

Course Title: Materials and Processes Technology I
Course Number: 8601110
Course Credit: 1

Course Description:

This course provides students with an introduction to the knowledge, human relations, and technical skills of industrial materials and processes technology.

CTE Standards and Benchmarks		NGSSS-Sci
04.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:	
04.01	Illustrate the nature and development of technological knowledge and processes.	
04.02	Graph the rapid increase in the rate of technological development and diffusion.	
04.03	Conduct specific, goal-directed research related to inventions and innovations.	
05.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:	SC.912.L.17.11,16,19, 20; SC.912.N.1.1
05.01	Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems.	
05.02	Discuss technological systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	
05.03	Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	
05.04	Select resources involving trade-offs between competing values, such as availability, cost, desirability, and waste.	
05.05	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	
05.06	Implement strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints.	
05.07	Organize a management system as the process of planning, organizing, and controlling work.	
06.0	Demonstrate an understanding of the relationships among technologies and the connections between technology and other fields of study. – The student will be able to:	SC.912.N.1.3, 4; 2.4, 5
06.01	Discuss technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	
06.02	Identify technological innovations resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	
06.03	Outline the process of patenting to protect a technological idea.	

CTE Standards and Benchmarks		NGSSS-Sci
06.04	Identify technological progresses that promote the advancement of science and mathematics.	
07.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:	SC.912.N.2.4, 5
07.01	Compare the use of technology involving weighing the trade-offs between the positive and negative effects.	
07.02	Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.	
08.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:	SC.912.L.17.8, 11, 16, 17; SC.912.P.12.5
08.01	Compare trade-offs of developing technologies to reduce the use of resources.	
08.02	Assess technologies devised to reduce the negative consequences of other technologies.	
08.03	Make decisions about the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	
09.0	Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:	SC.912.N.2.4, 5
09.01	Investigate how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	
09.02	Collect societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.	
09.03	Identify a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.	
10.0	Demonstrate an understanding of the influence of technology on history. – The student will be able to:	SC.912.N.1.1, 5, 7; 2.4, 5
10.01	Research how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	
10.02	Describe the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	
10.03	Discuss that early in the history of technology, the development of many tools and machines was based not on scientific knowledge, but on technological know-how.	
10.04	Define the Iron Age as the use of iron and steel as the primary materials for tools.	
10.05	Define the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society.	
10.06	Define the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology.	
10.07	Define the Industrial Revolution as the development of continuous manufacturing, improved education and leisure time.	

CTE Standards and Benchmarks	NGSS-Sci
10.08 Define the Information Age and its placement of emphasis on the processing and exchange of information.	
11.0 Demonstrate an understanding of the attributes of design. – The student will be able to:	SC.912.N.1.1; 3.5
11.01 Recognize the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	
11.02 Restate design problems that are seldom presented in a clearly defined form.	
11.03 Check and critique a design continually, and improve and revise the idea of the design as needed.	
11.04 List competing requirements of a design, such as criteria, constraints, and efficiency.	
12.0 Demonstrate an understanding of engineering design. – The student will be able to:	SC.912.N.1.1, 7; 3.5
12.01 Identify design principles used to evaluate existing designs, to collect data, and to guide the design process.	
12.02 Describe the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.	
12.03 Construct a prototype or working model used to test a design concept by making actual observations and necessary adjustments.	
12.04 Identify factors taken into account in the process of engineering.	
13.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
13.01 Define research and development as a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	
13.02 Identify research needed to solve technological problems.	
13.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.	
13.04 Utilize a multidisciplinary approach to solving technological problems.	
14.0 Demonstrate abilities to apply the design process. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
14.01 Identify the design problem to solve and decide whether or not to address it.	
14.02 Identify criteria and constraints and determine how these will affect the design process.	
14.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	

CTE Standards and Benchmarks	NGSS-Sci
14.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	
14.05 Develop and produce a product or system using a design process.	
14.06 Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	
15.0 Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
15.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	
15.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	
15.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	
15.04 Operate systems so that they function in the way they were designed.	
15.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	
16.0 Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
16.01 Collect information and evaluate its quality.	
16.02 Evaluate data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.	
16.03 Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	
16.04 Identify forecasting techniques to evaluate the results of altering natural systems.	
17.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
17.01 Service products to keep them in good operating condition.	
17.02 Classify materials based on their qualities as natural, synthetic, or mixed.	
17.03 Classify goods as durable goods designed to operator for a long period of time, or non-durable goods designed to operate for a short period of time.	
17.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production.	
17.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes.	

CTE Standards and Benchmarks		NGSSS-Sci
17.06	Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products.	
17.07	Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it.	
18.0	Demonstrate safe and appropriate use of tools, machines, and materials in materials & processes technology.. – The student will be able to:	
18.01	Select appropriate tools, procedures, and/or equipment.	
18.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.	
18.03	Follow laboratory safety rules and procedures.	
18.04	Demonstrate good housekeeping at workstation within total laboratory.	
18.05	Identify color-coding safety standards.	
18.06	Explain fire prevention and safety precautions and practices for extinguishing fires.	
18.07	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.	
19.0	Demonstrate the ability to properly identify, organize, plan, and allocate resources. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
19.01	Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.	
19.02	Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.	
19.03	Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.	
19.04	Display knowledge of the efficient use of human resources.	
20.0	Demonstrate an understanding of entrepreneurship. – The student will be able to:	
20.01	Define entrepreneurship.	
20.02	Describe the importance of entrepreneurship to the American economy.	
20.03	List the advantages and disadvantages of business ownership.	
20.04	Identify the risks involved in ownership of a business.	
20.05	Identify the necessary personal characteristics of a successful entrepreneur.	

CTE Standards and Benchmarks	NGSS-Sci
20.06 Identify the business skills needed to operate a small business efficiently and effectively.	
21.0 Demonstrate technical knowledge and skills associated with pre-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
21.01 Define and describe the term “pre-processing” as it relates to industrial materials.	
21.02 Describe the technical processes of extracting materials from natural resources.	
21.03 Locate and order industrial materials.	
21.04 Arrange for the appropriate transportation of industrial materials.	
21.05 Store and protect industrial materials properly.	
21.06 Follow proper precautions in the receiving, unpacking, and handling of industrial materials.	
22.0 Demonstrate technical knowledge and skills associated with processing activities and practices of industrial materials. – The student will be able to:	SC.912.P.8.1, 2, 11; 10.3, 4, 5, 7, 15, 18; 12.11, 12
22.01 Define and describe “processing” as it relates to industrial materials.	
22.02 Demonstrate technical processing of a variety of industrial materials, such as wood, metals, and plastic.	
22.03 Apply the technical processes of separating and forming using a variety of industrial materials.	
22.04 Apply the technical processes of conditioning a variety of industrial materials.	
22.05 Apply the technical processes of combining in the fabrication and finishing of a product.	
23.0 Demonstrate technical knowledge and skills associated with post-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, SC.912.L.17.13, 20
23.01 Define and describe “post-processing” as it relates to industrial materials.	
23.02 Identify processes for distributing products made of industrial materials.	
23.03 Describe processes for installing products made of industrial materials.	
23.04 Describe processes for maintaining products made of industrial materials.	
23.05 Describe processes for altering products made of industrial materials.	
23.06 Describe processes for servicing products made of industrial materials.	

Course Title: Materials and Processes Technology II
Course Number: 8601120
Course Credit: 1

Course Description:

This course provides students with an intermediate understanding of the knowledge, human relations, and technical skills of industrial materials and processes technology.

CTE Standards and Benchmarks	NGSSS-Sci
04.0 Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:	
04.01 Discuss the nature and development of technological knowledge and processes.	
04.02 Explain the rapid increase in the rate of technological development and diffusion.	
04.03 Conduct specific, goal-directed research related to inventions and innovations.	
05.0 Demonstrate an understanding of the core concepts of technology. – The student will be able to:	SC.912.L.17.11,16,19, 20; SC.912.N.1.1
05.01 Identify systems thinking logic and creativity with appropriate compromises in complex real-life problems.	
05.02 Define technological systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	
05.03 Identify the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	
05.04 Identify resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.	
05.05 Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	
05.06 List strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints.	
05.07 Define a management system as the process of planning, organizing, and controlling work.	
06.0 Demonstrate an understanding of the relationships among technologies and the connections between technology and other fields of study. – The student will be able to:	SC.912.N.1.3, 4; 2.4, 5
06.01 Identify technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	
06.02 Outline the process of patenting to protect a technological idea.	
06.03 Identify technological progresses that promote the advancement of science and mathematics.	
07.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:	SC.912.N.1.3, 4; 2.4, 5

CTE Standards and Benchmarks	NGSSS-Sci
07.01 Classify the use of technology involving weighing the trade-offs between the positive and negative effects.	
07.02 List the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.	
08.0 Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:	SC.912.L.17.8, 11, 16, 17; SC.912.P.12.5
08.01 List trade-offs of developing technologies to reduce the use of resources.	
08.02 Identify technologies devised to reduce the negative consequences of other technologies.	
08.03 Discuss the implementation of technologies involving the weighing of trade-offs between predicted positive and negative effects on the environment.	
09.0 Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:	SC.912.N.2.4, 5
09.01 Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	
09.02 Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.	
09.03 Consider a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.	
10.0 Demonstrate an understanding of the influence of technology on history. – The student will be able to:	SC.912.N.1.1, 5, 7; 2.4, 5
10.01 Discuss how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	
10.02 Discuss the history of technology as a powerful force in reshaping the social, cultural, political, and economic landscape.	
10.03 Debate that early in the history of technology, the development of many tools and machines was based not on scientific knowledge, but on technological know-how.	
10.04 Discuss the Iron Age as the use of iron and steel as the primary materials for tools.	
10.05 Discuss the Middle Ages and its development of many technological devices that produced long-lasting effects on technology and society.	
10.06 Discuss the Renaissance, a time of rebirth of the arts and humanities, as an important development in the history of technology.	
10.07 Discuss the Industrial Revolution as the development of continuous manufacturing, improved education and leisure time.	
10.08 Discuss the Information Age and its placement of emphasis on the processing and exchange of information.	
11.0 Demonstrate an understanding of the attributes of design. – The student will be able to:	SC.912.N.1.1; 3.5

CTE Standards and Benchmarks	NGSS-Sci
11.01 Describe the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	
11.02 Translate design problems that are seldom presented in a clearly defined form.	
11.03 Evaluate a design continually, and improve and revise the idea of the design as needed.	
11.04 Analyze competing requirements of a design, such as criteria, constraints, and efficiency.	
12.0 Demonstrate an understanding of engineering design. – The student will be able to:	SC.912.N.1.1, 7; 3.5
12.01 Investigate design principles used to evaluate existing designs, to collect data, and to guide the design process.	
12.02 Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.	
12.03 Construct a prototype or working model used to test a design concept by making actual observations and necessary adjustments.	
12.04 Consider factors taken into account in the process of engineering.	
13.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
13.01 Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	
13.02 Conduct research needed to solve technological problems.	
13.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.	
13.04 Utilize a multidisciplinary approach to solving technological problems.	
14.0 Demonstrate abilities to apply the design process. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
14.01 Interpret the design problem to solve and decide whether or not to address it.	
14.02 Consider criteria and constraints and determine how these will affect the design process.	
14.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	
14.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	

CTE Standards and Benchmarks	NGSS-Sci
14.05 Develop and produce a product or system using a design process.	
14.06 Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	
15.0 Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
15.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	
15.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	
15.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	
15.04 Operate systems so that they function in the way they were designed.	
15.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	
16.0 Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
16.01 Collect information and evaluate its quality.	
16.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.	
16.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	
16.04 Design forecasting techniques to evaluate the results of altering natural systems.	
17.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
17.01 Service products to keep them in good operating condition.	
17.02 Classify materials based on their qualities as natural, synthetic, or mixed.	
17.03 Classify goods as durable goods designed to operate for a long period of time, or non-durable goods designed to operate for a short period of time.	
17.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production.	
17.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes.	
17.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products.	

CTE Standards and Benchmarks		NGSSS-Sci
17.07	Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it.	
18.0	Demonstrate safe and appropriate use of tools, machines, and materials in materials & processes technology. – The student will be able to:	
18.01	Select appropriate tools, procedures, and/or equipment.	
18.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.	
18.03	Follow laboratory safety rules and procedures.	
18.04	Demonstrate good housekeeping at workstation within total laboratory.	
18.05	Identify color-coding safety standards.	
18.06	Explain fire prevention and safety precautions and practices for extinguishing fires.	
18.07	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.	
19.0	Demonstrate the ability to properly identify, organize, plan, and allocate resources. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
19.01	Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.	
19.02	Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.	
19.03	Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.	
19.04	Display knowledge of the efficient use of human resources.	
20.0	Demonstrate an understanding of entrepreneurship. – The student will be able to:	
20.01	Define entrepreneurship.	
20.02	Describe the importance of entrepreneurship to the American economy.	
20.03	List the advantages and disadvantages of business ownership.	
20.04	Identify the risks involved in ownership of a business.	
20.05	Identify the necessary personal characteristics of a successful entrepreneur.	
20.06	Identify the business skills needed to operate a small business efficiently and effectively.	

CTE Standards and Benchmarks		NGSS-Sci
21.0	Demonstrate technical knowledge and skills associated with pre-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
21.01	Define and describe the term “pre-processing” as it relates to industrial materials.	
21.02	Describe the technical processes of extracting materials from natural resources.	
21.03	Locate and order industrial materials.	
21.04	Arrange for the appropriate transportation of industrial materials.	
21.05	Store and protect industrial materials properly.	
21.06	Follow proper precautions in the receiving, unpacking, and handling of industrial materials.	
22.0	Demonstrate technical knowledge and skills associated with processing activities and practices of industrial materials. – The student will be able to:	SC.912.P.8.1, 2, 11; 10.3, 4, 5, 7, 15, 18; 12.11, 12
22.01	Define and describe “processing” as it relates to industrial materials.	
22.02	Demonstrate technical processing using a variety of composite and synthetic industrial materials.	
22.03	Demonstrate understanding of both manual and automated processes.	
22.04	Apply the technical processes of separating and forming a variety of industrial materials.	
22.05	Apply the technical processes of conditioning a variety of industrial materials.	
22.06	Apply the technical processes of combining in the fabrication and finishing of a product.	
23.0	Demonstrate technical knowledge and skills associated with post-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, SC.912.L.17.13, 20
23.01	Define and describe “post-processing” as it relates to industrial materials.	
23.02	Identify processes for distributing products made of industrial materials.	
23.03	Describe processes for installing products made of industrial materials.	
23.04	Describe processes for maintaining products made of industrial materials.	
23.05	Describe processes for altering products made of industrial materials.	
23.06	Describe processes for servicing products made of industrial materials.	
24.0	Perform advanced study and technical skills related to materials and processes. – The student will be able to:	SC.912.N.1.1

CTE Standards and Benchmarks	NGSSS-Sci
24.01 Select an individual or group project in cooperation with the teacher.	
24.02 Develop a written plan of work to carry out the project.	
24.03 Show evidence of technical study in support of the project.	
24.04 Perform skills related to the project.	
24.05 Complete the project as planned.	

Course Title: Materials and Processes Technology III
Course Number: 8601130
Course Credit: 1

Course Description:

This course provides students with an advanced understanding of the knowledge, human relations, and technical skills of industrial materials and processes technology.

CTE Standards and Benchmarks		NGSS-Sci
04.0	Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:	
04.01	Discuss the nature and development of technological knowledge and processes.	
04.02	Explain the rapid increase in the rate of technological development and diffusion.	
04.03	Conduct specific, goal-directed research related to inventions and innovations.	
05.0	Demonstrate an understanding of the core concepts of technology. – The student will be able to:	SC.912.L.17.11, 16, 19, 20; SC.912.N.1.1
05.01	Identify systems thinking logic and creativity with appropriate compromises in complex real-life problems.	
05.02	Assess technological systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	
05.03	Assess the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop.	
05.04	Compare resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.	
05.05	Identify the criteria and constraints of a product or system and determine how they affect the final design and development.	
05.06	Propose strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints.	
05.07	Organize a management system as the process of planning, organizing, and controlling work.	
06.0	Demonstrate an understanding of the relationships among technologies and the connections between technology and other fields of study. – The student will be able to:	
06.01	Create technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.	
06.02	Outline the process of patenting to protect a technological idea.	
06.03	Investigate technological progresses that promote the advancement of science and mathematics.	

CTE Standards and Benchmarks		NGSS-Sci
09.0	Demonstrate an understanding of the role of society in the development and use of technology. – The student will be able to:	
09.01	Report how different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	
09.02	Consider societal opinions and demands, as well as corporate cultures to use as a basis for deciding whether or not to develop a technology.	
09.03	Evaluate a number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads as contributors to shaping the design of and demand for various technologies.	
11.0	Demonstrate an understanding of the attributes of design. – The student will be able to:	SC.912.N.1.1; 3.5
11.01	Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	
11.02	Translate design problems that are seldom presented in a clearly defined form.	
11.03	Evaluate a design continually, and improve and revise the idea of the design as needed.	
11.04	Analyze competing requirements of a design, such as criteria, constraints, and efficiency.	
12.0	Demonstrate an understanding of engineering design. – The student will be able to:	SC.912.N.1.7; 3.5
12.01	Select design principles used to evaluate existing designs, to collect data, and to guide the design process.	
12.02	Examine the influence of personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly on the engineering design process.	
12.03	Construct a prototype or working model used to test a design concept by making actual observations and necessary adjustments.	
12.04	Evaluate factors taken into account in the process of engineering.	
13.0	Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
13.01	Employ research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	
13.02	Conduct research needed to solve technological problems.	
13.03	Differentiate between technological and non-technological problems, and identify which problems can be solved using technology.	
13.04	Utilize a multidisciplinary approach to solving technological problems.	

CTE Standards and Benchmarks	NGSS-Sci
14.0 Demonstrate abilities to apply the design process. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
14.01 Interpret the design problem to solve and decide whether or not to address it.	
14.02 Evaluate criteria and constraints and determine how these will affect the design process.	
14.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	
14.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	
14.05 Develop and produce a product or system using a design process.	
14.06 Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	
15.0 Demonstrate the abilities to use and maintain technological products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
15.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	
15.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	
15.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	
15.04 Operate systems so that they function in the way they were designed.	
15.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	
16.0 Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
16.01 Collect information and evaluate its quality.	
16.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.	
16.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	
16.04 Design forecasting techniques to evaluate the results of altering natural systems.	
17.0 Demonstrate an understanding of and be able to select and use manufacturing technologies. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3

CTE Standards and Benchmarks	NGSSS-Sci
17.01 Service products to keep them in good operating condition.	
17.02 Classify materials based on their qualities as natural, synthetic, or mixed.	
17.03 Classify goods as durable goods designed to operator for a long period of time, or non-durable goods designed to operate for a short period of time.	
17.04 Identify and classify manufacturing systems into types, such as customized production, batch production, and continuous production.	
17.05 Discuss the interchangeability of parts to increase the effectiveness of manufacturing processes.	
17.06 Identify chemical technologies providing a means for humans to alter or modify materials and to produce chemical products.	
17.07 Employ marketing techniques involving establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it.	
18.0 Demonstrate safe and appropriate use of tools, machines, and materials in materials & processes technology. – The student will be able to:	
18.01 Select appropriate tools, procedures, and/or equipment.	
18.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.	
18.03 Follow laboratory safety rules and procedures.	
18.04 Demonstrate good housekeeping at workstation within total laboratory.	
18.05 Identify color-coding safety standards.	
18.06 Explain fire prevention and safety precautions and practices for extinguishing fires.	
18.07 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.	
19.0 Demonstrate the ability to properly identify, organize, plan, and allocate resources. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
19.01 Demonstrate the ability to select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.	
19.02 Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.	
19.03 Demonstrate the ability to acquire, store, allocate, and use materials or space efficiently.	
19.04 Display knowledge of the efficient use of human resources.	
20.0 Demonstrate an understanding of entrepreneurship. – The student will be able to:	

CTE Standards and Benchmarks		NGSSS-Sci
20.01	Define entrepreneurship.	
20.02	Describe the importance of entrepreneurship to the American economy.	
20.03	Explain the advantages and disadvantages of business ownership.	
20.04	Identify the risks involved in ownership of a business.	
20.05	Identify the necessary personal characteristics of a successful entrepreneur.	
20.06	Identify the business skills needed to operate a small business efficiently and effectively.	
21.0	Demonstrate technical knowledge and skills associated with pre-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, 3, 6; 2.1, 2, 5; 3.5 SC.912.P.10.3
21.01	Define and describe the term “pre-processing” as it relates to industrial materials.	
21.02	Describe the technical processes of extracting materials from natural resources.	
21.03	Locate and order industrial materials.	
21.04	Arrange for the appropriate transportation of industrial materials.	
21.05	Store and protect industrial materials properly.	
21.06	Follow proper precautions in the receiving, unpacking, and handling of industrial materials.	
22.0	Demonstrate technical knowledge and skills associated with processing activities and practices of industrial materials. – The student will be able to:	SC.912.P.8.1, 2, 11; 10.3, 4, 5, 7, 15, 18; 12.11, 12
22.01	Define and describe “processing” as it relates to industrial materials.	
22.02	Demonstrate technical processing using a variety of industrial materials.	
22.03	Demonstrate technical ability to utilize automated processing equipment.	
22.04	Apply the technical processes of separating and forming a variety of industrial materials.	
22.05	Apply the technical processes of conditioning a variety of industrial materials.	
22.06	Apply the technical processes of combining in the fabrication and finishing of a product.	
23.0	Demonstrate technical knowledge and skills associated with post-processing activities and practices of industrial materials. – The student will be able to:	SC.912.N.1.1, SC.912.L.17.13, 20
23.01	Define and describe “post-processing” as it relates to industrial materials.	

CTE Standards and Benchmarks		NGSSS-Sci
23.02	Identify processes for distributing products made of industrial materials.	
23.03	Describe processes for installing products made of industrial materials.	
23.04	Describe processes for maintaining products made of industrial materials.	
23.05	Describe processes for altering products made of industrial materials.	
23.06	Describe processes for servicing products made of industrial materials.	
24.0	Perform advanced study and technical skills related to industrial materials and processes. – The student will be able to:	SC.912.N.1.1
24.01	Identify and research a design problem related to materials and processes.	
24.02	Produce a detailed design and plan for the production of the solution.	
24.03	Complete the advanced design project as planned.	
24.04	Deliver a professional quality presentation of the design process and solution.	
28.0	Demonstrate understanding of career opportunities and requirements in the field of materials and processes technology. – The student will be able to:	
28.01	Discuss individual interests related to a career in materials and processes.	
28.02	Explore career opportunities related to materials and processes.	
28.03	Explore secondary education opportunities related to materials and processes.	
28.04	Conduct a job search.	
28.05	Complete a job application form correctly.	
28.06	Demonstrate competence in job interview techniques.	
28.07	Create a professional resume and letter of introduction.	
28.08	Solicit awards, letters of recommendation and recognition.	
28.09	Organize work samples in a professional, presentable format.	