describe animated crime-scene reconstruction.
		Discuss the value of animated crime-scene reconstruction as demonstrative evidence.
		Explain how crime-scene reconstructions animations are made.
		Describe the types of images a forensic artist may be asked to produce.
		Compare the career pathway of a forensic animator with that of a forensic artist and photographer.
	Project: Decision Making	
	Career Opportunities in Forensic Science	
		Discover Web sites and tools useful for career exploration.
		Find ways to assess personal interests, skills, and personality as related to career selection.
		Identify various elements important to the identification of goals and career pathway choices.

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Unit	**Lesson**	**Objectives**
		Compare and contrast various careers.
	Project: What I Have Learned About Career Paths	
	Test	
COURSE REVIEW AND EXAM		
	Review	
	Exam	