



Teaching &
Learning
Standards

FORENSIC SCIENCE

Science



Cherokee
County
School
District

Course Description

The Forensic Science Cherokee Teaching & Learning Standards are designed to build upon science concepts from previous courses and apply science to the investigation of crime scenes. Students will learn the scientific protocols for analyzing a crime scene, chemical and physical separation methods to isolate and identify materials, how to analyze biological evidence, and the criminal use of tools, including impressions from firearms, tool marks, arson, and explosive evidence.

Science standards integrate the three dimensions of **Science and Engineering Practices (SEPs)**, **Crosscutting Concepts (CCCs)**, and **Disciplinary Core Ideas (DCIs)** to provide a comprehensive framework that emphasizes active engagement, interdisciplinary connections, and core scientific principles. Together, they show how science standards engage *students* in obtaining, evaluating, and communicating information.

Science and Engineering Practices	Crosscutting Concepts	Disciplinary Core Ideas
Asking Questions (Science) and Defining Problems (Engineering)	Patterns	Engineering, Technology, and the Application of Science (TLS)
Developing and Using Models	Cause and Effect: Mechanism and Explanation	
Planning and Carrying Out Investigations	Scale, Proportion, and Quantity	Physical Science (P) Forensic Science (FS)
Analyzing and Interpreting Data	Systems and System Models	
Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation	Life Science (L) Forensic Science (FS)
Constructing Explanations (Science) and Designing Solutions (Engineering)		
Engaging in Argument from Evidence	Structure and Function	Earth and Space Science (E)
Obtaining, Evaluating, and Communicating Information	Stability and Change	

Science and Engineering Practices are fundamental approaches that scientists and engineers use to investigate the natural world and solve practical problems. **Crosscutting Concepts** in science are overarching themes that bridge various disciplines, helping students and researchers see connections and deepen their understanding of the natural world. **Disciplinary Core Ideas** are fundamental concepts that students need to understand to develop a deep knowledge of science across various disciplines.

Thinking Like a Scientist

Thinking Like a Scientist standards represent scientific thinking skills that should be incorporated throughout the entire course.

Overarching Standard

TLS9-12: Refine scientific inquiry and problem-solving skills by designing and conducting investigations, applying scientific theories, and critically evaluating scientific literature.

Supporting Standards for Student Mastery

TLS9-12.a: Use specialized scientific terms and concepts to analyze and explain scientific phenomena.

TLS9-12.b: Design and conduct independent experiments with multiple variables.

TLS9-12.c: Engage in complex data collection using advanced tools and technology (e.g., sensors, probes, software, simulations). Apply statistical methods to interpret data and generate a variety of graph types.

TLS9-12.d: Critically evaluate and communicate complex findings through reports and presentations. Contribute to scientific discussions by constructing and defending scientific explanations. Use and critique evidence to strengthen scientific arguments and discussions.

Semester 1 (August – December)

Unit 1A: Introduction to Forensic Science (3 weeks)

In this introductory unit, students will explore the foundational principles and practices of forensic science, focusing on the scientific methods and protocols used in crime scene investigation. The unit will delve into the historical evolution of forensic techniques, highlighting the contributions of key figures and significant rulings that have shaped the field. Students will also examine the roles of major crime labs in the United States and Georgia, learning how these institutions contribute to forensic investigations.

Overarching Standard for Unit 1A

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.a: Construct an explanation of how scientific forensic techniques used in collecting and submitting evidence for admissibility in court have evolved over time.

(Clarification statement: Emphasis is on describing the contributions of important individuals in Forensic Science history - Locard's Exchange Principle, Frye standard, Daubert ruling)

- Discuss the major crime labs in the United States and Georgia and their role in forensic investigations.

Supporting Standards for Student Mastery in Unit 1A

FS1.b: Plan and carry out investigations using the scientific protocols for analyzing a crime scene (e.g., search, isolate, collect, and record).

FS1.d: Develop models to analyze and communicate information obtained from the crime scene.

(Clarification statement: Properly document and sketch a crime scene.)

Unit 1B: Crime Scene & Evidence Collection (3 weeks)

In this unit, students will explore the critical processes and techniques involved in crime scene investigation and evidence collection. They will learn how to apply scientific protocols to search, isolate, collect, and record evidence systematically. The unit emphasizes the importance of understanding the relevance of different types of evidence in forensic investigations and how evidence collection procedures align with legal frameworks, such as the Bill of Rights. Students will also practice documenting and sketching crime scenes to effectively communicate findings in a forensic context.

Overarching Standard for Unit 1B

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 1B

FS1.b: Plan and carry out investigations using the scientific protocols for analyzing a crime scene (e.g., search, isolate, collect, and record).

- Relate evidence collection to the Bill of Rights and follow proper search procedures, including evidence logs, chain of custody, and search warrants.

FS1.d: Develop models to analyze and communicate information obtained from the crime scene.

(Clarification statement: Properly document and sketch a crime scene.)

Unit 2: Fingerprint Evidence (2 weeks)

In this unit, students will discuss the significance of fingerprint evidence in forensic investigations. They will learn how to identify, lift, and analyze different types of fingerprints, including latent, plastic, and patent prints, using appropriate forensic techniques. The unit will focus on understanding fingerprint classification, minutiae patterns, and the importance of ridge counts in the identification process. Additionally, students will learn about impression evidence, such as tool marks, footwear, and tire impressions, to gain a comprehensive understanding of how such evidence can be analyzed and interpreted in forensic contexts.

Overarching Standard for Unit 2

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 2

FS4.a: Construct an explanation for utilizing the appropriate technique to lift and evaluate identifiable, latent, plastic and patent fingerprints.

(Clarification statement: Classifying print and minutiae patterns, including ridge and ridge count, are addressed in this element. Students should be able to explain why they are using a specific technique.)

FS4.b: Analyze and interpret data regarding impression evidence.

(Clarification statement: Impression evidence could include ballistics, tool marks, footwear, tire impressions, etc.).

Unit 3: Hair, Fiber, Soil & Glass Evidence (3-4 weeks)

In this unit, students will explore the analysis and significance of various types of trace evidence, including hair, fibers, soil, and glass, in forensic investigations. They will learn to conduct thorough investigations to evaluate the relevance of physical evidence found at crime scenes. The unit will focus on the morphology and classification of hair and fibers, as well as the unique characteristics of soil and glass that can be used to establish connections between suspects, victims, and crime scenes. Through hands-on activities, students will gain experience in analyzing and interpreting these types of evidence to make physical match examinations and support forensic conclusions.

Overarching Standard for Unit 3

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 3

FS2: Obtain, evaluate, and communicate information on various scientific techniques to analyze physical, trace, and digital evidence.

FS2.a: Plan and carry out an investigation to determine the value of physical and trace evidence.

FS2.b: Plan and carry out an investigation to analyze the morphology and types of hair, fibers, soil, and glass evidence to make a physical match examination.

Unit 4: DNA Evidence (2-3 weeks)

In this unit, students will explore the role of DNA evidence in forensic science and its critical impact on criminal investigations. They will learn about the structure and function of DNA, as well as the techniques used to collect, process, and analyze DNA samples from crime scenes. Students will engage in hands-on investigations to understand the value of DNA as a form of physical and trace evidence, exploring how DNA profiling can link suspects to crimes, exonerate the innocent, and provide key insights in forensic cases. Through these activities, students will gain a comprehensive understanding of the processes involved in DNA analysis and its significance in modern forensic investigations.

Overarching Standard for Unit 4

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 4

FS2.a: Plan and carry out an investigation to determine the value of physical and trace evidence.

FS3.e: Plan and carry out an investigation involving DNA processing and analysis.

Unit 5: Blood Evidence (3-4 weeks)

In this unit, students will discuss the forensic analysis of blood evidence, focusing on its critical role in crime scene investigations. They will learn to distinguish between human and animal blood, using scientific techniques to identify and classify blood samples accurately. Additionally, students will explore the physics of bloodstain patterns, conducting hands-on investigations to understand how various factors, such as velocity, angle of impact, and surface texture, influence blood spatter. These activities will equip students with the knowledge and skills needed to interpret blood evidence effectively and construct evidence-based arguments regarding its relevance in forensic cases.

Overarching Standard for Unit 5

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 5

FS3.c: Construct an explanation to distinguish the difference between human and animal blood.

FS3.d: Plan and carry out an investigation to analyze the physics of bloodstain patterns.

Semester 2 (January – May)

Unit 6: Ballistics & Impression Evidence (3-4 weeks)

In this unit, students will learn about the significance of impression evidence, including ballistics, tool marks, footwear, and tire impressions, in forensic investigations. They will learn to obtain, evaluate, and communicate information to analyze the role of these types of evidence in making physical match examinations. By constructing explanations and interpreting data, students will understand how impression evidence contributes to solving crimes and its importance in legal proceedings. This unit emphasizes the scientific protocols and analytical skills needed to support the significance of impression evidence in forensic cases.

Overarching Standard for Unit 6

FS4: Obtain, evaluate, and communicate information to analyze the role of impression evidence in order to make a physical match examination.

FS4.c: Construct an explanation to support the significance of impression evidence in an investigation.

Supporting Standards for Student Mastery in Unit 6

FS4.b: Analyze and interpret data regarding impression evidence.

(Clarification statement: Impression evidence could include ballistics, tool marks, footwear, tire impressions, etc.).

Unit 7: Handwriting, Forgery & Counterfeiting, and Digital Evidence (2-3 weeks)

In this unit, students will explore the intricate processes involved in analyzing document and digital evidence in forensic investigations. They will learn to evaluate handwriting and document authenticity, identify forgery and counterfeiting techniques, and investigate digital sources such as cell phones, search records, GPS data, and hard drives. The unit emphasizes the importance of constructing arguments based on evidence and the application of scientific methods, such as chromatography and spectroscopy, to analyze and validate the relevance of this evidence in criminal cases.

Overarching Standard for Unit 7

FS1: Obtain, evaluate, and communicate information to properly conduct a forensic investigation of a crime scene.

FS1.c: Construct an argument from evidence explaining the relevance of possible evidence at the site of an investigation.

Supporting Standards for Student Mastery in Unit 7

FS2.c: Use models for the evaluation of handwriting and document evidence.

FS2.d: Analyze and interpret data to evaluate digital sources of evidence.

(Clarification statement: Including, but not limited to, cell phones, search records, GPS, and hard drives.)

FS2.e: Ask questions to determine the appropriate uses of chromatography and spectroscopy in evidence analysis.

(Clarification statement: Addressing spectroscopy at an analytical chemistry level is not required.)

Unit 8: Drugs & Toxicological Evidence (3-4 weeks)

In this unit, students will investigate the complex world of forensic toxicology, exploring how various toxins, poisons, and drugs affect the human body. They will discuss the different types of substances encountered in forensic cases and learn to analyze and interpret data related to their impact, such as the effects of blood alcohol content. The unit will also provide opportunities for students to utilize scientific techniques like chromatography and spectroscopy, enabling them to determine the presence and concentration of these substances in biological samples. Through this exploration, students will gain a deeper understanding of the role toxicological evidence plays in forensic investigations.

Overarching Standard for Unit 8

FS3: Obtain, evaluate, and communicate information relating to biological evidence in forensic investigations.

FS3.a: Ask questions to investigate types of toxins, poisons, and drugs and their effects on the body.

Supporting Standards for Student Mastery in Unit 8

FS2.e: Ask questions to determine the appropriate uses of chromatography and spectroscopy in evidence analysis.

(Clarification statement: Addressing spectroscopy at an analytical chemistry level is not required.)

FS3.b: Analyze and interpret data to investigate the effects of blood alcohol content on the body.

Unit 9: Death Investigations (6-7 weeks)

In this unit, students will engage in a comprehensive exploration of the procedures and methodologies used in medicolegal death investigations. They will examine the various manners of death and learn to construct evidence-based arguments regarding these determinations. The unit will discuss the causes and mechanisms of death as well as post-mortem changes to understand how these factors help determine the post-mortem interval (PMI). Additionally, the role of entomology in decomposition and the use of anthropological data to create profiles of victims and potential perpetrators will be explored, providing students with a well-rounded understanding of the investigative process in forensic death cases.

Overarching Standard for Unit 9

FS5: Obtain, evaluate, and communicate information to Medicolegal Death Investigations.

FS5.b: Construct an argument based on evidence that pertains to the manner of death (natural, homicide, suicide, accidental, or undetermined).

Supporting Standards for Student Mastery in Unit 9

FS5.a: Ask questions to identify various causes and mechanisms of death (blunt force trauma, heart attack, bleeding, etc.).

FS5.c: Use mathematics and computational thinking to explain post-mortem changes used to determine post-mortem interval (PMI):

- Rigor mortis
- Livor mortis
- Algor mortis
- Gastric contents

(Clarification statement: Instruction should include the historical use of Algor Mortis as it is often not used by practicing forensic specialists.)

FS5.d: Analyze and interpret entomological data to evaluate the role insects play in decomposition and determining PMI.

FS5.e: Plan and carry out an investigation to analyze height, sex, age, and race to develop an anthropological profile of the victim and potential perpetrator.