Career Cluster Technologies I

Career Cluster Technologies I introduces students in Grade 7 to foundational knowledge and processes needed to increase their level of technological literacy. This course is aligned with the International Technology Education Association’s Standards for Technological Literacy and introduces students to the sixteen career clusters and the pathways associated with each. Students explore technologies related to the clusters through courses that may be taught for a minimum of nine weeks to a maximum of two semesters. For a nine-week or 35-hour rotation course, content standards 1, 2, 4, 7, 8, 9, and 18 must be included. For a semester or 70-hour course, content standards 1, 2, 4, 5, 7, 8, 9, 13, 14, 15, 17 and 18 must be included. All standards must be included in a one-credit or two-semester course.

Students gain knowledge and skills in the application, design, production, and assessment of products, services, and systems in a variety of areas including, but not limited to, medical, agriscience, energy and power, communications, transportation, manufacturing, and construction technologies.

Career and technical student organizations are integral, cocurricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Nature of Technology

Students will:

1. Describe the scope of technology.
   - Identifying how new products and systems can be developed to solve problems or help do things that require technology
   - Explaining the nature of the development of technology
   - Explaining how technology is linked to creativity and innovation
   - Describing how corporations create demand for a product by utilizing technology for marketing and advertising

2. Explain core concepts of technology.
   - Identifying components of technology systems as input, process, output, and at times, feedback
   - Describing the relationship of parts in systems thinking
   - Comparing open-loop and closed-loop systems
   - Illustrating how technology systems can be connected to one another and how a malfunction of any part of a system may affect the function and quality of the system or related systems
   - Describing effects of requirements on a product or system
   - Explaining the nature of trade-offs and the need for careful compromises among competing factors
   - Explaining that different technologies involve different sets of processes
   - Summarizing the maintenance process of technical systems
   - Explaining how controls serve as mechanisms of change
3. Describe relationships and connections among technologies and other fields.
   - Explaining how a product, system, or environment developed for one setting may be applied to another setting
   - Explaining how knowledge gained from other fields of study has a direct effect on the development of technological products and systems

**Technology and Society**

4. Describe the role of society in the development and use of technology.
   - Identifying factors that influence the development of technology
   - Summarizing the process in which social and cultural priorities influence invention and innovation and how invention and innovation influence social and cultural priorities
   - Explaining acceptance and use of technological products and systems

5. Summarize cultural, social, economic, environmental, political, and historical effects of technology.
   - Describing ways technology affects humans, including safety, comfort, choices, and attitudes about further development of technology
   - Identifying consequences and ethical considerations of the use of technology products and systems
   - Stating ways that technology development influences economy, politics, and culture
   - Describing how technology is used to manage waste and repair damage in technological systems
   - Recognizing conflicts that may occur between environmental and economic concerns related to advances in technology
   - Describing the evolution of techniques, measurement, and resources used in technology development
   - Recognizing the effect of technology innovations on the specialization of labor needs

**Design**

6. Describe the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

7. Identify creative attributes of design, including brainstorming, modeling, testing, evaluating, and modifying.
   - Recognizing the purpose for design
   - Recognizing the role of criteria and constraints in a given design
   - Understanding limits of design regarding perfection
Abilities for a Technological World

8. Demonstrate technology design processes for solving problems in and beyond the laboratory and classroom.
   - Specifying criteria and constraints for the design
   - Modeling a solution to a problem in two-dimensional and three-dimensional representations
   - Recognizing that testing and evaluation of the design in relation to preestablished requirements are essential parts of the process
   - Documenting the solution to a given design problem

9. Select correct tools needed to operate and maintain technology products and systems.
   - Using information provided in manuals, protocols, or by experienced people to see and understand how things work
   - Using tools, materials, and machines safely to diagnose, adjust, and repair systems
   - Using computers and calculators in various applications
   - Operating systems to achieve a given purpose

10. Assess the impact of technology products and systems on society.
    - Designing instruments to collect data
    - Using data collected to analyze and interpret trends in order to identify positive and negative effects of a technology
    - Evaluating information for accuracy to determine its usefulness

The Designed World

11. Identify advances and innovations in medical technologies and health care.
    - Recognizing sanitation processes used in the disposal of medical products
    - Recognizing why vaccines are developed for use in immunization
    - Describing how genetic engineering involves modifying the structure of deoxyribonucleic acid (DNA) to produce new genetic designs

12. Identify advances and innovations in agricultural and related biotechnologies.
    - Comparing a wide range of equipment and practices used to improve the production of food, fiber, fuel, and other useful products for the care of animals
    - Recognizing how biotechnology applies principles of biology to create commercial products or processes
    - Contrasting techniques used to provide long-term storage of food, including refrigeration, freezing, dehydration, preservation, and irradiation

13. Identify advances and innovations in energy and power technologies.
    - Defining energy and power
    - Identifying uses of energy and power systems that provide propulsion to other technological products and systems
    - Describing concepts of efficiency and conservation of power and energy
14. Identify advances and innovations in information and communications technologies.
   - Identifying primary modes of information transfer, including human to human, human to machine, and machine to human
   - Describing required components of a basic communications system, including source, encoder, transmitter, receiver, decoder, and destination
   - Identifying factors that affect the design of a message, including intended audience, medium, purpose, and nature of the message
   - Describing elements of common language used to promote clear communications, including symbols, measurements, and drawings

15. Identify advances and innovations in transportation technologies.
   - Identifying functional components that comprise a transportation system
   - Describing transportation subsystems, including structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively
   - Describing how government regulations influence the design and operation of transportation systems
   - Explaining how transportation processes, including receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for an entire transportation system to operate efficiently

16. Identify advances and innovations in manufacturing technologies.
   - Describing how manufacturing systems use mechanical processes to change the form of materials through separating, forming, combining, and conditioning
   - Classifying manufactured goods as durable or nondurable
   - Explaining the manufacturing process, including designing, developing, producing, and servicing of products and systems
   - Identifying chemical technologies used in manufacturing, including synthetic fibers, pharmaceuticals, plastics, and fuels
   - Explaining techniques used to locate, acquire, and transform raw materials used in manufacturing
   - Summarizing the steps of marketing

17. Identify advances and innovations in construction technologies.
   - Describing factors influencing construction design decisions, including building laws and codes, style, convenience, cost, climate, and function
   - Identifying types of foundations and their uses
   - Classifying structures as temporary or permanent
   - Comparing building subsystems
     Examples: waste disposal, water, electrical, structural, climate control, communication

18. Recognize Alabama’s sixteen career clusters and associated pathways and their relationships to technology.
   - Describing how pathways lead students through secondary and postsecondary training towards a credential
   - Identifying employment opportunities associated with the clusters
   - Explaining employment skills for securing and keeping a job