Utah CTE

Engineering Technology

Students will follow safety practices. S1

Standard 1 **Identify potential safety hazards and follow general laboratory safety practices.** S1.1

- a Assess workplace conditions regarding safety and health. S1.1.A
- b Identify potential safety issues and align with relevant safety standards to ensure a safe workplace/jobsite. S1.1.B
- c Locate and understand the use of show safety equipment. S1.1.C
- d Select appropriate personal protective equipment. S1.1.D

Standard 2 **Use safe work practices.** S1.2

- a Use personal protective equipment according to manufacturer rules and regulations. S1.2A
- b Follow correct procedures when using any materials, tools, or equipment. S1.2.B
- c Ref: https://schools.utah.gov/cte/engineering/resources under the Safety Program and Management tab. S1.2.C

Complete a basic safety test without errors (100%) before using any tools or shop equipment. S1.3

Standard 3 **Complete a basic safety test without errors (100%) before using any tools or shop equipment.** S1.3

Students will develop an engineering mindset. S2

Standard 1 **Use an engineering design process to solve a problem. (For example: Identify & define the problem (criteria & constraints), Brainstorm solutions, Create a model (predictive analysis) & build a prototype, Test the prototype (gather data), Iteration (redesign & optimize))** S2.1

Standard 2 **Use mathematics and science to produce technology (STEM) which often requires a multi- disciplinary approach. (Algebra, Geometry, Physics)** S2.2

Standard 3 **Demonstrate the relationship between a scientific method and an engineering design process. (For example: Record data, Sketch ideas, Analyze data to develop a mathematical model, Reach a conclusion (cause & effect))** S2.3

Students will apply the elements of an engineering design process to create a product or system. S3

Standard 1 **Identify the design problem and decide how to address it. (For example: Clearly define the problem based on wants and needs, Identify criteria and constraints and determine how they will affect the design, Investigate existing design solutions, Consider factors including safety, reliability, cost, quality control the environment, production, manufacturability, maintenance and repair, aesthetics ergonomics, and human factors)** S3.1

Standard 2 **As a team, think of new ideas or approaches to the problem and choose one.** S3.2

- a Brainstorm a variety of potential solutions. S3.2.A
- b Evaluate their strengths and weaknesses based on the established criteria. S3.2.B
- c Choose the best solution. S3.2.C

Standard 3 **Create a model and a prototype of the proposed design. (For example: Mathematical models (spreadsheets and graphs), Technical drawings (isometric & orthographic), 3D solid models, Working prototype)** S3.3

Standard 4 **Test the prototype, record the results, and evaluate the performance of the design. (For example: Identify and record both failures and successes, Evaluate the performance of the prototype against the stated requirements)** S3.4

Standard 5 **Redesign the prototype by repeating the design process in order to further optimize the design. (For example: Learn from failed attempts and identify areas for improvement from testing, Reconsider any discarded ideas, Look for mathematical relationships and use them to identify the factors that affect the design the most, Repeat the steps of the design process until the prototype meets the requirements)** S3.5

Students will develop an understanding of the cultural, environmental, economic, and political effects of engineering, and the impacts of technology throughout history. S4

Standard 1 **In order to understand the effects of engineering on society, students should learn that engineers have improved the quality of life by introducing revolutionary technologies such as: Clean water systems, Transportation & infrastructure, Medicines & biotechnology, Electronics, Energy.** S4.1

Standard 2 **In order to realize the impact of society on technology, students should learn that: The use of inventions and innovations has led to changes in society and the creation of new needs and wants, Each innovation introduces both solutions and new challenges.** S4.2

Standard 3 **Students will recognize that engineers will have a role in solving current and future problems such as the National Academy of Engineering Grand Challenges.** S4.3

Students will apply engineering fundamentals. S5

Standard 1 **Distinguish between six simple machines and their identifying characteristics. (For Example: Lever, Wedge, Inclined Plane, Screw, Wheel & Axle, and Pulley)** S5.1

Standard 2 **Practice real world applications of physical laws.** S5.2

- a Ohm's Law & Watt's Law S5.2.A
- b Newton's Laws of Motion S5.2.B
- c Pascal's Principle S5.2.C
- d Bernoulli's Principle S5.2.D
- e Mass and energy balances, and chemical reactions. S5.2.E

Students will investigate future training opportunities and careers in engineering. S6

Standard 1 **Investigate the USBE's CTE engineering pathway.** S6.1

Standard 2 **Identify occupations related to engineering.** S6.2

- a Technician S6.2.A
- b Designer S6.2.B
- c Engineer S6.2.C
- d Manager S6.2.D

Standard 3 **List and differentiate among different engineering disciplines. (For example: Aerospace, Biomedical, Civil, Chemical, Computer (both Hardware &
Software), Electrical, Energy, Manufacturing, Mechanical)** S6.3

Standard 4 **Investigate different types of occupational training. (For example: Trade school, Community College, University, Graduate Training)** S6.4

Standard 5 **Recognize the importance of both "hard" and "soft" skills in the workplace.** S6.5