Career and Technical Education TEKS Review Draft Recommendations

Texas Essential Knowledge and Skills (TEKS) for Career and Technical Education Draft Recommendations

Hospitality & Tourism and Law, Public Safety, Corrections & Security Career Clusters

The document reflects draft recommendations to the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) that have been recommended by the State Board of Education's TEKS review work groups for the following courses that can satisfy a graduation requirement in science: **Food Science (Hospitality & Tourism Career Cluster) and Forensic Science (Law, Public Safety, Corrections, & Security Career Cluster)**.

Proposed additions are shown in green font with underline (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple italicized font with underlines (*new text location*). Numbering for the knowledge and skills statements in the document will be finalized when the proposal is prepared to file with the *Texas Register*.

Comments in the right-hand column provide explanations for the proposed changes. The following notations may be used as part of the explanations.

Skills Gap/Gap Analysis:	refers to gap analysis report on essential knowledge and skills aligned to in-demand high-wage occupations
CCRS:	refers to the College and Career Readiness Standards
MV:	refers to multiple viewpoints expressed by work group members

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§130.256. Food Science, Adopted 2021

	TEKS with edits	Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: ~~three units of science, including~~ chemistry and biology. Recommended prerequisite: Principles of Hospitality and Tourism. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.	Rationale: prerequisites reduced to the two specified science courses to allow 11^{th} grade students to take the course as a 3^{rd} or 4^{th} science credit.
(b)	Introduction.	Include computer technology across all courses.
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry ~~and~~ relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and ~~or~~ emerging professions.	Changes to be made by subcommittee.
(2)	The Hospitality and Tourism Career Cluster focuses on the management, marketing, and operations of restaurants and other food/beverage services, lodging, attractions, recreation events, and travel-related services.	This work group prefers to eliminate the paragraph because this also counts as a science credit and isn't only a CTE course. But will be consistent with other groups' decision.
(3)	In Food Science, students examine the nature and properties of foods, food microbiology, and the principles of science in food production, processing, preparation, and preservation, use scientific methods to conduct laboratory and field investigations, and make informed decisions using critical thinking and scientific problem solving. This course provides students a foundation for further study that leads to occupations in food and beverage services, the health sciences, agriculture, food, and natural resources, and human services. ~~In Food Science students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Food Science is the study of the nature of foods, the causes of deterioration, the principles underlying food processing, and the improvement of foods for the consuming public.~~	

(4)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable. ~~Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.~~	
(5)	Scientific hypotheses and theories. Students are expected to know that: ~~Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.~~	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
(6)	Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified. ~~Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).~~	

(A)	Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.	
(B)	Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.	
(7)	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information). ~~A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.~~	
(8)	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(9)~~(8)~~	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(10)~~(9)~~	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by the food service business and industry. The student is expected to:	
(A)	apply interpersonal communication skills in the food service business and industry settings;	
(B)	explain and recognize the value of collaboration within the workplace;	

(C)	examine the importance of time management to succeed in the workforce;	
(D)	identify work ethics/professionalism in a job setting; ~~and~~	
(E)	develop problem-solving and critical-thinking skills; and~~.~~	
(F)	explore careers and professions in food science.	
(2)	Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena, or design solutions using appropriate tools and models. The student is expected to:	Scientific and engineering practices approved by the SBOE in November 2020 for science high school courses.
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;	
(C)	use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;	
(D)	use appropriate tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, and models, diagrams, or samples of biological specimens or structures, vacuum sealer, oven, cook top, cookware, bakeware, cutlery, measuring cups and spoons;	
(E)	collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;	
(F)	organize quantitative and qualitative data using lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports;	
(G)	develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and	
(H)	distinguish among scientific hypotheses, theories, and laws.	

(3)	Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:	
(A)	identify advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying significant statistical features, patterns, sources of error, and limitations;	
(C)	use mathematical calculations to assess quantitative relationships in data; and	
(D)	evaluate experimental and engineering designs.	
(4)	Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:	
(A)	develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;	
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	
(C)	engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.	
(5)	Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:	
(A)	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;	
(B)	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; and	
(C)	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) or food science field ~~in order to investigate STEM careers~~.	

~~(2)~~	~~The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:~~	Replaced with scientific and engineering practices
~~(A)~~	~~demonstrate safe practices during laboratory and field investigations; and~~	
~~(B)~~	~~demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.~~	
~~(3)~~	~~The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:~~	
~~(A)~~	~~know the definition of science and understand that it has limitations, as specified in subsection (b)(4) of this section;~~	
~~(B)~~	~~know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories;~~	
~~(C)~~	~~know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;~~	
~~(D)~~	~~distinguish between scientific hypotheses and scientific theories;~~	
~~(E)~~	~~plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;~~	
~~(F)~~	~~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, micropipettors, 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;~~	
~~(G)~~	~~analyze, evaluate, make inferences, and predict trends from data; and~~	
~~(H)~~	~~communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.~~	

~~(4)~~	~~The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:~~	
~~(A)~~	~~in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;~~	
~~(B)~~	~~communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;~~	
~~(C)~~	~~draw inferences based on data related to promotional materials for products and services;~~	
~~(D)~~	~~evaluate the impact of scientific research on society and the environment;~~	
~~(E)~~	~~evaluate models according to their limitations in representing biological objects or events; and~~	
~~(F)~~	~~research and describe the history of biology and contributions of scientists.~~	
(6)	The student analyzes household and commercial sustainability and regulatory practices in food production. The student is expected to:	Rationale: Added a KS to include environmental issues that were missing from the original course.
(A)	research and investigate resource use, sustainability, and conservation in food production, such as with water, land, and oceans;	
(B)	analyze the effect of food on the decomposition cycle including composting, recycling, and disposal; and	CCRS: Science - X.E.5
(C)	demonstrate appropriate methods for sorting and disposing of food and packaging waste from food production, including fats and oils.	
(7)~~(5)~~	The student analyzes the role of acids and bases in the food sciences. The student is expected to:	
(A)	evaluate physical and chemical properties of acids and bases; and	CCRS: Science – VII.a.1 Math – I.C.1
(B)	analyze the relationship of pH to the properties, safety, and freshness of food.	CCRS: Science – VII.c.2

(8)~~(6)~~	The student evaluates the principles of microbiology and food safety practices. The student is expected to:	
(A)	investigate the properties of microorganisms that cause food spoilage;	CCRS: Science – VI.a.5, VII.f.2 CD – II.c.2
(B)	compare food intoxication and food infection;	
(C)	examine methods to destroy or inactivate harmful pathogens in foods;	CCRS: Science – VII.h.1, VII.i.7 CD – II.c.2
(D)	compare beneficial and harmful microorganisms including lactic acid bacteria, acetic acid bacteria, various baking and brewing yeasts, E. coli, Staphylococcus, Clostridium botulinum, Clostridium perfringens, Salmonella, Listeria, and Shigella;	Rationale: Added specific microorganisms that are used in food production and cause food spoilage and foodborne illnesses.
(E)	analyze sanitary food-handling practices such as personal hygiene or equipment sanitation; and	Rationale: Added examples of practices.
(F)	prepare for a state or national food manager's sanitation certification or alternative credential within the field of food science technology.	
(9)~~(7)~~	The student examines the chemical properties of food. The student is expected to:	Difference between chemically organic vs USDA “organic” label. CCRS: CD – II.c.2
(A)	describe elements, compounds, and mixtures, ~~and formulas~~ related to food science including acids, bases, salts, carbohydrates, lipids, and proteins;	Rationale: Removed “formulas” because it is covered in proposed 8.D. CCRS: Math – I.a.2 Science – VII.a.2, VII.j.1
(B)	compare heterogeneous and homogeneous mixtures;	CCRA: Science – VII.a.2
(C)~~(D)~~	analyze chemical and physical changes in food;~~. and~~	CCRS: Science – VII.a.1
(D)~~(C)~~	use chemical symbols, formulas, and equations in food science such as oxidation of sugars in a cut apple or fermentation in the production of yogurt. ~~; and~~	Rationale: Reordered C & D so that the students discuss the chemical changes before they write and use the equations for them. CCRS: Math – VII.a.2, VII.b.1, VII.c.1, VII.d.1 Science – VII.f.1-2

(10) ~~(8)~~	The student analyzes solutions, colloids, solids, gels, foams, and emulsions in food science. The student is expected to:	
(A)	identify the solvent and solute in various ~~a given~~ solutions such as brines;	Rationale: Example of a solution in food science was provided. CCRS: Science – VII.i.2
(B)	compare unsaturated, saturated, and supersaturated solutions, including their effects on boiling and freezing points such as when making candy or ice cream;	Rationale: Added examples for clarity. CCRS: Math – I.c.1 Science – VII.i.2, VII.h.1-2
(C)	calculate the concentration of a solution using mass percent such as the concentration of sugar needed for crystallization;	CCRS: CD – I.d.3 Math – I.c.1, VII.d.1 Science – VII.g.1-2
(D)	describe the properties of colloidal dispersions such as gelatin, mayonnaise, or milk;	CCRS: Science – VII.i.2, VII.i.5
(E)	differentiate among and give examples of temporary, semi-permanent, and permanent emulsions;	Rationale: Content was missing, added to make sense of the next SE. CCRS: Science – VII.i.2
(F)~~(E)~~	investigate the relationships among the three parts of a~~n~~ permanent emulsion; and	Rationale: Only permanent and some semi-permanent emulsions necessarily have all three parts, temporary emulsions have only the two liquids. CCRS: CD – II.c.2 Science – VII.i.2
(G)~~(F)~~	create ~~various~~ temporary, semi-permanent, and permanent food emulsions.	Rationale: The work group determined that students should have experience with all three types of emulsions. CCRS: Science – VII.i.2
(11)~~(9)~~	The student analyzes the functions of enzymes in food science. The student is expected to:	
(A)	describe the role of enzymes as catalysts in chemical reactions of food including cheese-making, the enzymatic tenderization of meat, and oxidation of sugars in fruit;	Rationale: Added specific examples of reactions in different food groups. CCRS: Science – VI.b.2, VII.e.3
(B)	explain the relationship between an enzyme and a substrate;	CCRS: Science – VI.b.2

(C)	analyze the functions of enzymes in digestion, including the factors that influence enzyme activity and relate enzymatic activity in digestion to dietary restrictions; and	Rationale: Added to the SE to bridge between digestion and food science, allowing students to relate to the SE. CCRS: Science – VI.b.2
(D)	analyze enzyme reactions in food preparation including cheese-making, the enzymatic tenderization of meat, and oxidation of sugars in fruit.	Rationale: Added specific examples of reactions in different food groups. CCRS: Science – VI.b.2, VII.a.1, VII.e.1
(12)~~(10)~~	The student evaluates the role of fermentation in food science. The student is expected to:	
(A)	analyze modern and historical reasons food is fermented;	Rationale: Brought in historical reasons for using fermentation (to preserve food and to make food safe to consume) and allows the teacher to bring in international and ethnic foods.
(B)	describe the conditions under which bacterial fermentation of food occurs and use chemical equations to describe the products of fermentation ~~assess the role of bacteria in food fermentation~~; and	Rationale: Increased the specificity of the SE, tied it back to chemical changes and equations (proposed 8.D.), more closely aligned to the assigned skill. CCRS: Math – VII.a.2, VII.b.1, VII.c.1, VII.d.1 Science – VI.b.5
(C)	prepare various fermented food products.	
(13) ~~(11)~~	The student assesses the reaction of leavening agents in baked products. The student is expected to:	
(A)	describe the physical and chemical changes that occur in leavening;	Rationale: Leavening was not previously described. CCRS: Math – VII.a.2, VII.b.1, VII.c.1, VII.d.1 Science – VII.a.1
(B)~~(A)~~	identify various leavening agents and describe their functions ~~role~~ in food production;	Rationale: Changed "role" to "function".
(C)~~(B)~~	use chemical equations to describe how acids act as leavening agents ~~analyze the role of acids as leavening agents~~;	CCRS: Math – VII.a.2, VII.b.1, VII.c.1, VII.d.1 Science – VII.e.1-2, VII.f.1-3
~~(C)~~	~~compare doughs and batters~~;	Rationale: Combined with proposed 12.D.

(D)	conduct laboratory experiments with various types and amounts of leavening agents to compare the doughs and batters produced ~~using the scientific processes~~; and	Rationale: Combined 11.C. & 11.D. to be both specific and clear. CCRS: Science – I.b.1, V.b.1
(E)	create baked products using various leavening agents.	CCRS: Science – I.c.3
(14)~~(12)~~	The student explores the roles of food additives. The student is expected to:	
(A)	evaluate the various types of food additives such as incidental, intentional, natural, and artificial;	CCRS: Science – V.b.1
(B)	investigate the various functions ~~roles~~ of food additives such as preserving food ~~preservation~~, increasing nutritive value, and enhancing sensory characteristics; and	Rationale: Changed "roles" to "functions" to be more specific and made the examples parallel. CCRS: CD – II.c.2 Science – I.b.1
(C)	research local, state, national, and international agencies involved in regulating food additives.	Rationale: Broadened and specified which level of agencies. CCRS: Science – VI.b.1
(15)~~(13)~~	The student analyzes the effects of heat ~~processes of~~ energy transfer ~~*production*~~ in food *production*. The student is expected to:	Rationale: KS modified to better encompass revised SEs.
(A)	analyze the relationship between ~~discuss~~ molecular motion and temperature;	Rationale: The important aspect is for student to relate the motion to temp and its effects on food. CCRS: Math – I.c.1, VII.d.1 Science – VIII.h.1-2
(B)	compare and contrast ~~examine~~ heat transfer processes including ~~such as~~ conduction, convection, and radiation;	Rationale: Elevate and specify the verb and processes that must be included instruction. CCRS: Math – I.c.1, Science – VII.h.1
(C)	investigate the role of ~~latent heat in~~ phase changes in food production including ~~such as~~ crystallization, coagulation, and reduction ~~condensation~~; and	Rationale: "Latent heat" is only one phase change and is not necessary to call out. CCRS: CD – II.c.2 Science – VII.h.2

(D)	demonstrate analyze rates of reaction using various temperatures and describe the effects of temperature on the characteristics of food products.	Rationale: "Demonstrate" offers student opportunity to for real-time observation; additional text to specifically relate to food science. CCRS: Math – I.c.1, VII.a.2, VII.b.1, VII.c.1, VII.d.1 Science – VII.h.2
(16)(14)	The student evaluates the properties of carbohydrates in food and their effects on food production. The student is expected to:	
(A)	discuss photosynthesis;	Rationale: Sufficiently covered in other courses - middle school science & Biology.
(A)(B)	identify the physical *properties* and chemical *properties* structures of simple and complex carbohydrates;	Rationale: Clarifies and specifies what the students need to know to understand how carbohydrates function in food production. CCRS: Math – I.a.2 Science – VI.b.1, VII.a.1, VII.j.1
(B)(C)	describe the functions of carbohydrates *such as* a *caramelization, crystallization, and thickening agents* in food production *such as a caramelizing agent, crystallizing agent, and thickening agent*;	Rationale: simplified the SE. CCRS: Science – VI.b.1
(D)	compare the structures of simple and complex carbohydrates and how these structures affect food production;	Rationale: Included in proposed (A).
(C)(E)	describe the various processes of such as gelatinization and retrogradation, *and syneresis* in food production; and	Rationale: "Syneresis" is more related to proteins and should be in that KS (moved to proposed 17.B). CCRS: Science – VII.a.1
(D)(F)	create food products using simple and/or complex carbohydrates.	CCRS: Science – I.d.3, VI.b.1

(17)~~(15)~~	The student evaluates the properties of fats in food and their effects on food production. The student is expected to:	
(A)	identify the physical properties and chemical ~~properties~~ chemical structure of saturated and unsaturated fats;	Rationale: Clarifies and specifies what the students need to know to understand how fats function in food production. CCRS: Math – I.c.1 Science – VI.b.1, VII.j.1
~~(B)~~	~~compare the properties of saturated and unsaturated fats;~~	Rationale: Subsumed in modified (A).
(B)~~(C)~~	describe ~~examine~~ the functions of different types of fats ~~the~~ in food production;	Rationale: More measurable verb, clarified. CCRS: Science – VI.b.1, VII.j.1
(C)~~(D)~~	demonstrate ~~explore~~ methods for controlling fat oxidation;	Rationale: More active and observable verb. CCRS: Science – VII.j.1
(D)~~(E)~~	analyze the effects of temperature on fats in food preparation;	CCRS: Math – I.c.1 Science – VII.h.2, VII.j.1
(E)~~(F)~~	conduct laboratory experiments using the scientific processes to explore the functions of fats in food production; and	CCRS: Science – I.b.1
(F) ~~(G)~~	create food products using saturated and unsaturated fats.	CCRS: Science – I.c.2-3
(18) ~~(16)~~	The student evaluates the properties of proteins and their effects on food production. The student is expected to:	
(A)	identify the physical properties and chemical structure of proteins;	Rationale: Parallelism with carbs and fats KS. CCRS: Math – I.a.2 Science – VI.b.1, VII.j.1
(B)~~(A)~~	explain the processes of protein denaturation, ~~and~~ coagulation, *and syneresis*;	Rationale: Moved from (14)(E). CCRS: Science – VII.h.2
(C)~~(B)~~	describe ~~examine~~ the functions and uses of proteins *such as in* emulsions ~~emulsifiers~~, *foams, and gluten formation* ~~in food productions~~ ~~*such as emulsifiers, foams, and in gluten formation*~~;	Rationale: Changed verb to more active measurable. CCRS: Science – VII.i.2

(D)~~(C)~~	analyze the effects of moisture and temperature on protein in food production ~~and storage~~ such as *moist and dry heat methods for preparation*; and	Rationale: Combined (C) and (D); made the structure of the KS parallel to the other nutrients. CCRS: Math – I.a.2, I.c.1 Science – VII.i.6
~~(D)~~	~~explore *moist and dry heat methods for preparing* protein rich foods; and~~	Rationale: Combined (C) and (D)
(E)	create food products using protein.	Rationale: Gather information about how to prepare food. CCRS: Science – I.b.1
(19)~~(17)~~	The student evaluates the properties of vitamins and minerals and their *interrelationships* in ~~effects on~~ food production. The student is expected to:	Rationale: Food production affects vitamins and minerals rather than as stated here.
~~(A)~~	~~describe discuss the functions of vitamins and minerals in food production;~~	Rationale: Food production affects vitamins and minerals rather than as stated here.
(A)~~(B)~~	compare the effects of food production on water- and fat-soluble vitamins *and minerals*.~~; and~~	Rationale: Included both vitamins & minerals as in the KS, combined (B) and (C).
~~(C)~~	~~assess the *interrelationships* among vitamins and *minerals* in food production.~~	Rationale: Minerals moved to (B) and interrelationships fit better in the KS.
(20)~~(18)~~	The student evaluates the properties of water and their effects on food production. The student is expected to:	
(A)	identify the properties of water, including as a solvent or medium, *and* its *effects on food production*; *and*	Rationale: Specific properties to narrow the scope. CCRS: Science – VII.i.2
(B)	compare the effects of hard and soft water on food production.~~;~~	
~~(C)~~	~~analyze the phases of water *and their effects on food production*~~; ~~*and*~~	Incorporated into (A).
~~(D)~~	~~explain the functions of water in food production such as a heat medium and a solvent and create a food product.~~	Incorporated into (A).
(21)	The student explains nutritional aspects of food production. The student is expected to:	Rationale: New strand to address certain topics in nutrition not otherwise covered in the course.
(A)	describe how variations in human digestion and metabolism affect dietary modifications;	CCRS: Science – VI.f.2

(B)	identify common and special dietary modifications such as for food allergies, intolerances, or medical conditions;	CCRS: Science – VI.f.2
(C)	develop and modify recipes for dietary differences such as allergies and intolerances or for personal health preferences such as low-fat or sugar-free; and	CCRS: Science – II.f.1-2
(D)	plan and create a dining experience using the most recent USDA dietary guidelines.	CCRS: Science – I.d.1
(22)~~(19)~~	The student analyzes processes that manage ~~destroy~~ bacteria to safe levels during food production. The student is expected to:	Rationale: Adjusted the wording to be more accurate.
~~(A)~~	~~examine the *food irradiation* process; and~~	Rationale: Combined (A) into (B) and clarified specific processes.
(A)~~(B)~~	investigate *processes* that manage food bacteria such as ~~the~~ dehydration, pasteurization, and ~~*process*~~ *food irradiation*.	Rationale: Combined (A) into (B) and clarified specific processes. CCRS: CD – II.c.2 Science – VIII.h.2
(23)~~(20)~~	The student examines packaging and labeling guidelines. The student is expected to:	CCRS: CD – II.c.2
(A)	research and evaluate federal food packaging regulations ~~guidelines~~, including the *information required on a food label*;	Rationale: Updated to "regulations" to indicate they were required, not optional; combined with (D). CCRS: Math – I.a.2 Science – IV.b.1
(B)	compare global food packaging regulations to those of the United States; and	Rationale: Added SE to address global standards. CCRS: Science – IV.b.1
(C)~~(B)~~	analyze the effectiveness of ~~components of appropriate~~ commercial food packaging ~~containers~~ for specific foods.~~;~~	Rationale: Broadened the scope of the SE to include more about food packaging. CCRS: Science – IV.a.1
~~(C)~~	~~describe controlled-atmosphere packaging; and~~	Rationale: This can be taught within proposed (C).
~~(D)~~	~~describe *information required on a food label*~~.	Rationale: Incorporated in (A).
(24)~~(21)~~	The student analyzes food preservation processes. The student is expected to:	
(A)	describe the benefits of ~~reasons for~~ food preservation;	Rationale: Narrows scope.

(B)	compare *various* methods of household *and commercial* dehydration, *canning*, and *freezing* ~~*create a food product using dehydration*~~; and	Rationale: Combined (B), (C), and (D); changed to "household" to be more inclusive. CCRS: Science – VII.h.1-2
(C)	*create a food product* using a selected preservation method. ~~analyze various methods of personal and commercial food canning; and~~	Rationale: Moved from (B) and made parallel to other KS. CCRS: Science – I.b.1
~~(D)~~	~~examine the various methods of personal and commercial food freezing.~~	

§130.339. Forensic Science (One Credit), ~~Adopted 2015.~~ Adopted 2021.

	TEKS with edits	Work Group Comments/Rationale
(a)	General requirements. The course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry. Recommended prerequisite or corequisite: any Law, Public Safety, Corrections, and Security Career Cluster course. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course.	
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards, industry ~~and~~ relevant technical knowledge, and college and career readiness skills for students to further their education and succeed in current and ~~or~~ emerging professions.	
(2)	The Law, Public Safety, Corrections, and Security Career Cluster focuses on planning, managing, and providing legal services, public safety, protective services, and homeland security, including professional and technical support services.	
(3)	Forensic Science is a survey course that introduces students to the application of science to law. ~~connect a violation of law to a specific criminal, criminal act, or behavior and victim.~~ Students will learn terminology and procedures related to the ~~the search and the~~ collection and examination of physical evidence using scientific processes, ~~in criminal cases~~ as ~~they are~~ performed in a field or ~~typical crime~~ laboratory setting. ~~Using scientific methods, processes, students will collect and analyze evidence such as fingerprints, simulated bodily fluids, hairs, fibers, paint, glass, and cartridge casings.~~ Students will also learn the history and the legal aspects ~~as they relate to each discipline~~ of forensic science.	Do we need to mention that this is a foundational or survey course? **CCRS ELA II.B; S I.A-E, IV A-C**
(4)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable. ~~Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.~~	Need to match this with high school science counterpart as recently adopted by SBOE **CCRS S I.A**

(5)	Scientific hypotheses and theories. Students are expected to know that: ~~Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.~~	Need to match this with high school science counterpart as recently adopted by SBOE **CCRS S I.B**
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
(6)	Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified. ~~Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).~~	Need to match this with high school science counterpart as recently adopted by SBOE **CCRS S IV.B**
(A)	Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.	
(B)	Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.	

(7)	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information). ~~A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.~~	Need to match this with high school science counterpart as recently adopted by SBOE **CCRS S I.A V.E**
(8)	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(9)~~(8)~~	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	Need to match this with high school science counterpart as recently adopted by SBOE
(10)~~(9)~~	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	Need to match this with high school science counterpart as recently adopted by SBOE
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry ~~The student is expected to achieve business and industry employability skills standards~~ such as attendance, punctuality, meeting deadlines, working toward personal/team goals every day, and ethical conduct. ~~use of technology~~.	
(2)	Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to explain phenomena, or design solutions using appropriate tools and models. The student is expected to:	Scientific and engineering practices approved by the SBOE in November 2020 for science high school courses. **CCRS S I.A-E**
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	**CCRS S I.A-B,ELA II.C** **CCRS CD.1.C.1**

(B)	apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;	**CCRS S I.B** **CCRS CD.1.C.2&3**
(C)	use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;	**CCRS S I.C**
(D)	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 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, ABFO Scales, Alternate Light Sources 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.	Differs from standard science equipment list because it is forensic specific **CCRS S I.D3**
(E)	collect quantitative data with accuracy and precision using the International System of Units (SI) and United States customary units and qualitative data as evidence;	**CCRS S II.F M I.C**
(F)	organize quantitative and qualitative data using appropriate methods of communication such as reports, graphs, tables, or charts	Completed the SEs and came back to this **CCRS S I.D2-3, M I.C** **CCRS CD.I.D.3**
(G)	develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and	**CCRS S I.D2, SI.E**
(H)	distinguish among scientific hypotheses, theories, and laws.	**CCRS S I.B**
(3)	Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:	**CCRS S II.E S III.B** **CCRS CD.1.B.2**
(A)	identify advantages and limitations of models such as their size, scale, properties, and materials;	**CCRS S I.D.2**
(B)	analyze data by identifying significant statistical features, patterns, sources of error, and limitations;	**CCRS M I.B; S II.E; CD.II.D1-2**
(C)	use mathematical calculations to assess quantitative relationships in data; and	**CCRS M I.B; S II.A-C**
(D)	evaluate experimental and engineering designs.	**CCRS.S.11.D.1**

(4)	Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:	**CCRS S III.C**
(A)	develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;	**CCRS S I.A.4, III.A, D**
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	**CCRS ELA III, S III.A-E**
(C)	engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.	**CCRS ELA III-IV.2, SIII.A-E**
(5)	Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:	
(A)	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;	**CCRS S III.D, ELA II.A**
(B)	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; and	**CCRS S IV.C** **CCRS CD.II.C.1-3**
(C)	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 ~~in order to investigate STEM~~.	**CCRS SIV.C ELA V.A-C**
~~(2)~~	~~The student, for at least 40% of instructional time, conducts laboratory and/or field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:~~	Replaced with scientific and engineering practices
~~(A)~~	~~demonstrate safe practices during laboratory and field investigations; and~~	
~~(B)~~	~~demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.~~	
~~(3)~~	~~The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:~~	
~~(A)~~	~~know the definition of science and understand that it has limitations, as specified in subsection (b)(4) of this section;~~	

~~(B)~~	~~know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories;~~	
~~(C)~~	~~know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;~~	
~~(D)~~	~~distinguish between scientific hypotheses and scientific theories;~~	
~~(E)~~	~~plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;~~	
~~(F)~~	~~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, micropipettors, 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;~~	
~~(G)~~	~~analyze, evaluate, make inferences, and predict trends from data; and~~	
~~(H)~~	~~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.~~	
~~(4)~~	~~The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:~~	
~~(A)~~	~~analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, to encourage critical thinking;~~	
~~(B)~~	~~communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;~~	
~~(C)~~	~~draw inferences based on data related to criminal investigation;~~	
~~(D)~~	~~evaluate the impact of scientific research on criminal investigation, society, and the environment;~~	
~~(E)~~	~~evaluate models according to their limitations in representing biological objects or events; and~~	

~~(F)~~	~~research and describe the history of science and contributions of scientists within the criminal justice system.~~	
(6)~~(5)~~	The student explores the history~~, legal aspects, and career options within~~ of forensic science. The student is expected to:	Separated to provide clarity and specificity **CCRS S IV.A1,C1-2**
~~(A)~~	~~distinguish between criminalistics and criminology;~~	Moved to 8 A
(A)~~(B)~~	identify and analyze illustrate the historical development and current advancements roles, functions, and responsibilities of different forensic science disciplines such as forensic biology, anthropology/odontology, forensic chemistry, serology, - DNA controlled substances, toxicology, trace evidence, ballistics firearms, fingerprints, digital forensics, and questioned documents; and	Added anthropology/odontology from 21 to address history and background of these **CCRS.S.IV.C.2**
~~(C)~~	~~*summarize the ethical standards required of a forensic science professional;*~~	Moved to 7
~~(D)~~	~~*identify and illustrate roles, functions, and responsibilities of professionals in the criminal justice system, including crime scene investigators, criminalists, attorneys, and medical examiners;*~~	Moved to 8
~~(E)~~	~~*explore and demonstrate an understanding of the terminology and the procedures employed in the criminal justice system; and*~~	Moved to 7
(B)~~(F)~~	~~illustrate~~ explain ~~the history of forensic science and recognize the major contributors in the development of forensic science~~ the significant historical and modern contributors to the development and advancement of forensic science, such as Locard, Orfila, Galton, Henry, and Jeffreys.	Added flexibility to assess knowledge Added specificity for clarity **CCRS S.IV.A & C**
(7)	The student analyzes the legal aspects within forensic science. The student is expected to:	
(C)	*summarize the ethical standards required of a forensic science professional;*	Moved from 5 C **CCRS S IV.B1-2**
(A)	demonstrate knowledge of terminology and procedures employed in the criminal justice system as they pertain to the chain of custody procedure for evidence;	Alignment **CCRS ELA II.B**
(D)	~~explore and~~ *demonstrate* knowledge ~~an understanding~~ *of* ~~the~~ *terminology and* ~~the~~ *procedures employed in the criminal justice system* as they pertain to expert witness testimony; and	Added SE for additional clarity of delineation between field work and lab work (from 5 E) **CCRS ELA II.B, S IV.B**
(E)	explore the effect of biases on evidence collection, forensic analysis, and expert testimony, such as confirmation bias and framing cognitive bias.	Added SE related to understanding bias for real world relevance **CCRS ELA IV-V** Updated language based on industry feedback

(B)	compare and contrast the admissibility of expert witness testimony in terms of the Frye Standard and the Daubert Standard under federal rules of evidence	Added SE related to legal testimony, evidence in the courtroom, Federal Rule 702, Daubert, Frye for clarity and real-world relevance **CCRS S IV.B**
(8)	The student explores the career options within forensic science. The student is expected to:	Separated for clarity
(B)	explore discipline specific requirements including but not limited to collegiate course requirements, licensure, certifications, and physical and mental capabilities; and	Physical and mental capabilities added in response to industry feedback
(C)	~~identify and illustrate~~ differentiate the *roles*~~, functions,~~ *and responsibilities of professionals in the criminal justice system, including,* but not limited to, forensic scientist*, crime scene investigators,* ~~criminalists,~~ criminologists, ~~attorneys, and medical examiners;~~ court systems personnel, and medicolegal death investigations.	Added criminologists to the list of professions in forensic science (from (5) (A) and (D)) combined SEs, Verb change for increased rigor, added part of SE from 8 (A) to be less repetitive criminalist term is outdated **CCRS ELA V**
(A)	~~identify and~~ differentiate ~~illustrate roles~~ the *functions*, ~~and responsibilities~~ *of* ~~different~~ various *forensic science disciplines such as* forensic biology, forensic chemistry, ~~serology, DNA analysis~~, ~~controlled substances, toxicology,~~ *trace evidence,* ballistics ~~firearms~~, *fingerprints,* digital forensics, *and questioned documents;*	Moved from 5 B **CCRS S IV.C**
(9)~~(6)~~	The student recognizes the procedures of crime scene investigation ~~evidence collection~~ while maintaining ~~the~~ scene integrity. ~~of a crime scene.~~ The student is expected to:	Increased rigor by focusing on the entire scene rather than just evidence collection Influenced by skills analysis**CCRS CD.1.F.1-2**
~~(A)~~	~~compare and contrast the roles of forensic scientists and crime scene investigators;~~	Added to 8(A) to reduce repetitiveness
(A)~~(B)~~	demonstrate the ability to work as a member of a crime scene team and an understanding of the roles and tasks needed to complete the examination, which may include collaboration with outside experts and agencies;	Added to fulfill gap analysis from lines 34 and 36 **CCRS S I.C** **CCRS CD.1.F.1-2** **CCRS CD.2.D** **CCRS CD.I.E.1-2**
(B)	develop a detailed, technical, written record, based on observations and activities, documenting the crime scene examination;	Technical and written record added from gap Analysis lines 40 and 46 **CCRS S I.E, III.A,C ELA I.A**

(C)~~(D)~~	~~apply~~ demonstrate knowledge of the elements of criminal law that guide search and seizure of persons, property, and evidence;	Reflecting content advisor input (simulated vs. actual crime scene)
(D)~~(C)~~	*conduct a* primary and secondary *systematic search of a simulated crime scene for physical evidence* ~~following~~ utilizing ~~crime~~ ~~scene~~ *search patterns such as spiral, line, grid, and* ~~strip~~ zone;	From 6 (C): Reflects current terminology and practices
(E)	document a crime scene using photographic or audiovisual equipment;	Driven by gap analysis (lines 31 and 268 of unassigned skills)
(F)~~(E)~~	generate ~~develop~~ *a* physical or digital *crime scene* ~~describe the elements of a crime scene~~ *sketch, including* ~~using~~ *coordinates* ~~/~~ *or measurements from fixed points,* ~~including such as measurements~~, compass directions, scale of proportion, legend-key, ~~and title~~ heading, and title block; and	Combined (E) and (F) "physical or digital" added in response to industry feedback
~~(F)~~	~~*develop a crime scene sketch using coordinates/measurements from fixed points;*~~	Moved to (E) and modified
~~(G)~~	~~*outline the chain of custody procedure for evidence discovered in a crime scene; and*~~	Moved legal aspects to 7, but combined the processing with (H)
(G)~~(H)~~	demonstrate proper techniques for collecting, packaging, and preserving physical evidence found at a crime scene while maintaining documentation including chain of custody.	
(13)~~(7)~~	The student recognizes the methods to process and analyze glass ~~trace~~ evidence. ~~commonly found in a crime scene~~. The student is expected to:	Divided into separate types of evidence for clarity
(A)	demonstrate how to collect and preserve ~~process trace~~ *glass* evidence ~~such as~~ ~~*glass*~~ ~~paint,~~ ~~*fibers, hair, soil, grass and blood collected in at*~~ ~~a simulated crime scene~~;	Fibers and hair were addressed in a subsequent section Put soil and organic plant material with impression area
(B)	compare and contrast the composition of various types of glass such as soda lime, borosilicate, leaded, and tempered;	
(C)	determine the direction of a projectile by examining glass fractures; and	
(D)	define refractive index and explain how it is used in forensic glass analysis. ~~;~~	**CCRS S VIII.J.3**
~~(E)~~	~~describe the instrumental analysis of trace glass evidence such as microscopy and spectrometry;~~	Instrumentation would be cost-prohibitive
~~(F)~~	~~*compare and contrast the microscopic characteristics of human hair and animal hair, including medulla, pigment distribution, and scales;*~~	Content expert recommendation Moved to 12
~~(G)~~	~~*describe and illustrate the different microscopic characteristics used to determine the* racial and somatic *origin of a human hair sample;*~~	Content expert recommendation, changing of social norms Moved to 12
~~(H)~~	~~*differentiate between natural and synthetic fibers; and*~~	Moved to 12

(I)	describe various examinations performed in forensic paint analysis, including microscopic morphology, binder, and pigment characterization.	Removed paint because it is not commonly encountered at the crime scene
(12)	The student recognizes the methods to process and analyze hair and fibers found in a crime scene. The student is expected to:	Broke out hair and fiber from other trace evidence for clarity and organization
(A)	*demonstrate how to collect* hair and fiber trace *evidence* such as glass, paint, fibers, and hair, soil, and grass organic plant material, and blood collected in at *a simulated crime scene;*	Moved from new 13 and re-worded
(B)	perform *the* instrumental *analysis of* hair and fiber trace *evidence such as microscopy* and flame testing spectrometry*;*	Edited to provide specificity for the evidence Moved some terms from current 7 E **CCRS CD.2E**
(C)	*compare and contrast the microscopic characteristics of human hair and* animal non-human *hair, including medulla, pigment distribution, and scales;*	Content expert recommendation Moved from old 7F
(D)	*describe and illustrate the different microscopic characteristics used to determine the* racial and somatic *origin of a human hair sample; and*	Content expert recommendation, changing of social norms Moved from old 7G
(E)	*differentiate between natural and synthetic fibers.*	Moved from old 7H
(10)	The student analyzes fingerprint evidence in forensic science. The student is expected to:	Moved from old 8 (separated for clarity)
(A)	*compare the three major fingerprint patterns of arches, loops, and whorls* and their respective subclasses*;*	Subclasses removed because overall fingerprint evaluation is sufficient Moved from old 8 **CCRS S I.B**
(B)	*identify the minutiae of fingerprints, including* but not limited to *bifurcations, ending ridges, dots, short ridges, and enclosures*/islands*;*	Moved from old 8 **CCRS S I.B**
(C)	*distinguish among patent, plastic, and latent impressions;*	Moved from old 8
(E)	*perform* laboratory *procedures for developing* and lifting *latent prints* using chemical processes *on porous* and adhesive surfaces and nonporous objects *using chemicals such as* iodine, and *ninhydrin* and crystal violet, silver nitrate, and cyanoacrylate resin and documenting the results via photography; and	Moved from old 8 **CCRS S I.B**
(D)	*perform* laboratory *procedures for* developing and *lifting latent prints on nonporous* objects surfaces *using* cyanoacrylate and *fingerprint powders* such as black powder and florescent powders*;*	Moved from old 8 **CCRS S III.D**
(F)	*explain the* Integrated *Automated Fingerprint Identification System (IAFIS) and describe the* characteristics examined in the IAFIS; implications of NGI- Next Generation Identification systems.	Moved from old 8 **CCRS. CD.2.E.1.C.; CCRS.S.III.D.1; CCRS. CD2.E**

(11)~~(8)~~	The student collects and analyzes impression evidence in forensic science. The student is expected to:	Old #8
(A)	~~explain~~ analyze the class and *individual characteristics of tool mark* impressions and the recovery and documentation of surface characteristics, such as wood or metal;	Moved from old 14A Elaborated to provide clarity
(B)	analyze the class and individual characteristics of footwear impressions and the recovery and documentation of surface characteristics such as soil or organic plant material;	Added because it is an industry expectation
(C)	analyze the class and individual characteristics of tire tread impressions and the recovery documentation of surface characteristics such as soil or organic plant material; and	Added because it is an industry expectation
~~*(A)*~~	~~*compare the three major fingerprint patterns of arches, loops, and whorls and their respective subclasses;*~~	Moved to new 10
~~*(B)*~~	~~*identify the minutiae of fingerprints, including bifurcations, ending ridges, dots, short ridges, and enclosures;*~~	Moved to new 10
~~*(C)*~~	~~*distinguish among patent, plastic, and latent impressions;*~~	Moved to new 10
~~*(D)*~~	~~*perform laboratory procedures for lifting latent prints on porous and nonporous objects using chemicals such as iodine, ninhydrin, silver nitrate, and cyanoacrylate resin;*~~	Moved to new 10
~~*(E)*~~	~~*perform laboratory procedures for lifting latent prints on nonporous objects using fingerprint powders such as black powder and florescent powders;*~~	Moved to new 10
(F)	~~*explain the Automated Fingerprint Identification System (AFIS) and describe the characteristics examined in the AFIS; and*~~	Moved to new 10
(D)~~(G)~~	compare impression evidence collected at a simulated crime scene with the known impression.	
(18)~~(9)~~	The student analyzes blood spatter at a simulated crime scene. The student is expected to:	
(A)	analyze blood stain ~~patterns~~ characteristics based on surface type, ~~source~~, ~~direction, and~~ pattern type, ~~angle of trajectory; and~~ identification of directionality, and mechanism which includes area of convergence and angle of impact;	Added for clarification and aligned with industry standards **CCRS S II.C M II.C M III A,C,D**
(B)	explain the methods of chemically enhancing ~~isolating an invisible~~ latent blood ~~stain~~ patterns using reagents such as ~~luminol~~ Blue Star or Amido Black; and	Updated vocabulary and reagents
(C)	conduct and interpret blood presumptive tests for various biologicals such as phenolphthalein and Tetramethylbenzidine (TMB).	Addresses industry standards and gap analysis line 117

(17)~~(10)~~	The student explores toxicology ~~laboratory procedures~~ in forensic science. The student is expected to:	Struck "lab procedures" to be inclusive of field tests
(A)	explain the absorption, distribution, metabolization, and elimination of ~~alcohol~~ toxins through the human body, such as alcohol, prescription drugs, controlled substances, and carbon monoxide;	Opened up to all toxicology instead of limiting to blood alcohol
(B)	describe ~~the blood alcohol~~ the presumptive and confirmatory laboratory procedures as they relate to toxicological analysis such as head space analysis, solid phase extractions and gas chromatography-mass spectrometry (GC/MS), color tests and immunoassays; ~~as they relate to blood alcohol concentration;~~	Opened up to all toxicology instead of limiting to blood alcohol **CCRS CD.2.D**
~~(C)~~	~~explain the levels of tolerance and impairment due to alcohol consumption; and~~	Deleted because it is taught in Law 2 as a major unit
(C)	interpret results and their implications from presumptive and confirmatory laboratory procedures, including GC/MS; and	Industry standard
(D)	explain the precautions necessary in the forensic laboratory for proper preservation of biological ~~blood~~ samples.	Opened up to all toxicology instead of limiting to blood alcohol
(19)~~(11)~~	The student will analyze the foundations and methodologies surrounding the processing of biological evidence for the purpose of identification. ~~The student explores serology laboratory procedures in forensic science.~~ The student is expected to:	Reworded to include all biological evidence (not just serology)
~~(A)~~	~~explain forensic laboratory procedures to determine if a stain detected in a crime scene is blood;~~	Covered with blood spatter
(A)	identify different types of biological samples and practice proper collection and preservation techniques;	Necessary and wasn't included previously
(B)	identify the red blood cell antigens and antibodies as they relate to human blood types;	**CCRS S VI.D1-5**
~~(C)~~	~~determine genotypes and phenotypes in the human red blood cell system using Punnet Squares; and~~	Outdated and suggestion from content expert
(C)	*describe the structure of a DNA molecule and its function;*	Moved from 12A **CCRS S VI.D3**
~~(D)~~	~~research methodologies used to collect and analyze other body fluids.~~	Redundant with A
(D)	explain the analytical procedure for generating a DNA profile including extraction, quantification, amplification, and capillary electrophoresis;	Clarifying and combining 12B-C **CCRS S I.D**
(E)	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);	Added to address industry advancements **CCRS S III.B.1**

(F)	*interpret the components of an electropherogram; and*	Moved from 12D **CCRS S III.B.1**
(G)	explore the databasing systems associated with DNA such as CODIS and ancestry-based.	Added to address industry advancements
~~(12)~~	~~The student analyzes deoxyribonucleic acid (DNA) laboratory procedures in forensic science. The student is expected to:~~	Combined with 11
~~*(A)*~~	~~*describe the structure of a DNA molecule and its function;*~~	Moved to new 19C
~~(B)~~	~~describe the steps used in extraction of DNA;~~	Extracted to make 19D
~~(C)~~	~~explain the analytical procedure for forensic DNA typing, including electrophoresis, polymerase chain reaction, and short tandem repeat; and~~	Extracted to make 19D
~~*(D)*~~	~~*interpret the components of an electropherogram.*~~	Moved to 19F
(16) ~~(13)~~	The student identifies ~~drugs~~ controlled and illicit substances ~~found at a simulated crime scene~~. The student is expected to:	Updated to current vocabulary
(A)	differentiate between toxicology and controlled substances as it relates to the collection and impact on the body;	Necessary, not previously included
(B)~~(A)~~	classify controlled substances using the schedules under the Controlled Substances Act; and	
(C)~~(B)~~	identify ~~controlled~~ unknown substances using presumptive and confirmatory ~~laboratory~~ procedures such as microchemical/color indicating reagent field tests, microscopy, chromatography, and spectrophotometry.	Clarification
(15) ~~(14)~~	The student evaluates ~~bullet and tool mark~~ firearms and ballistics ~~impressions in a criminal investigation~~ evidence. The student is expected to:	Updated language and clarification
~~*(A)*~~	~~*explain the individual characteristics of tool marks;*~~	Moved to 11
(A)~~(B)~~	describe the mechanism of modern firearms, such as long guns and handguns;	In response to the science review committee's recommendation
(B)~~(C)~~	recognize the components and characteristics of bullet and cartridge cases;	
(C)~~(D)~~	describe the composition of and method of analysis for gunshot residue and primer residue; ~~and~~	
(D)	conduct and calculate trajectory analysis of bullet strikes within a simulated crime scene; and	Included because of gap analysis line 14 **CCRS S II.C M II.C M III A,C,D CCRS CD.2.E**
(E)	recognize the type of information available through the National Integrated Ballistics Information Network.	

(14) ~~(15)~~	The student explores principles of questioned document analysis in ~~forensic science~~ the physical and digital form. The student is expected to:	Updated to modernize **CCRS CD II.C**
(A)	~~describe~~ research different types of examinations performed on digital and physical evidence ~~by a questioned document examiner~~ in a forensic laboratory, ~~including~~ such as digital data recovery, counterfeiting, ~~handwriting,~~ ink, and paper analysis;	Advancements in industry Struck handwriting because it is in 15A **CCRS E.V.A.2, B.2,** **CCRS CD.II.D.2**
(B)	~~describe~~ investigate the security features incorporated in the U.S. and foreign currency to prevent counterfeiting; and	We live in a global society
(C)	perform handwriting comparisons of an unknown sample with exemplars by analyzing characteristics such as letter, line, and formatting.~~;~~	
~~(D)~~	~~describe the process of ink analysis using chromatography.~~	Redundant with 15A
(21) ~~(16)~~	The student explores principles of anthropology and odontology relevant to forensic science. The student is expected to:	SE wasn't previously addressed in KS
(A)	identify the major bones of the human skeletal system;	
(B)	compare composition and structure of human and non-human bones ~~with other animals~~;	**CCRS, CD A.1.B** Feedback from expert reviewer
(C)	describe the collection and preservation methods for bone evidence ~~techniques used to excavate bones from a crime scene~~;	To be consistent with collection and preservation of other types of evidence
(D)	explain the characteristics of the human skeletal system indicative of specific biological sex ~~gender, racial origin,~~ and approximate range of age and height; and	racial origins moved up to 5 **CCRS CD.II. D.2**
(E)	explain how human remains are identified through dental records such as dentures, x-rays, and implants. ~~explain the role of dental records in identification of human remains.~~	Reorganized the wording of the whole thing Previous standard led to misconception on conducting bite mark analysis
(20) ~~(17)~~	The student explores the principles surrounding medico-legal death investigations. ~~calculates the time and cause of death in relationship to decomposition of the human body.~~ The student is expected to:	changed language because death investigation is more than calculating time of death and to broaden the scope of death investigation
(A)	explain and apply the principles of rigor, algor, and livor mortis to deceased persons; ~~explain the process and timeline of rigor mortis and its role in calculating time of death;~~	Addresses all stages of the body post-mortem
(B)	differentiate between the types of wound patterns such as lacerations and blunt force trauma resulting from stabbings, bludgeoning, gunshots, and strangulations;	New based on expert feedback/suggestion **CCRS CD.II. D.1**
~~(B)~~	~~explain post mortem lividity and its importance when processing a crime scene;~~	Concept from stricken text moved to A

(D)(C)	determine the approximate time of death using entomology.;	Clarification that time of death is an estimation **CCRS CD.II. D.2**
(C)(D)	determine time and cause and manner of death from an autopsy report obtained through resources such as case-studies, simulated autopsies, and dissections; and methodologies through case studies	Materials and processes that would be used in actual practice **CCRS CD.I.B.1**