§130.25. Advanced Plant and Soil Science (One Credit), Adopted 2015.

. (b) Introduction.

. (5) 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.

. (c) Knowledge and skills.

. (3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(3)(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; Edit: "... are descriptive, comparative, or experimental."

(3)(F) Delete “gel electrophoresis apparatuses, micropipettors, and hot plates". ADD tools that pertain to soil science. "...soil samples, soil sampling shovels, soil analysis kits, sifters"

. (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:

(4)(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;

(4)(A) Edit: "...logical reasoning, and descriptive and experimental testing..."

. (7) The student develops scenarios for advances in plant and soil science. The student is expected to:

(7) section – all (A), (B), (C), (D) - Delete. Found in process intro section.

. (11) The student describes the origin and use of water in a watershed. The student is expected to:

(11)(B) - Replace: "Identify and analyze the type and quality or water in a watershed;"

(11)(C) - Delete (C), in (B).
(17) The student diagrams the structure and function of nucleic acids in the mechanism of genetics. The student is expected to:

(C) compare and contrast genetic variations observed in plants and animals; and

(D) compare the processes of mitosis and meiosis and their significance.

(18) The student demonstrates skills related to the human, scientific, and technological dimensions of crop production and the resources necessary for producing domesticated plants. The student is expected to:

(D) design and conduct experiments to support known principles of genetics.

§130.224. Anatomy and Physiology (One Credit), Adopted 2015.

(a) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: two science credits. Recommended prerequisite: a course from the Health Science Career Cluster. 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.

(5) 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.

(c) Knowledge and skills.

(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;

(17)(C) - Replace: "Compare the processes of mitosis and meiosis and the significance in genetic variations observed in organisms." DELETE (D), now included in (C).

(18)(D) - Edit - change experiments to "investigations"

Edit: "Biology, Chemistry or Integrated Physics and Chemistry (IPC) or Physics"

Edit: "... are descriptive, comparative, or experimental."

Edit "descriptive, comparative or experimental" testing
§130.225. Medical Microbiology (One Credit), Adopted 2015.

(b) Introduction.

(5) 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.

(c) Knowledge and skills.

(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;

(6) The student is expected to perform and analyze results in the microbiology laboratory. The student is expected to:

(H) interpret the Gram stain results;

(7) The student examines the role of microorganisms in infectious diseases. The student is expected to:

(A) outline the infectious process, including how pathogenic microorganisms affect the human body system;
§130.227. Pathophysiology (One Credit), Adopted 2015.

(b) Introduction.

(5) 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.

(c) Knowledge and skills.

(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;

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

(b) Introduction.

(5) Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation can be **experimental, descriptive, or comparative**. The method chosen should be appropriate to the question being asked. (c) Knowledge and skills.

(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;

(7) The student recognizes the methods to process and analyze trace evidence commonly found in a crime scene. The student is expected to:

(A) demonstrate how to process trace evidence such as glass, paint, fibers, and hair collected in a simulated crime scene;
§130.412. Engineering Design and Problem Solving (One Credit), Adopted 2015.

(a) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Algebra I and Geometry. Recommended prerequisites: two Science, Technology, Engineering, and Mathematics (STEM) Career Cluster credits. 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.

(7) 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.

(c) Knowledge and skills.

(2) The student, for at least 40% of instructional time, conducts engineering laboratory and field activities using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during engineering laboratory and field activities; and

§130.10. Advanced Animal Science (One Credit), Adopted 2015.

(a) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology, Chemistry, or Integrated Physics and Chemistry (IPC); Algebra I and Geometry; and either Small Animal Management, Equine Science, or Livestock Production. Recommended prerequisite: Veterinary Medical Applications. 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.

Edit: "Biology, Chemistry or Integrated Physics and Chemistry (IPC) or Physics’
§130.414. Engineering Science (One Credit), Adopted 2015.

The course "Principles of Engineering" (old name) is really a Project Lead the Way course, which is a copyrighted program. These TEKS mirror the PLTW course.

(a) General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Algebra I and one credit of high school science. Recommended prerequisite: Geometry. 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.

(5) 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.

(c) Knowledge and skills.

(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;

(7) The student understands mechanisms, including simple and compound machines, and performs calculations related to mechanical advantage, drive ratios, work, and power. The student is expected to:

(A) explain how components, including gears, sprockets, pulley systems, and simple machines, make up mechanisms;

(8) The student understands energy sources, energy conversion, and circuits and performs calculations related to work and power. The student is expected to:

(D) define voltage, current, and resistance and calculate each using Ohm's law.

(9) The student understands system energy requirements and how energy sources can be combined to convert energy into useful forms. The student understands the relationships among material conductivity, resistance, and geometry in...
order to calculate energy transfer and determine power loss and efficiency. The student is expected to:

- (F) analyze how thermal energy transfer is affected by conduction, R-values, and radiation; and

- (10) The student understands the interaction of forces acting on a body and performs calculations related to structural design. The student is expected to:

  (A) illustrate, calculate, and experimentally measure all forces acting upon a given body;

- (11) The student understands material properties and the importance of choosing appropriate materials for design. The student is expected to:

  (B) calculate and measure the weight, volume, mass, density, and surface area of selected common household products; and

- (12) The student uses material testing to determine a product's function and performance. The student is expected to:

  (E) identify and compare measurements and calculations of sample material properties such as elastic range, proportional limit, modulus of elasticity, elastic limit, resilience, yield point, plastic deformation, ultimate strength, failure, and ductility using stress-strain data points.

- (14) The student demonstrates an understanding of fluid power systems and calculates values in a variety of systems. The student is expected to:

  (C) use Pascal's Law to calculate values in a fluid power system;

  (E) calculate values in a pneumatic system using the ideal gas laws; and

- (16) The student demonstrates an understanding of kinematics in one and two dimensions and applies the concepts to real-world engineering design problems. The student is expected to:

  (C) calculate the X and Y components of a projectile motion; and

*Edit:* “analyze how thermal energy transfer is affected by conduction, thermal resistance R values, convection, and radiation.”

*Edit:* “understand the definition of a force according to Newton's Second Law of Motion and the four general types of forces: weight (force due to gravity).”

*Edit:* “Calculate takes into account measurement.”

*Edit:* replace “identify and compare measurements and calculations of sample” with “identify and calculate sample...”

*Edit:* “system, including force, mass, and cross-sectional area”

*Edit:* “...ideal gas laws using pressure, volume, and temperature”

*Edit:* “X and Y components of an object in projectile motion...”
§130.415. Biotechnology I (One Credit), Adopted 2015.

  . (a) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Biology. Recommended prerequisites: Principles of Biosciences and Chemistry. 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.

  . (5) Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation can be experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(c) Knowledge and skills.

  . (2) The student, for at least 40% of instructional time, conducts ……..

      . (D) maintain required safety training, including location and understanding of interpretation of material safety data sheets;

  . (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;

  . (5) The student explores the emerging field of biotechnology. The student is expected to:

      . (B) apply scientific processes and concepts outlined in the Texas essential knowledge and skills (TEKS) for Biology relevant to biotechnology;

  . (7) The student understands the role of genetics in the biotechnology industry. The student is expected to:

      . (B) describe the structure and function of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) in eukaryotic and prokaryotic cells;

  . (8) The student analyzes the importance of recombinant DNA technology and genetic engineering. The student is expected to:

      . (G) distinguish between vectors commonly used in biotechnology for DNA insertion, including plasmids, retroviruses, and bacteriophage; and
(11) The student **prepares solutions** and reagents for the biotechnology laboratory. The student is expected to:

   Edit: "...prepares and properly labels solutions..."

(12) The student performs advanced biotechnology laboratory procedures. The student is expected to:

   - (B) **isolate**, maintain, and store **bacterial** cultures;
   Edit “safely isolate …. Store microbial cultures;”

§130.416. Biotechnology II (One Credit), Adopted 2015.

(b) Introduction.

(5) 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.

(c) Knowledge and skills.

(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;

   Edit “descriptive, comparative, or experimental.”

(5) The student formulates hypotheses to guide **experimentation** and data collection. The student is expected to:

   Edit – change experimentation to “investigation”

(6) The student analyzes published research. The student is expected to:

   (B) examine a **prescribed research design** and identify dependent and independent variables;

   Edit "a prescribed research design" to "comparative and experimental investigations”

   (D) **compare the relationship of the hypothesis to the conclusion.**

Replace: “determine if the data and conclusion support the hypothesis”

(7) The student develops and **implements investigative** designs. The student is expected to:

Edit “implements appropriate investigative”
The student collects, organizes, and evaluates qualitative and quantitative data obtained through experimentation. The student is expected to:

(B) record observations as they occur within an investigation;

(C) acquire, manipulate, and analyze data using appropriate equipment and technology, following the rules of significant digits;

(D) identify sources of random error and systematic error and differentiate between both types of error;

(E) report error of a set of measured data in various formats, including standard deviation and percent error;

(F) construct data tables to organize information collected in an experiment; and

(G) evaluate data using statistical methods to recognize patterns, trends, and proportional relationships.

The student communicates conclusions clearly and concisely to an audience of professionals. The student is expected to:

(A) construct charts, tables, and graphs using technology in order to facilitate data analysis and to communicate experimental results clearly and effectively, including oral presentation of original findings of a research project to an audience of peers and professionals; and

(B) suggest alternative explanations from observations or trends evident within the data or from prompts provided by a review panel.
§130.417. Scientific Research and Design (One Credit), Adopted 2015.

(a) General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: one credit of high school science. 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.

(5) 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.

(c) Knowledge and skills.

(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;

FOOD CHEMISTRY SCIENCE

(b) Introduction.

(b)(7) Scientific inquiry. Food 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.

(3) The student uses scientific methods processes and equipment during laboratory and field …..

(6)

FOOD CHEMISTRY

Title: Edit “Food Science”

Change name back to Food Science Majority of content is applied general science, not chemistry focused.

(b)(7) Edit order: "...descriptive, comparative, or experimental."

(3) - Change back to methods to be consistent with best practices and other courses.

(6)(D) - Change "organisms" to "microorganisms."

(6)(E) – Edit "analyze and practice ..."
| (7) | (7)(A) - delete "related to food science" |
| (8) | (8)(E) - should be "relationships among the ..." |
| (9) | (9)(A) - delete "of food" |
|      | (9)(C) – Edit – “…in digestion, including the factors that influence enzyme activity” |
| (10) | (10)(B) - should be "assess" |
|      | (10)(C) - Delete. Redundant from first process section |
| (11) | (11)(A), (B), (C) - Delete “in baked products” |
| (12) | (12)(C) – Edit “Investigate regulations of the agencies ...” |
| (13) | (12)(D) – Delete, part of process section |
|      | (13) – Return to original text |
|      | (13)(C) – Edit “investigate the role of latent heat in phase changes ...” |
|      | (13)(D) - (D) Return to original language. New text makes no sense |
|      | (13)(E) and (F) - Delete - in process section |
| (14) | (14) – Edit “carbohydrates in food ...” |
|      | Old (14)(C) – Keep original text, do not delete |
|      | (14)(F) - Delete - in process section |
| (15) | (15) - "...properties of fats in food” .... food production “and role in maintaining optimum health” |
| (16) | (16) - Delete "and amino acids"
| (16) – Edit – “... effects in food production and role in maintaining optimum health”
| (16)(A) and (B) and (G) – Delete
| (17) – Edit – “...in food production and maintaining optimum health”
| (17)(A) – Edit “identity and discuss the function ...” .... “... in food production and maintaining optimum health”
| (17)(D) – Delete. In process section.
| (18) – Edit “...in food production and maintaining optimum health”
| (18)(D) - AD  "... and create a food product"
| (18)(E) and (F) – Delete. In process section.
| (20)(D) - Return to "describe" (instead of investigate)
| (21)(B) – Edit "... and create a food product using dehydration"
| (21)(C) – Edit "... and create a food product using canning"
| (21)(D) – Edit "... and create a food product using freezing"
| (21)(E) and (F) and (G) – Delete. In process section. |
§130.404. Principles of Technology (One Credit), Adopted 2015.

(b) Introduction.

(5) 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.

(c) Knowledge and skills.

(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;

(7) The student uses critical-thinking, scientific-reasoning, and problem-solving skills. The student is expected to:

(A) analyze and evaluate scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing;

(B) communicate and apply scientific information;

(C) explain the societal impacts of scientific contributions; and

(D) research and describe the connections between technologies and future career opportunities.

(12) The student analyzes the properties of wave motion and optics. The student is expected to:

(B) investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength;

(C) investigate and calculate the relationship between wavespeed, frequency, and wavelength;

(E) investigate behaviors of waves, including reflection, refraction, diffraction, interference, resonance, and the Doppler effect;

(13) The student analyzes the concepts of atomic, nuclear, and quantum phenomena. The student is expected to:

(D) INSERT NEW STUDENT EXPECTATION