Emerging Technology-Technology Education-Modules

North Dakota Department of Career and Technical Education

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Emerging Technology Topics and Competencies--Created February 15, 2006 /Updated February 14, 2007/

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Emerging Technology Student Competencies of Current Modules

All current modules are grouped into four categories:

I. **Automated Manufacturing**
II. **Science Technologies**
III. **Engineering**
IV. **Information/Communication Technology**

A statement follows each grouping to better define the particular category. The core concepts that are listed for each category are applicable to every module in that area. The items in parenthesis are there to further describe either the module or the core concept.

I. Automated Manufacturing

Students will have an understanding of the concepts used in computer numerical control as it relates to the production and handling of materials to create products.

Modules

1. Mill
2. Laser Engraver
3. Router
4. Robotics
5. ColorCAMM
6. CNC Embroidery

Core Concepts: **Equipment Function (Tools, Feed Rate); Computer (File Format, Application Software); Three Axis Geometry; Design Processes**

II. Science Technologies

Students will have an understanding of basic scientific concepts and principles by applying them to real life applications.

Modules

1. Bio Tech (DNA, Genetics, Forensics)
2. Science Workshop/Probes (Physiology Concepts)

Core Concepts: **Basic Science Concepts; Biology Concepts; Physics Concepts; Chemistry Concepts; Ecology**

III. Engineering

Students will have an understanding of problem-solving skills using engineering concepts and processes. Integrations of math and science principals and foundations skills used in production will be stressed during support activities.

Modules

1. CADD (Basic Computer Skills)
2. Laser (Fiber Optics)
3. Electronics
4. Pneumatics/Hydraulics/Mechanical

Core Concepts: **Terminology; Systems; Schematics; Basic Linear Logic; Properties**

IV. Information/Communication Technologies

Students will have an understanding of a wide range of information data systems that are used across many discipline areas.

Modules

1. Aviation (Experimental Flight)
2. GPS (Tracking)
3. Video/Digital Editing

Core Concepts: **Map Reading; Navigation; Geography; Triangulation**

Explanation of Modules/Topics/Student Competencies

There are 19 Topics in all of Emerging Technology Standards. Each topic has a various amount of Student Competencies (or sub-standards) attached to it.

Not all Topics are applicable to every Module.

Not all competencies are applicable in every module or included module topics.

Every Student Competency **IS** found somewhere at least once in the entire document of modules; however, not every module uses all available Student Competencies found in Emerging Technology.

For example, **Topic 1** has eight Student Competencies sprinkled throughout all 15 Modules:

BUT,

"Module 1: MILL" only uses five of the eight (not including 1.1.5, 1.1.6, and 1.1.7, as they didn't apply to the MILL Module.)

It is therefore listed as such below:

Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.

If a topic or competency is missing in numerical order, it was not deemed necessary for that Module.

Module 1	***MILL***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
	1.3.7	Recognize how technological progress has advanced science and mathematics.

Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.4	Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
	1.9.5	Create a prototype as a working model used to test a design concept by making actual observations and necessary adjustments.
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.

Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.7	Identify criteria and constraints and determine how these will affect the design process.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.9	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.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.5	Collect information and evaluate quality.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Inform and communicate how systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.7	Service products to maintain good operating condition.
	1.19.8	Classify how materials have different qualities (natural, synthetic, or mixed).
	1.19.10	Classify manufacturing systems (e.g. customized production, batch production, continuous production, etc.).
	1.19.13	Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).

Module 2	*LASER ENGRAVER*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.

	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.6	Examine why technological ideas are sometimes protected through the process of patenting.
	1.3.7	Recognize how technological progress has advanced science and mathematics.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.

Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.
	1.5.2	Explore how technologies can be used to repair damage cause by natural disasters and to break down waste from the use of various products and systems.
	1.5.4	Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
	1.5.5	Determine considerations of trade-offs when new technologies are developed to reduce the use of resources.
	1.5.8	Recognize how humans devise technologies to reduce the negative consequences of other technologies.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.

	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.2	Use brainstorming as a group problem-solving design process.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.
	1.10.6	Realize that all problems are not technological and not every problem can be solved using technology.
	1.10.7	Apply a multidisciplinary approach to solve technological problems.

Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.1	Apply a design process to solve problems in and beyond the laboratory-classroom.
	1.11.2	Specify criteria and constraints for the design.
	1.11.3	Make two-dimensional and three-dimensional representations of the designed solution.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.5	Make a product or system and document the solution.
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.1	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	1.13.2	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	1.13.3	Identify trends and monitor the potential consequences of technological development.
	1.13.5	Collect information and evaluate quality.
	1.13.6	Use assessment techniques to make decisions about the future development of technology.
Topic 1.14	**Relate medical technologies for selection and use.**	
	Student Competencies	
	1.14.1	Analyze advances and innovations in medical technologies used to improve healthcare.
	1.14.4	Research medical technologies which protect and maintain health (e.g., prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)

	1.14.5	Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.).
Topic 1.16	**Research and develop an understanding of how to select and use energy and power technologies.**	
	Student Competencies	
	1.16.1	Define energy as the ability to do work.
	1.16.2	Demonstrate that energy can be used to do work using many processes.
	1.16.3	Identify power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	1.16.4	Show that power systems are used to drive and provide propulsion to other technological products and systems.
	1.16.8	Illustrate how power systems must have a source of energy, a process, and loads.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Inform and communicate how systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.1	Use mechanical processes related to manufacturing systems to change the form of materials (e.g. separating, forming, combining, conditioning, etc.).

	1.19.2	Classify manufactured goods as durable and nondurable.
	1.19.3	Explain how the manufacturing process includes designing, developing, making, and servicing products and systems.
	1.19.4	Use chemical technologies to modify or alter chemical substances.
	1.19.6	Market a product by informing the public about it as well as assisting in selling and distributing.
	1.19.7	Service products to maintain good operating condition.
	1.19.8	Classify how materials have different qualities (natural, synthetic, or mixed).
	1.19.10	Classify manufacturing systems (e.g. customized production, batch production, continuous production, etc.).
	1.19.11	Demonstrate how the interchangeability of parts increases the effectiveness of manufacturing processes.
	1.19.12	Show how chemical technologies provide a means for humans to alter or modify materials and to produce chemical products.
	1.19.13	Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).

Module 3	***ROUTER***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
	1.3.7	Recognize how technological progress has advanced science and mathematics.

Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.4	Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
	1.9.5	Create a prototype as a working model used to test a design concept by making actual observations and necessary adjustments.
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.

Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.7	Identify criteria and constraints and determine how these will affect the design process.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.9	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.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.5	Collect information and evaluate quality.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.7	Service products to maintain good operating condition.
	1.19.8	Classify how materials have different qualities (natural, synthetic, or mixed).
	1.19.10	Classify manufacturing systems (e.g. customized production, batch production, continuous production, etc.).
	1.19.13	Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).

Module 4	***ROBOTS***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.

	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
	1.4.7	Debate ethical considerations important to the development, selection, and use of technologies.
	1.4.8	Hypothesize how the transfer of a technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.

	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
	1.8.6	Check and critique the design to redefine and improve upon it.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.5	Create a prototype as a working model used to test a design concept by making actual observations and necessary adjustments.
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.2	Specify criteria and constraints for the design.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.3	Incorporate computers and calculators in various applications.

	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.14	**Relate medical technologies for selection and use.**	
	Student Competencies	
	1.14.1	Analyze advances and innovations in medical technologies used to improve healthcare.
	1.14.4	Research medical technologies which protect and maintain health (e.g., prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)
	1.14.5	Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.).
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Inform and communicate how systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.1	Use mechanical processes related to manufacturing systems to change the form of materials (e.g. separating, forming, combining, conditioning, etc.).
	1.19.11	Demonstrate how the interchangeability of parts increases the effectiveness of manufacturing processes.

Module 5	*COLOR CAM*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
	1.3.7	Recognize how technological progress has advanced science and mathematics.

Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.7	Debate ethical considerations important to the development, selection, and use of technologies.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.2	Use brainstorming as a group problem-solving design process.

Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.2	Specify criteria and constraints for the design.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.7	Identify criteria and constraints and determine how these will affect the design process.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.9	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.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.7	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.
	1.12.8	Operate systems to function as designed.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.

	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.1	Use mechanical processes related to manufacturing systems to change the form of materials (e.g. separating, forming, combining, conditioning, etc.).
	1.19.3	Explain how the manufacturing process includes designing, developing, making, and servicing products and systems.
	1.19.4	Use chemical technologies to modify or alter chemical substances.

Module 6	*CNC EMBROIDERY*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.

	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.6	Examine why technological ideas are sometimes protected through the process of patenting.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.

Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.8	Specify the development of tools and machines that are based on technological know-how rather than scientific knowledge.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.

Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.2	Use brainstorming as a group problem-solving design process.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.2	Differentiate between invention and innovation.
	1.10.3	Solve technological problems through experimentation.
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.
	1.10.6	Realize that all problems are not technological and not every problem can be solved using technology.
	1.10.7	Apply a multidisciplinary approach to solve technological problems.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.1	Apply a design process to solve problems in and beyond the laboratory-classroom.
	1.11.2	Specify criteria and constraints for the design.

	1.11.3	Make two-dimensional and three-dimensional representations of the designed solution.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.5	Make a product or system and document the solution.
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.3	Identify trends and monitor the potential consequences of technological development.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.

	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.2	Classify manufactured goods as durable and nondurable.
	1.19.3	Explain how the manufacturing process includes designing, developing, making, and servicing products and systems.
	1.19.5	Determine materials that can be located and removed by extraction processes (e.g. harvesting, drilling, mining, etc.).
	1.19.6	Market a product by informing the public about it as well as assisting in selling and distributing.
	1.19.7	Service products to maintain good operating condition.
	1.19.8	Classify how materials have different qualities (natural, synthetic, or mixed).
	1.19.9	Differentiate between durable and nondurable goods.
	1.19.10	Classify manufacturing systems (e.g. customized production, batch production, continuous production, etc.).
	1.19.11	Demonstrate how the interchangeability of parts increases the effectiveness of manufacturing processes.
	1.19.13	Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).

Module 7	***BIO TECH***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.

	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.7	Recognize how technological progress has advanced science and mathematics.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.

	1.5.2	Explore how technologies can be used to repair damage cause by natural disasters and to break down waste from the use of various products and systems.
	1.5.3	Investigate how decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.
	1.5.8	Recognize how humans devise technologies to reduce the negative consequences of other technologies.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.

Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.
	1.10.6	Realize that all problems are not technological and not every problem can be solved using technology.
	1.10.7	Apply a multidisciplinary approach to solve technological problems.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.1	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	1.13.3	Identify trends and monitor the potential consequences of technological development.
	1.13.5	Collect information and evaluate quality.
	1.13.6	Use assessment techniques to make decisions about the future development of technology.
Topic 1.14	**Relate medical technologies for selection and use.**	
	Student Competencies	
	1.14.1	Analyze advances and innovations in medical technologies used to improve healthcare.
	1.14.2	Explain how different sanitation processes used in the disposal of medical products help to protect people from harmful organisms and diseases and shape the ethics of medical safety.
	1.14.3	Understand how genetic engineering involves modifying the structure of DNA to produce novel genetic make-ups.
	1.14.4	Research medical technologies which protect and maintain health (e.g., prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)
	1.14.6	Examine how the sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.

Topic 1.15	Understand, select and use agricultural and related biotechnologies.	
	Student Competencies	
	1.15.1	Enumerate how the technological advances in agriculture directly affect the time and number of people required to produce food for a large population.
	1.15.3	Relate how biotechnology applies the principles of biology to create commercial products or processes.
	1.15.5	Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, genetic engineering, etc.).

Module 8	***SCIENCE WORKSHOPS/PROBES***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).

Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.7	Recognize how technological progress has advanced science and mathematics.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.

Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.1	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	1.13.5	Collect information and evaluate quality.
Topic 1.14	**Relate medical technologies for selection and use.**	
	Student Competencies	
	1.14.1	Analyze advances and innovations in medical technologies used to improve healthcare.
	1.14.2	Explain how different sanitation processes used in the disposal of medical products help to protect people from harmful organisms and diseases and shape the ethics of medical safety.
	1.14.4	Research medical technologies which protect and maintain health (e.g., prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.

	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Inform and communicate how systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).

Module 9	***CADD***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.4	Connect technological systems one to another.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.6	Examine why technological ideas are sometimes protected through the process of patenting.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.

Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)

Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.2	Differentiate between invention and innovation.
	1.10.5	Research solutions to technological problems.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.2	Specify criteria and constraints for the design.
	1.11.3	Make two-dimensional and three-dimensional representations of the designed solution.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.5	Make a product or system and document the solution.
	1.11.7	Identify criteria and constraints and determine how these will affect the design process.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.8	Operate systems to function as designed.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.6	Inform and communicate how systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.11	Demonstrate how the interchangeability of parts increases the effectiveness of manufacturing processes.

Module 10	***LASER***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.4	Connect technological systems one to another.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
	1.4.6	Make decisions about the use of technology by weighing the trade-offs between the positive and negative effects.

	1.4.7	Debate ethical considerations important to the development, selection, and use of technologies.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.2	Specify criteria and constraints for the design.
	1.11.5	Make a product or system and document the solution.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.7	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.4	Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
	1.13.5	Collect information and evaluate quality.
Topic 1.14	**Relate medical technologies for selection and use.**	
	Student Competencies	
	1.14.1	Analyze advances and innovations in medical technologies used to improve healthcare.
	1.14.4	Research medical technologies which protect and maintain health (e.g., prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)

Topic 1.17	Select and use information and communication technologies.	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.

Module 11	***ELECTRO***	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).

	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.
	1.5.2	Explore how technologies can be used to repair damage cause by natural disasters and to break down waste from the use of various products and systems.
	1.5.3	Investigate how decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.
	1.5.4	Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
	1.5.5	Determine considerations of trade-offs when new technologies are developed to reduce the use of resources.
	1.5.6	Monitor various aspects of the environment to provide information for decision-making with the aid of technology.
	1.5.7	Associate the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment.
	1.5.8	Recognize how humans devise technologies to reduce the negative consequences of other technologies.
	1.5.9	Relate how the decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.

	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.6	Check and critique the design to redefine and improve upon it.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.2	Use brainstorming as a group problem-solving design process.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.

	1.10.6	Realize that all problems are not technological and not every problem can be solved using technology.
	1.10.7	Apply a multidisciplinary approach to solve technological problems.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.1	Apply a design process to solve problems in and beyond the laboratory-classroom.
	1.11.2	Specify criteria and constraints for the design.
	1.11.3	Make two-dimensional and three-dimensional representations of the designed solution.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.5	Make a product or system and document the solution.
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.

	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).

Module 12	*PNEUMATICS/HYDRAULICS/MECHANICAL*	
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.4	Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.

Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.1	Apply a design process to solve problems in and beyond the laboratory-classroom.
	1.11.2	Specify criteria and constraints for the design.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.7	Identify criteria and constraints and determine how these will affect the design process.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.9	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.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.7	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.
	1.12.8	Operate systems to function as designed.
Topic 1.16	**Research and develop an understanding of how to select and use energy and power technologies.**	
	Student Competencies	
	1.16.1	Define energy as the ability to do work.
	1.16.2	Demonstrate that energy can be used to do work using many processes.
	1.16.3	Identify power as the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done.
	1.16.4	Show that power systems are used to drive and provide propulsion to other technological products and systems.
	1.16.5	Uncover how much of the energy use in our environment is not used efficiently.
	1.16.6	Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another.
	1.16.8	Illustrate how power systems must have a source of energy, a process, and loads.

Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
Topic 1.18	**Research and develop an understanding of how to select and use transportation technologies.**	
	Student Competencies	
	1.18.1	Identify that transporting people and goods involves a combination of individuals and vehicles.

Module 13	*AVIATION*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.

	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.1	Examine how the management of waste produced by technological systems is an important societal issue.

	1.5.3	Investigate how decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.
	1.5.4	Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
	1.5.5	Determine considerations of trade-offs when new technologies are developed to reduce the use of resources.
	1.5.6	Monitor various aspects of the environment to provide information for decision-making with the aid of technology.
	1.5.7	Associate the alignment of technological processes with natural processes to maximize performance and reduce negative impacts on the environment.
	1.5.8	Recognize how humans devise technologies to reduce the negative consequences of other technologies.
	1.5.9	Relate how the decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.

	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.8	Specify the development of tools and machines that are based on technological know-how rather than scientific knowledge.
	1.7.9	Review the important developments of history in technology during the Renaissance.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.
	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.15	**Understand, select and use agricultural and related biotechnologies.**	
	Student Competencies	
	1.15.1	Enumerate how the technological advances in agriculture directly affect the time and number of people required to produce food for a large population.
	1.15.2	Identify the wide range of specialized equipment and practices used to improve the production of food, fiber, fuel, and other useful products and in the care of animals.

	1.15.4	Classify the agricultural businesses using a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.
	1.15.5	Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, genetic engineering, etc.).
Topic 1.16	**Research and develop an understanding of how to select and use energy and power technologies.**	
	Student Competencies	
	1.16.4	Show that power systems are used to drive and provide propulsion to other technological products and systems.
	1.16.5	Uncover how much of the energy use in our environment is not used efficiently.
	1.16.7	Discuss how it is impossible to build an engine to perform work that does not exhaust thermal energy to the surroundings.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.18	**Research and develop an understanding of how to select and use transportation technologies.**	
	Student Competencies	
	1.18.1	Identify that transporting people and goods involves a combination of individuals and vehicles.
	1.18.2	Observe that transportation vehicles are made up of subsystems that must function together for a system to work

	1.18.3	Explain how governmental regulations often influence the design and operation of transportation systems. effectively (e.g., structural, propulsion, suspension, guidance, control, support, etc.).
	1.18.4	Examine how processes are necessary for the entire transportation system to operate efficiently (e.g. receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, using conventions, etc.).
	1.18.5	Relate how transportation plays a vital role in the operation of other technologies (e.g. manufacturing, construction, communication, health and safety, agriculture, etc.)
	1.18.6	Demonstrate how intermodalism uses different modes of transportation to move people and goods easily from one mode to another (e.g. highways, railways, and waterways as part of an interconnected system, etc.).
	1.18.7	Expand on how transportation services and methods have led to a population that is regularly on the move.

Module 14	*GPS*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.3	Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.7	Recognize the need for careful compromises among competing factors in the trade-off decision process.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.

	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.18	Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
Topic 1.5	**Investigate the effects of technology on the environment.**	
	Student Competencies	
	1.5.3	Investigate how decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.
	1.5.8	Recognize how humans devise technologies to reduce the negative consequences of other technologies.

	1.5.9	Relate how the decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.
	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.1	Investigate inventions and innovations that have evolved by using slow and methodical processes of tests and refinements.
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.

	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.1	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	1.13.2	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	1.13.3	Identify trends and monitor the potential consequences of technological development.
	1.13.5	Collect information and evaluate quality.
	1.13.6	Use assessment techniques to make decisions about the future development of technology.
Topic 1.15	**Understand, select and use agricultural and related biotechnologies.**	
	Student Competencies	
	1.15.1	Enumerate how the technological advances in agriculture directly affect the time and number of people required to produce food for a large population.
	1.15.2	Identify the wide range of specialized equipment and practices used to improve the production of food, fiber, fuel, and other useful products and in the care of animals.
	1.15.4	Classify the agricultural businesses using a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.
	1.15.5	Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, genetic engineering, etc.).
	1.15.6	Demonstrate how conservation practices control the environment (e.g. soil erosion, reduce sediment in waterways, conserve water, improve water quality, etc.).
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.

	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.
	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.18	**Research and develop an understanding of how to select and use transportation technologies.**	
	Student Competencies	
	1.18.1	Identify that transporting people and goods involves a combination of individuals and vehicles.
	1.18.5	Relate how transportation plays a vital role in the operation of other technologies (e.g. manufacturing, construction, communication, health and safety, agriculture, etc.)
	1.18.6	Demonstrate how intermodalism uses different modes of transportation to move people and goods easily from one mode to another (e.g. highways, railways, and waterways as part of an interconnected system, etc.).
	1.18.7	Expand on how transportation services and methods have led to a population that is regularly on the move.

Module 15	*DIGITAL EDITING*	
Topic 1.1	**Recognize the characteristics and scope of technology.**	
	Student Competencies	
	1.1.1	Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1.1.2	Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1.1.3	Discover how technology is closely linked to creativity which has resulted in innovation.
	1.1.4	Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1.1.5	Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1.1.6	Correlate the rate of technological development with diffusion which is increasing rapidly.
	1.1.7	Connect how inventions and innovations are the results of specific, goal-directed research.
	1.1.8	Explain why most development of technologies is driven by the profit motive and the market.
Topic 1.2	**Connect the core concepts of technology.**	
	Student Competencies	
	1.2.1	Model technological systems to include input, processes, output, and at times, feedback.
	1.2.2	Relate how systems thinking involves considering how every part relates to others.
	1.2.4	Connect technological systems one to another.
	1.2.5	Determine how malfunctions to any part of a system may affect the function and quality of the system.
	1.2.6	Identify and use the requirements of parameters placed on the development of a product or system.
	1.2.8	Connect how different technologies involve different sets of processes.
	1.2.9	Show how maintenance is a process of inspecting and servicing a product or system on a regular basis (in order for it to continue functioning properly, to extend its life, or to upgrade its capability).
	1.2.10	Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	1.2.11	Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	1.2.12	Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	1.2.13	Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).

	1.2.14	Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	1.2.15	Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	1.2.16	Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	1.2.17	Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	1.2.19	Explain how management is the process of planning, organizing, and controlling work.
	1.2.20	Examine complex systems that have many layers of controls and feedback loops to provide information.
Topic 1.3	**Interpret the relationships among technologies and the connections between technology and other fields of study.**	
	Student Competencies	
	1.3.1	Show how technological systems often interact with one another.
	1.3.2	Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	1.3.3	Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	1.3.5	Relate how technological innovation results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
	1.3.6	Examine why technological ideas are sometimes protected through the process of patenting.
Topic 1.4	**Predict cultural, social, economic, and political effects of technology.**	
	Student Competencies	
	1.4.1	Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	1.4.2	Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	1.4.3	Determine how the development and use of technology poses ethical issues.
	1.4.4	Identify economic, political, and cultural issues influenced by the development and use of technology.
	1.4.5	Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
Topic 1.6	**Examine the role of society in the development and use of technology.**	
	Student Competencies	
	1.6.1	Illustrate new technologies that have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
	1.6.2	Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.
	1.6.3	Summarize the social and cultural priorities and values reflected in technological devices.

	1.6.4	Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	1.6.5	Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
	1.6.6	Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
	1.6.7	Explain the different factors that contribute to shaping the design of and demand for various technologies (e.g. advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Topic 1.7	**Isolate the influences of technology on history.**	
	Student Competencies	
	1.7.2	Recognize that the specialization of function is at the heart of many technological improvements.
	1.7.3	Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
	1.7.4	Describe how invention or innovation was not always developed with the knowledge of science.
	1.7.5	Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	1.7.6	Report how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
	1.7.7	Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	1.7.8	Specify the development of tools and machines that are based on technological know-how rather than scientific knowledge.
	1.7.10	Evaluate technological developments of the Industrial Revolution (e.g., continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, improved education, and leisure time, etc.).
	1.7.11	Relate how the Information Age places emphasis on the processing and exchange of information.
Topic 1.8	**Explore the attributes of design.**	
	Student Competencies	
	1.8.1	Illustrate how design as a creative planning process leads to useful products and systems.
	1.8.2	Infer that there is no perfect design.
	1.8.3	Relate how requirements for a design are made up of criteria and constraints.
	1.8.4	Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	1.8.5	Analyze why design problems are seldom presented in a clearly defined form.

	1.8.6	Check and critique the design to redefine and improve upon it.
	1.8.7	Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Topic 1.9	**Integrate engineering design.**	
	Student Competencies	
	1.9.1	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	1.9.2	Use brainstorming as a group problem-solving design process.
	1.9.3	Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	1.9.4	Distinguish how engineering design is influenced by personal characteristics (e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
Topic 1.10	**Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.**	
	Student Competencies	
	1.10.1	Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	1.10.3	Solve technological problems through experimentation.
	1.10.4	Incorporate research and development as a specific problem-solving approach.
	1.10.5	Research solutions to technological problems.
	1.10.6	Realize that all problems are not technological and not every problem can be solved using technology.
	1.10.7	Apply a multidisciplinary approach to solve technological problems.
Topic 1.11	**Implement the design process.**	
	Student Competencies	
	1.11.1	Apply a design process to solve problems in and beyond the laboratory-classroom.
	1.11.2	Specify criteria and constraints for the design.
	1.11.3	Make two-dimensional and three-dimensional representations of the designed solution.
	1.11.4	Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	1.11.5	Make a product or system and document the solution.
	1.11.6	Recommend a design problem to solve and decide whether or not to address it.
	1.11.8	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.
	1.11.10	Develop and produce a product or system using a design process.
Topic 1.12	**Use and maintain technological products and systems.**	
	Student Competencies	
	1.12.1	Utilize information provided in manuals, protocols, or by experienced people to see and understand how things work.

	1.12.2	Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	1.12.3	Incorporate computers and calculators in various applications.
	1.12.4	Maintain and operate systems in order to achieve a given purpose.
	1.12.5	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	1.12.6	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	1.12.8	Operate systems to function as designed.
Topic 1.13	**Assess the impact of products and systems**	
	Student Competencies	
	1.13.1	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	1.13.2	Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.
	1.13.3	Identify trends and monitor the potential consequences of technological development.
	1.13.4	Interpret and evaluate the accuracy of the information obtained and determine if it is useful.
	1.13.5	Collect information and evaluate quality.
	1.13.6	Use assessment techniques to make decisions about the future development of technology.
Topic 1.17	**Select and use information and communication technologies.**	
	Student Competencies	
	1.17.1	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
	1.17.2	Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
	1.17.3	Interpret how the design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.
	1.17.4	Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
	1.17.5	Demonstrate the inputs, processes, and outputs associated with sending and receiving information.
	1.17.6	Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.
	1.17.7	Develop information and communication systems that can be used to inform, persuade, entertain, control, manage, and educate.
	1.17.8	Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	1.17.9	Integrate ways to communicate information.

	1.17.10	Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Topic 1.19	**Understand, select and use manufacturing technologies.**	
	Student Competencies	
	1.19.6	Market a product by informing the public about it as well as assisting in selling and distributing.
	1.19.7	Service products to maintain good operating condition.
	1.19.9	Differentiate between durable and nondurable goods.
	1.19.11	Demonstrate how the interchangeability of parts increases the effectiveness of manufacturing processes.
	1.19.13	Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).