Forensic Science
At-A-Glance - Lamar CISD

	Professional Standards/Employability Skills/Technical Skills
Ongoing Skills Imbedded All Year	**Professional Standards/Employability Skills** FS 1(A) The student will 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. **Safety** FS 2(C) The student will use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards. **Scientific Method** FS 2(A) The student will ask questions and define problems based on observations or information from text, phenomena, models, or investigations. FS 2(B) The student will apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems. FS 2(C) The student will use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards. FS 2(D) The student will 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. FS 2(E) The student will collect quantitative data with accuracy and precision using the International System of Units (SI) and United States customary units and qualitative data as evidence. FS 2(F) The student will organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts. FS 2(G) The student will develop and use models to represent phenomena, systems, processes, or solutions to engineering problems. FS 2(H) The student will distinguish between scientific hypotheses, theories, and laws. **Critical Thinking** FS 3(A) The student will identify advantages and limitations of models such as their size, scale, properties, and materials. FS 3(B) The student will analyze data by identifying significant statistical features, patterns, sources of error, and limitations. FS 3(C) The student will use mathematical calculations to assess quantitative relationships in data. FS 3(D) The student will evaluate experimental and engineering designs. FS 2(F) The student will organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts. FS 2(G) The student will develop and use models to represent phenomena, systems, processes, or solutions to engineering problems. FS 2(H) The student will distinguish between scientific hypotheses, theories, and laws. **Scientific Literacy** FS 4(A) The student will develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories. FS 4(B) The student will communicate explanations and solutions individually and collaboratively in a variety of settings and formats. FS 4(C) The student will engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence. FS 5 (A) The student will 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. FS 5 (B) The student will 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. FS 5 (C) The student will 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. **History** FS 6(A) The student will 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. FS 6(B) The student will 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. FS 7(A) The student will summarize the ethical standards required of a forensic science professional. FS 7 (D) The student will research and discuss the effect of biases such as confirmation bias and framing cognitive bias on evidence collection, forensic analysis, and expert testimony. FS 7 (E) The student will compare the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence.

Grading Period	Unit Name	Estimated Time Frame	TEKS
Grading Period 1 **29 Days**	**Professional Standards/Employability Skills**	**1 Day**	1A
	FS 1(A) The student will 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.		
	Safety	**2 Days**	2A, 2C
	FS 2(A) The student will ask questions and define problems based on observations or information from text, phenomena, models, or investigations. FS 2(C) The student will use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.		
	Scientific Method	**2 Days**	2B, 2D, 2E, 2F, 2G, 2H, 3A, 3B, 3C, 3D
	FS 2(B) The student will apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems. FS 2(D) The student will 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. FS 2(E) The student will collect quantitative data with accuracy and precision using the International System of Units (SI) and United States customary units and qualitative data as evidence. FS 2(F) The student will organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts. FS 2(G) The student will develop and use models to represent phenomena, systems, processes, or solutions to engineering problems. FS 2(H) The student will distinguish between scientific hypotheses, theories, and laws. FS 3(A) The student will identify advantages and limitations of models such as their size, scale, properties, and materials. FS 3(B) The student will analyze data by identifying significant statistical features, patterns, sources of error, and limitations. FS 3(C) The student will use mathematical calculations to assess quantitative relationships in data. FS 3(D) The student will evaluate experimental and engineering designs.		
	Critical Thinking	**1 Day**	3A, 3B, 3C, 3D, 4A, 4B, 4C
	FS 3(A) The student will identify advantages and limitations of models such as their size, scale, properties, and materials. FS 3(B) The student will analyze data by identifying significant statistical features, patterns, sources of error, and limitations. FS 3(C) The student will use mathematical calculations to assess quantitative relationships in data. FS 3(D) The student will evaluate experimental and engineering designs. FS 4(A) The student will develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories. FS 4(B) The student will communicate explanations and solutions individually and collaboratively in a variety of settings and formats. FS 4(C) The student will engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.		
	History	**5 Days**	5A, 5B, 5C, 6A, 6B
	FS 5(A) The student will 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. FS 5(B) The student will 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. FS 5(C) The student will 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. FS 6(A) The student will 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. FS 6(B) The student will 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.		

	Careers and Roles	**6 Days**	8A, 8B, 8C
	FS 8(A) The student will explore and describe discipline-specific requirements for careers in forensic science, including collegiate course requirements, licensure, certifications, and physical and mental capabilities. FS 8(B) The student will 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. FS 8(C) The student will differentiate the functions of various forensic science disciplines such as forensic biology, forensic chemistry, trace evidence, ballistics, fingerprints, digital forensics, and questioned documents.		
	Ethics	**2 Days**	7A, 7B, 7C, 7D, 7E
	FS 7(A) The student will summarize the ethical standards required of a forensic science professional. FS 7(B) The student will 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. FS 7(C) The student will identify and explain knowledge of terminology and procedures employed in the criminal justice system as they pertain to expert witness testimony. FS 7(D) The student will research and discuss the effect of biases such as confirmation bias and framing cognitive bias on evidence collection, forensic analysis, and expert testimony. FS 7(E) The student will compare the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence.		
	Physical Evidence	**10 Days**	9A, 9B, 9C, 9D, 9E, 9F, 9G
	FS 9(A) The student will 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. FS 9(B) The student will develop a detailed, technical written record based on observations and activities, documenting the crime scene examination. FS 9(C) The student will discuss the elements of criminal law that guide search and seizure of persons, property, and evidence. FS 9(D) The student will 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. FS 9(E) The student will document a crime scene using photographic or audiovisual equipment. FS 9(F) The student will 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. FS 9(G) The student will demonstrate proper techniques for collecting, packaging, and preserving physical evidence found at a crime scene while maintaining documentation, including chain of custody.		
Grading Period 2 **26 Days**	**Trace Evidence at Crime Scene**	**5 Days**	12A, 12B, 12C, 12D, 12E, 13A, 13B, 13C, 13D
	FS 12(A) The student will demonstrate how to collect hair and fiber evidence at a simulated crime scene. FS 12(B) The student will perform the analysis of hair and fiber evidence using forensic science methods such as microscopy and flame testing. FS 12(C) The student will compare the microscopic characteristics of human hair and non-human hair, including medulla, pigment distribution, and scales. FS 12(D) The student will describe and illustrate the different microscopic characteristics used to determine the origin of a human hair sample. FS 12(E) The student will differentiate between natural and synthetic fibers. FS 13(A) The student will demonstrate how to collect and preserve glass evidence. FS 13(B) The student will compare the composition of various types of glass such as soda lime, borosilicate, leaded, and tempered. FS 13(C) The student will determine the direction of a projectile by examining glass fractures. FS 13(D) The student will define refractive index and explain how it is used in forensic glass analysis.		
	Hair	**8 Days**	12A, 12B, 12C, 12D,
	FS 12(A) The student will demonstrate how to collect hair and fiber evidence at a simulated crime scene. FS 12(B) The student will perform the analysis of hair and fiber evidence using forensic science methods such as microscopy and flame testing. FS 12(C) The student will compare the microscopic characteristics of human hair and non-human hair, including medulla, pigment distribution, and scales. FS 12(D) The student will describe and illustrate the different microscopic characteristics used to determine the origin of a human hair sample.		
	Fibers	**8 Days**	12A, 12B, 12E
	FS 12(A) The student will demonstrate how to collect hair and fiber evidence at a simulated crime scene. FS 12(B) The student will perform the analysis of hair and fiber evidence using forensic science methods such as microscopy and flame testing. FS 12(E) The student will differentiate between natural and synthetic fibers.		

	Glass Direction	**5 Days**	13A, 13B, 13C, 13D
	FS 13(A) The student will demonstrate how to collect and preserve glass evidence. FS 13(B) The student will compare the composition of various types of glass such as soda lime, borosilicate, leaded, and tempered. FS 13(C) The student will determine the direction of a projectile by examining glass fractures. FS 13(D) The student will define refractive index and explain how it is used in forensic glass analysis.		
Grading Period 3 25 Days	**Blood Stain and Serology**	**19 Days**	17D, 18A, 18B, 18C, 19A, 19B
	FS 17(D) The student will explain the precautions necessary in the forensic laboratory for proper preservation of biological samples. FS 18(A) The student will 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 will explain the methods of chemically enhancing latent blood patterns using reagents such as Blue Star or Amido Black. FS 18(C) The student will conduct and interpret blood presumptive tests for various biologicals such as phenolphthalein and tetramethylbenzidine (TMB). FS 19(A) The student will identify different types of biological samples and practice proper collection and preservation techniques. FS 19(B) The student will identify the red blood cell antigens and antibodies as they relate to human blood types.		
	DNA Analysis	**6 Days**	19C, 19D, 19E, 19F, 19G
	FS 19(C) The student will describe the structure of a deoxyribonucleic acid (DNA) molecule and its function. FS 19(D) The student will explain the analytical procedure for generating a DNA profile, including extraction, quantification, amplification, and capillary electrophoresis. FS 19(E) The student will 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 will interpret the components of an electropherogram. FS 19(G) The student will explore the databasing systems associated with DNA such as Combined DNA Index System (CODIS) and ancestry-based databasing systems.		
Grading Period 4 32 Days	**DNA Analysis continues**	**10 Days**	19E, 19F, 19G
	FS 19(E) The student will 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 will interpret the components of an electropherogram. FS 19(G) The student will explore the databasing systems associated with DNA such as Combined DNA Index System (CODIS) and ancestry-based databasing systems		
	Fingerprint Patterns and Characteristics	**5 Days**	10A, 10B, 10C
	FS 10(A) The student will compare the three major fingerprint patterns of arches, loops, and whorls. FS 10(B) The student will identify the minutiae of fingerprints, including bifurcations, ending ridges, dots, short ridges, and enclosures/islands. FS 10(C) The student will distinguish between patent, plastic, and latent impressions.		
	Lifting Prints and Comparing	**9 Days**	10D, 10E, 10F
	FS 10(D) The student will perform procedures for developing and lifting latent prints on nonporous surfaces using cyanoacrylate and fingerprint powders. FS 10(E) The student will 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 will explain the Integrated Automated Fingerprint Identification System (IAFIS) and describe the implications of Next Generation Identification (NGI) systems.		
	Alcohol – Human Body, BAC, Impairment, Preservation	**8 Days**	17A, 17B, 17C
	FS 17(A) The student will 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 will 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 will interpret results from presumptive and confirmatory laboratory procedures, including GC/MS and their implications.		

Grading Period 5 32 Days	**FDA and Controlled Substance**	**10 Days**	16A, 16B, 16C, 17A, 17B, 17C, 17D
	FS 16(A) The student will differentiate between toxicological analysis and controlled substance analysis as they relate to the method of collection and impact on the body. FS 16(B) The student will classify controlled substances using the schedules under the Controlled Substances Act. FS 16(C) The student will identify unknown substances using presumptive and confirmatory procedures such as microchemical/color indicating reagent field tests, microscopy, chromatography, and spectrophotometry. FS 17(A) The student will 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 will 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 will interpret results from presumptive and confirmatory laboratory procedures, including GC/MS and their implications. FS 17(D) The student will explain the precautions necessary in the forensic laboratory for proper preservation of biological samples.		
	Tool Marks	**2 Days**	11A, 11B, 11C, 11D
	FS 11(A) The student will analyze the class and individual characteristics of tool mark impressions and the recovery and documentation of surface characteristics such as wood or metal. FS 11(B) The student will analyze the class and individual characteristics of footwear impressions and the recovery and documentation of surface characteristics such as soil or organic plant material. FS 11(C) The student will analyze the class and individual characteristics of tire tread impressions and the recovery documentation of surface characteristics such as soil or organic plant material. FS 11(D) The student will compare impression evidence collected at a simulated crime scene with the known impression.		
	Dental Records ID	**2 Days**	21E
	FS 21(E) The student will explain how human remains are identified through dental records such as dentures, x-rays, and implants.		
	Ballistics	**10 Days**	15A, 15B, 15C, 15D, 15E
	FS 15(A) The student will describe the mechanism of modern firearms such as long guns and handguns. FS 15(B) The student will identify the components and characteristics of bullet and cartridge cases. FS 15(C) The student will describe the composition of and method of analysis for gunshot residue and primer residue. FS 15(D) The student will conduct and calculate trajectory analysis of bullet strikes within a simulated crime scene. FS 15(E) The student will identify and recognize the type of information available through the National Integrated Ballistics Information Network.		
	Document Analysis	**8 Days**	14A, 14B, 14C
	FS 14(A) The student will 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. FS 14(B) The student will investigate and describe the security features incorporated in U.S. and foreign currency to prevent counterfeiting. FS 14(C) The student will perform handwriting comparisons of an unknown sample with exemplars by analyzing characteristics such as letter, line, and formatting.		
Grading Period 6 29 Days	**Forensic Anthropology**	**13 Days**	21A, 21B, 21C, 21D, 21E
	FS 21(A) The student will identify the major bones of the human skeletal system. FS 21(B) The student will compare composition and structure of human and non-human bones. FS 21(C) The student will describe the collection and preservation methods for bone evidence. FS 21(D) The student will explain the characteristics of the human skeletal system indicative of specific biological sex and approximate range of age and height. FS 21(E) The student will explain how human remains are identified through dental records such as dentures, x-rays, and implants.		
	Death and Decomposition	**13 Days**	20A, 20B, 20C, 20D
	FS 20(A) The student will explain the principles of rigor, algor, and livor mortis and how they apply to deceased persons. FS 20(B) The student will differentiate between the types of wound patterns such as lacerations and blunt force trauma resulting from stabbings, bludgeoning, gunshots, and strangulations. FS 20(C) The student will determine cause and manner of death from an autopsy report obtained through resources such as case studies, simulated autopsies, and dissections. FS 20(D) The student will determine the approximate time of death using entomology.		
	Semester Review & Test	**3 Days**	All above TEKS

Forensic Science
Lab Safety and Scientific Processes
Readiness Standards
Supporting Standards