

# Forensic Science

## At-A-Glance - Lamar CISD

	<b>Professional Standards/Employability Skills/Technical Skills</b>
<b>Ongoing Skills Imbedded All Year</b>	<p><b>Professional Standards/Employability Skills</b></p> <p>FS 1(A) The student is expected to demonstrate professional standards/employability skills as required by business and industry. The student is expected to demonstrate professional standards/employability skills such as demonstrating good attendance, punctuality, and ethical conduct; meeting deadlines, and working toward personal and team goals.</p> <p><b>Safety</b></p> <p>FS 2(A) The student is expected to ask questions and define problems based on observations or information from text, phenomena, models, or investigations.</p> <p>FS 2(C) The student is expected to use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.</p> <p><b>Scientific Method</b></p> <p>FS 2(B) The student is expected to apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.</p> <p>FS 2(D) The student is expected to use appropriate tools and equipment such as scientific calculators, computers, internet access, digital cameras, video recording devices, meter sticks, metric rulers, measuring tapes, digital range finders, protractors, calipers, light microscopes up to 100x magnification, hand lenses, stereoscopes, digital scales, dissection equipment, standard laboratory glassware, appropriate personal protective equipment (PPE), an adequate supply of consumable chemicals, biological specimens, prepared evidence slides and samples, evidence packaging and tamper evident tape, evidence tents, crime scene tape, L-rulers, American Board of Forensic Odontology (ABFO) scales, alternate light sources (ALS) and ALS protective goggles, blood specimens, blood presumptive tests, glass samples of various chemical composition, human and non-human bones, fingerprint brushes and powders, lifting tapes and cards, ten-print cards and ink pads, swabs with containers, disposable gloves, and relevant and necessary kits.</p> <p>FS 2(E) The student is expected to collect quantitative data with accuracy and precision using the International System of Units (SI) and United States customary units and qualitative data as evidence.</p> <p>FS 2(F) The student is expected to organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts.</p> <p>FS 2(G) The student is expected to develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.</p> <p>FS 2(H) The student is expected to distinguish between scientific hypotheses, theories, and laws.</p> <p>FS 3(A) The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.</p> <p>FS 3(B) The student is expected to analyze data by identifying significant statistical features, patterns, sources of error, and limitations.</p> <p>FS 3(C) The student is expected to use mathematical calculations to assess quantitative relationships in data.</p> <p>FS 3(D) The student is expected to evaluate experimental and engineering designs.</p> <p>FS 3(E) The student will plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology.</p> <p>FS 3(F) The student will collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettes, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures.</p> <p>FS 3(G) The student will analyze, evaluate, make inferences, and predict trends from data.</p> <p>FS 3(H) The student will communicate valid conclusions supported by the data through methods such as investigative reports, lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.</p> <p><b>Critical Thinking</b></p> <p>FS 4(A) The student is expected to develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.</p> <p>FS 4(B) The student is expected to communicate explanations and solutions individually and collaboratively in a variety of settings and formats.</p> <p>FS 4(C) The student is expected to engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.</p> <p>FS 5 (A) The student is expected to analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student.</p> <p>FS 5(B) The student is expected to relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content.</p> <p>FS 5 (C) The student is expected to research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field.</p> <p><b>History</b></p> <p>FS 6(A) The student is expected to analyze the historical development and current advancements of different forensic science disciplines such as forensic biology, anthropology/odontology, forensic chemistry, trace evidence, ballistics, fingerprints, digital forensics, and questioned documents.</p> <p>FS 6(B) The student is expected to explain significant historical and modern contributions to the development and advancement of forensic science made by contributors such as Edmond Locard, Mathieu Orfila, Francis Galton, Edwin Henry, and Alec Jeffreys.</p> <p><b>Ethics</b></p> <p>FS 7(A) The student is expected to summarize the ethical standards required of a forensic science professional.</p> <p>FS 7(C) The student is expected to identify and explain knowledge of terminology and procedures employed in the criminal justice system as they pertain to expert witness testimony.</p>

	<p>FS 7(D) The student is expected to research and discuss the effect of biases such as confirmation bias and framing cognitive bias on evidence collection, forensic analysis, and expert testimony.</p> <p>FS 7(E) The student is expected to compare the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence.</p> <p>FS 7(D) The student is expected to research and discuss the effect of biases such as confirmation bias and framing cognitive bias on evidence collection, forensic analysis, and expert testimony.</p> <p>FS 7(E) The student is expected to compare the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence.</p>		
<b>Grading Period</b>	<b>Unit Name</b>	<b>Estimated Time Frame</b>	<b>TEKS</b>
<b>Grading Period 1</b> <b>29 Days</b>	<b>Professional Standards/Employability Skills</b>	<b>1 Day</b>	1A
	<p>FS 1(A) The student is expected to demonstrate professional standards/employability skills as required by business and industry. The student is expected to demonstrate professional standards/employability skills such as demonstrating good attendance, punctuality, and ethical conduct; meeting deadlines, and working toward personal and team goals.</p>		
	<b>Safety</b>	<b>2 Days</b>	2C
	<p>FS 2(C) The student is expected to use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.</p>		
	<b>Scientific Method</b>	<b>4 Days</b>	2A, 2B, 2D, 2E, 2F, 2G, 2H, 3A, 3B, 3C, 3D
	<p>FS 2(A) The student is expected to ask questions and define problems based on observations or information from text, phenomena, models, or investigations.</p> <p>FS 2(B) The student is expected to apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.</p> <p>FS 2(D) The student is expected to use appropriate tools and equipment such as scientific calculators, computers, internet access, digital cameras, video recording devices, meter sticks, metric rulers, measuring tapes, digital range finders, protractors, calipers, light microscopes up to 100x magnification, hand lenses, stereoscopes, digital scales, dissection equipment, standard laboratory glassware, appropriate personal protective equipment (PPE), an adequate supply of consumable chemicals, biological specimens, prepared evidence slides and samples, evidence packaging and tamper evident tape, evidence tents, crime scene tape, L-rulers, American Board of Forensic Odontology (ABFO) scales, alternate light sources (ALS) and ALS protective goggles, blood specimens, blood presumptive tests, glass samples of various chemical composition, human and non-human bones, fingerprint brushes and powders, lifting tapes and cards, ten-print cards and ink pads, swabs with containers, disposable gloves, and relevant and necessary kits.</p> <p>FS 2(E) The student is expected to collect quantitative data with accuracy and precision using the International System of Units (SI) and United States customary units and qualitative data as evidence.</p> <p>FS 2(F) The student is expected to organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts.</p> <p>FS 2(G) The student is expected to develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.</p> <p>FS 2(H) The student is expected to distinguish between scientific hypotheses, theories, and laws.</p> <p>FS 3(A) The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.</p> <p>FS 3(B) The student is expected to analyze data by identifying significant statistical features, patterns, sources of error, and limitations.</p> <p>FS 3(C) The student is expected to use mathematical calculations to assess quantitative relationships in data.</p> <p>FS 3(D) The student is expected to evaluate experimental and engineering designs.</p>		
	<b>Critical Thinking</b>	<b>1 Day</b>	3A, 3B, 3C, 3D, 4A, 4B, 4C
	<p>FS 3(A) The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.</p> <p>FS 3(B) The student is expected to analyze data by identifying significant statistical features, patterns, sources of error, and limitations.</p> <p>FS 3(C) The student is expected to use mathematical calculations to assess quantitative relationships in data.</p> <p>FS 3(D) The student is expected to evaluate experimental and engineering designs.</p> <p>FS 4(A) The student is expected to develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.</p> <p>FS 4(B) The student is expected to communicate explanations and solutions individually and collaboratively in a variety of settings and formats.</p> <p>FS 4(C) The student is expected to engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.</p>		

	<b>History</b>	<b>4 Days</b>	<b>5A, 5B, 5C, 6A, 6B</b>
	<p>FS 5(A) The student is expected to analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student.</p> <p>FS 5(B) The student is expected to relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content.</p> <p>FS 5(C) The student is expected to research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field.</p> <p>FS 6(A) The student is expected to analyze the historical development and current advancements of different forensic science disciplines such as forensic biology, anthropology/odontology, forensic chemistry, trace evidence, ballistics, fingerprints, digital forensics, and questioned documents.</p> <p>FS 6(B) The student is expected to explain significant historical and modern contributions to the development and advancement of forensic science made by contributors such as Edmond Locard, Mathieu Orfila, Francis Galton, Edwin Henry, and Alec Jeffreys.</p>		
	<b>Careers and Roles</b>	<b>4 Days</b>	<b>8A, 8B, 8C</b>
	<p>FS 8(A) The student is expected to explore and describe discipline-specific requirements for careers in forensic science, including collegiate course requirements, licensure, certifications, and physical and mental capabilities.</p> <p>FS 8(B) The student is expected to differentiate the roles and responsibilities of professionals in the criminal justice system, including forensic scientists, crime scene investigators, criminologists, court systems personnel, and medicolegal death investigations.</p> <p>FS 8(C) The student is expected to differentiate the functions of various forensic science disciplines such as forensic biology, forensic chemistry, trace evidence, ballistics, fingerprints, digital forensics, and questioned documents.</p>		
	<b>Ethics</b>	<b>4 Days</b>	<b>7A, 7B, 7C, 7D, 7E</b>
	<p>FS 7(A) The student is expected to summarize the ethical standards required of a forensic science professional.</p> <p>FS 7(B) The student is expected to identify and explain knowledge of terminology and procedures employed in the criminal justice system as they pertain to the chain of custody procedure for evidence.</p> <p>FS 7(C) The student is expected to identify and explain knowledge of terminology and procedures employed in the criminal justice system as they pertain to expert witness testimony.</p> <p>FS 7(D) The student is expected to research and discuss the effect of biases such as confirmation bias and framing cognitive bias on evidence collection, forensic analysis, and expert testimony.</p> <p>FS 7(E) The student is expected to compare the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence.</p>		
	<b>Physical Evidence</b>	<b>9 Days</b>	<b>9A, 9B, 9C, 9D, 9E, 9F, 9G</b>
	<p>FS 9(A) The student is expected to explain the roles and tasks needed to complete a crime scene examination, which may require collaboration with outside experts and agencies, and demonstrate the ability to work as a member of a crime scene team.</p> <p>FS 9(B) The student is expected to develop a detailed, technical written record based on observations and activities, documenting the crime scene examination.</p> <p>FS 9(C) The student is expected to discuss the elements of criminal law that guide search and seizure of persons, property, and evidence.</p> <p>FS 9(D) The student is expected to conduct a primary and secondary systematic search of a simulated crime scene for physical evidence utilizing search patterns such as spiral, line, grid, and zone.</p> <p>FS 9(E) The student is expected to document a crime scene using photographic or audiovisual equipment.</p> <p>FS 9(F) The student is expected to generate a physical or digital crime scene sketch, including coordinates or measurements from fixed points, compass directions, scale of proportion, legend-key, heading, and title block.</p> <p>FS 9(G) The student is expected to demonstrate proper techniques for collecting, packaging, and preserving physical evidence found at a crime scene while maintaining documentation, including chain of custody.</p>		
<b>Grading Period 2 27 Days</b>	<b>Hair</b>	<b>8 Days</b>	<b>12A, 12B, 12C, 12D</b>
	<p>FS 12(A) The student is expected to demonstrate how to collect hair and fiber evidence at a simulated crime scene.</p> <p>FS 12(B) The student is expected to perform the analysis of hair and fiber evidence using forensic science methods such as microscopy and flame testing.</p> <p>FS 12(C) The student is expected to compare the microscopic characteristics of human hair and non-human hair, including medulla, pigment distribution, and scales.</p> <p>FS 12(D) The student is expected to describe and illustrate the different microscopic characteristics used to determine the origin of a human hair sample.</p>		
	<b>Fibers</b>	<b>8 Days</b>	<b>12A, 12B, 12E</b>
	<p>FS 12(A) The student is expected to demonstrate how to collect hair and fiber evidence at a simulated crime scene.</p> <p>FS 12(B) The student is expected to perform the analysis of hair and fiber evidence using forensic science methods such as microscopy and flame testing.</p> <p>FS 12(E) The student is expected to differentiate between natural and synthetic fibers.</p>		

	<b>Glass Direction</b>	<b>5 Days</b>	13A, 13B, 13C, 13D
	<p>FS 13(A) The student is expected to demonstrate how to collect and preserve glass evidence.          FS 13(B) The student is expected to compare the composition of various types of glass such as soda lime, borosilicate, leaded, and tempered.          FS 13(C) The student is expected to determine the direction of a projectile by examining glass fractures.          FS 13(D) The student is expected to define refractive index and explain how it is used in forensic glass analysis.</p>		
	<b>Blood Basics</b>	<b>6 Days</b>	18C, 19B
	<p>FS 18(C) The student is expected to conduct and interpret blood presumptive tests for various biologicals such as phenolphthalein and tetramethylbenzidine (TMB).          FS 19(B) The student is expected to identify the red blood cell antigens and antibodies as they relate to human blood types.</p>		
<b>Grading Period 3 28 Days</b>	<b>Blood Stain and Serology</b>	<b>13 Days</b>	17D, 18A, 18B, 19A
	<p>FS 17(D) The student is expected to explain the precautions necessary in the forensic laboratory for proper preservation of biological samples.          FS 18(A) The student is expected to analyze blood stain patterns based on surface type and appearance such as size, shape, distribution and location in order to determine the mechanism by which the patterns are created.          FS 18(B) The student is expected to explain the methods of chemically enhancing latent blood patterns using reagents such as Blue Star or Amido Black.          FS 19(A) The student is expected to identify different types of biological samples and practice proper collection and preservation techniques.</p>		
	<b>DNA Analysis</b>	<b>15 Days</b>	19C, 19D, 19E, 19F, 19G
	<p>FS 19(C) The student is expected to describe the structure of a deoxyribonucleic acid (DNA) molecule and its function.          FS 19(D) The student is expected to explain the analytical procedure for generating a DNA profile, including extraction, quantification, amplification, and capillary electrophoresis.          FS 19(E) The student is expected to explain the different methodologies surrounding the different types of DNA analysis such as short tandem repeats (STRs), Y-STRs, mitochondrial DNA, and single nucleotide polymorphisms (SNPs).          FS 19(F) The student is expected to interpret the components of an electropherogram.          FS 19(G) The student is expected to explore the databasing systems associated with DNA such as Combined DNA Index System (CODIS) and ancestry-based databasing systems.</p>		
<b>Grading Period 4 31 Days</b>	<b>Fingerprint Patterns and Characteristics</b>	<b>5 Days</b>	10A, 10B, 10C
	<p>FS 10(A) The student is expected to compare the three major fingerprint patterns of arches, loops, and whorls.          FS 10(B) The student is expected to identify the minutiae of fingerprints, including bifurcations, ending ridges, dots, short ridges, and enclosures/islands.          FS 10(C) The student is expected to distinguish between patent, plastic, and latent impressions.</p>		
	<b>Lifting Prints and Comparing</b>	<b>9 Days</b>	10D, 10E, 10F
	<p>FS 10(D) The student is expected to perform procedures for developing and lifting latent prints on nonporous surfaces using cyanoacrylate and fingerprint powders.          FS 10(E) The student is expected to perform procedures for developing latent prints using chemical processes on porous and adhesive surfaces with chemicals such as ninhydrin and crystal violet and documenting the results via photography.          FS 10(F) The student is expected to explain the Integrated Automated Fingerprint Identification System (IAFIS) and describe the implications of Next Generation Identification (NGI) systems.</p>		
	<b>Alcohol – Human Body, BAC, Impairment, Preservation</b>	<b>8 Days</b>	17A, 17B, 17C
<p>FS 17(A) The student is expected to explain the absorption, distribution, metabolization, and elimination of toxins such as alcohol, prescription drugs, controlled substances, and carbon monoxide through the human body.          FS 17(B) The student is expected to describe presumptive and confirmatory laboratory procedures as they relate to toxicological analysis such as head space analysis, solid-phase extractions, gas chromatography-mass spectrometry (GC/MS), color tests, and immunoassays.          FS 17(C) The student is expected to interpret results from presumptive and confirmatory laboratory procedures, including GC/MS and their implications.</p>			

	<b>FDA and Controlled Substance</b>	<b>9 Days</b>	16A, 16B, 16C, 17A, 17B, 17C, 17D
<b>Grading Period 5</b> <b>30 Days</b>	<p>FS 16(A) The student is expected to differentiate between toxicological analysis and controlled substance analysis as they relate to the method of collection and impact on the body.</p> <p>FS 16(B) The student is expected to classify controlled substances using the schedules under the Controlled Substances Act.</p> <p>FS 16(C) The student is expected to identify unknown substances using presumptive and confirmatory procedures such as microchemical/color indicating reagent field tests, microscopy, chromatography, and spectrophotometry.</p> <p>FS 17(A) The student is expected to explain the absorption, distribution, metabolization, and elimination of toxins such as alcohol, prescription drugs, controlled substances, and carbon monoxide through the human body.</p> <p>FS 17(B) The student is expected to describe presumptive and confirmatory laboratory procedures as they relate to toxicological analysis such as head space analysis, solid-phase extractions, gas chromatography-mass spectrometry (GC/MS), color tests, and immunoassays.</p> <p>FS 17(C) The student is expected to interpret results from presumptive and confirmatory laboratory procedures, including GC/MS and their implications.</p> <p>FS 17(D) The student is expected to explain the precautions necessary in the forensic laboratory for proper preservation of biological samples.</p>		
	<b>Impressions</b>	<b>7 Days</b>	11A, 11B, 11C, 11D
	<p>FS 11(A) The student is expected to analyze the class and individual characteristics of tool mark impressions and the recovery and documentation of surface characteristics such as wood or metal.</p> <p>FS 11(B) The student is expected to analyze the class and individual characteristics of footwear impressions and the recovery and documentation of surface characteristics such as soil or organic plant material.</p> <p>FS 11(C) The student is expected to analyze the class and individual characteristics of tire tread impressions and the recovery documentation of surface characteristics such as soil or organic plant material.</p> <p>FS 11(D) The student is expected to compare impression evidence collected at a simulated crime scene with the known impression.</p>		
	<b>Dental Records ID</b>	<b>2 Days</b>	21E
	<p>FS 21(E) The student is expected to explain how human remains are identified through dental records such as dentures, x-rays, and implants.</p>		
	<b>Ballistics</b>	<b>13 Days</b>	15A, 15B, 15C, 15D, 15E
<p>FS 15(A) The student is expected to describe the mechanism of modern firearms such as long guns and handguns.</p> <p>FS 15(B) The student is expected to identify the components and characteristics of bullet and cartridge cases.</p> <p>FS 15(C) The student is expected to describe the composition of and method of analysis for gunshot residue and primer residue.</p> <p>FS 15(D) The student is expected to conduct and calculate trajectory analysis of bullet strikes within a simulated crime scene.</p> <p>FS 15(E) The student is expected to identify and recognize the type of information available through the National Integrated Ballistics Information Network.</p>			
<b>Document Analysis</b>	<b>8 Days</b>	14A, 14B, 14C	
<p>FS 14(A) The student is expected to research and explain different types of examinations performed on digital and physical evidence in a forensic laboratory such as digital data recovery, counterfeiting, ink, and paper analysis.</p> <p>FS 14(B) The student is expected to investigate and describe the security features incorporated in U.S. and foreign currency to prevent counterfeiting.</p> <p>FS 14(C) The student is expected to perform handwriting comparisons of an unknown sample with exemplars by analyzing characteristics such as letter, line, and formatting.</p>			
<b>Grading Period 6</b> <b>27 Days</b>	<b>Forensic Anthropology</b>	<b>12 Days</b>	21A, 21B, 21C, 21D, 21E
	<p>FS 21(A) The student is expected to identify the major bones of the human skeletal system.</p> <p>FS 21(B) The student is expected to compare composition and structure of human and non-human bones.</p> <p>FS 21(C) The student is expected to describe the collection and preservation methods for bone evidence.</p> <p>FS 21(D) The student is expected to explain the characteristics of the human skeletal system indicative of specific biological sex and approximate range of age and height.</p> <p>FS 21(E) The student is expected to explain how human remains are identified through dental records such as dentures, x-rays, and implants.</p>		

	<b>Death and Decomposition</b>	<b>12 Days</b>	20A, 20B, 20C, 20D
	<p>FS 20(A) The student is expected to explain the principles of rigor, algor, and livor mortis and how they apply to deceased persons.</p> <p>FS 20(B) The student is expected to differentiate between the types of wound patterns such as lacerations and blunt force trauma resulting from stabbings, bludgeoning, gunshots, and strangulations.</p> <p>FS 20(C) The student is expected to determine cause and manner of death from an autopsy report obtained through resources such as case studies, simulated autopsies, and dissections.</p> <p>FS 20(D) The student is expected to determine the approximate time of death using entomology.</p>		
	<b>Semester Review &amp; Test</b>	<b>3 Days</b>	All above TEKS