Technology Engineering and Design Education

**Grade:** Grade 6 - 8

**Course:** Technological Systems

- **NCCTE.TE02** - Technological Systems
  - **NCCTE.TE02.01.00** - Technological Systems: How They Work
  - **NCCTE.TE02.02.00** - Technological Systems: Issues and Impacts
  - **NCCTE.TE02.03.00** - Technological System Interaction
  - **NCCTE.TE02.04.00** - Maintaining Technological Systems
  - **NCCTE.TE02.05.00** - Technological Systems in the Designed World

**Course:** Technology Design and Innovation

- **NCCTE.TE01** - Technology Design and Innovation
  - **NCCTE.TE01.101.00** - Semester One: Meet Technology
  - **NCCTE.TE01.102.00** - Semester One: Practicing Design
  - **NCCTE.TE01.103.00** - Semester One: Project revive
  - **NCCTE.TE01.201.00** - Semester Two: Introduction to Invention and Innovation
  - **NCCTE.TE01.202.00** - Semester Two: The Engineering Design Process
  - **NCCTE.TE01.203.00** - Semester Two: Invention and Innovation of the Designed World
  - **NCCTE.TE01.204.00** - Semester Two: Design and Creativity
  - **NCCTE.TE01.205.00** - Semester Two: Technology and Society

**Grade:** Grade 9 - 12

**Course:** Technology Engineering and Design

- **NCCTE.2015.TE11** - Technology Engineering and Design
  - **NCCTE.2015.TE11.01.00** - Technological Innovations and Inventions: Understand that most inventions and innovations are the result of an evolutionary process and how a series of refinements leads to an improvement in a technological device.
    - **NCCTE.2015.TE11.01.01** - Understand that most inventions and innovations are the result of an evolutionary process.
    - **NCCTE.2015.TE11.01.02** - Understand how new technologies are used to create new processes and products.
    - **NCCTE.2015.TE11.01.03** - Classify the factors that impact the demand and design of technology.
    - **NCCTE.2015.TE11.01.04** - Explain the research and development process as a problem-solving approach.
NCCTE.2015.TE11.02.00 - History of Technology: Explain how technology changes history.

NCCTE.2015.TE11.02.01 - Analyze the historic significance and interaction of technological advancements within society and the environment.

NCCTE.2015.TE11.02.02 - Understand the evolutionary process of technological development throughout history.

NCCTE.2015.TE11.03.00 - Systems: Apply the Universal Systems Model to troubleshoot technological systems

NCCTE.2015.TE11.03.01 - Differentiate the nine core technologies and their relationship within larger systems and products.

NCCTE.2015.TE11.03.02 - Analyze a functional system using the Universal Systems Model.

NCCTE.2015.TE11.03.03 - Analyze the function of a product by reverse engineering.

NCCTE.2015.TE11.03.04 - Apply procedures to troubleshoot a product and create a diagram and/or simulation.

NCCTE.2015.TE11.04.00 - Design: Analyze the Engineering Design process as a systematic, iterative problem solving method that produces solutions to meet human wants and desires.

NCCTE.2015.TE11.04.01 - Apply design principles when generating solutions to problems.

NCCTE.2015.TE11.04.02 - Apply the Engineering Design Process to produce solutions to problems

NCCTE.2015.TE11.04.03 - Interpret criteria and constraints to develop solutions to problems.

NCCTE.2015.TE11.04.04 - Apply procedures to construct models that meet design solutions.

NCCTE.2015.TE11.04.05 - Analyze data used in the engineering design process.

NCCTE.2015.TE11.04.06 - Propose an engineering design solution to the intended audience.

NCCTE.2015.TE11.05.00 - The Designed World: Analyze technology relationships to the designed world

NCCTE.2015.TE11.05.01 - Analyze energy and power systems.

NCCTE.2015.TE11.05.02 - Analyze types of manufacturing and the properties of materials problems.

NCCTE.2015.TE11.05.03 - Classify the types of construction and the factors that affect the design of structures.

NCCTE.2015.TE11.05.04 - Classify information and communication systems and their interaction with society.

NCCTE.2015.TE11.05.05 - Explain the relationship between agriculture and transportation.

NCCTE.2015.TE11.05.06 - Explain the technologies integrated in telemedicine.

NCCTE.TE11 - Technology Engineering and Design

NCCTE.TE11.01.00 - Understand that most inventions and innovations are the result of an evolutionary process and how a series of refinements leads to an improvement in a technological device.

NCCTE.TE11.02.00 - Explain how technology changes history.

NCCTE.TE11.03.00 - Apply the Universal Systems Model to troubleshoot technological systems.

NCCTE.TE11.04.00 - Analyze the Engineering Design process as a systematic, iterative problem solving method that produces solutions to meet human wants and desires.

NCCTE.TE11.05.00 - Analyze Technology Relationships to the Designed World.
Course: Technological Design

NCCTE.2015.TE12 - Technological Design

NCCTE.2015.TE12.01.00 - Introduction to Technological Design: Understand a STEM approach to understanding research methods in a global society to create a well-informed, creative, innovative, technologically literate citizen.
  - NCCTE.2015.TE12.01.01 - Understanding emerging technologies.
  - NCCTE.2015.TE12.01.02 - Evaluate fundamentals of STEM.
  - NCCTE.2015.TE12.01.03 - Understand research, design and development.
  - NCCTE.2015.TE12.01.04 - Evaluate universal design.

NCCTE.2015.TE12.02.00 - Technological Design Skills: Apply a management process to plan, design, create and analyze to refine a product through modeling.
  - NCCTE.2015.TE12.02.01 - Understanding and interpret the impact of product design and development.
  - NCCTE.2015.TE12.02.02 - Apply the Design Process.
  - NCCTE.2015.TE12.02.03 - Create using models and plans.

NCCTE.2015.TE12.03.00 - Technological Design Fundamentals: Apply Systems Thinking and the Universal Systems Model to meet criteria and constraints.
  - NCCTE.2015.TE12.03.01 - Apply systems thinking through compromise and optimization by analyzing a system.
  - NCCTE.2015.TE12.03.02 - Evaluate communication systems.
  - NCCTE.2015.TE12.03.03 - Assess complex systems thinking.
  - NCCTE.2015.TE12.03.04 - Understand patents, criteria, constraints and other design requirements.

NCCTE.2015.TE12.04.00 - Technology and Society: Understand the effects of the use of technology on society and the environment include consequences that can have both positive and negative impacts.
  - NCCTE.2015.TE12.04.01 - Discover technology trade-offs and transfers.
  - NCCTE.2015.TE12.04.02 - Examine how technology impacts the community.
  - NCCTE.2015.TE12.04.03 - Evaluate how technology impacts the environment.

NCCTE.2015.TE12.05.00 - The Designed World: Apply the areas of the Design World using the engineering design process to plan, organize, develop and control productivity to maximize efficiency.
  - NCCTE.2015.TE12.05.01 - Analyze types of bio-related and agricultural technologies.
  - NCCTE.2015.TE12.05.02 - Analyze types of energy, power and transportation.
  - NCCTE.2015.TE12.05.03 - Maximize resources in lean manufacturing.
  - NCCTE.2015.TE12.05.04 - Design using sustainable construction procedures.

NCCTE.TE12 - Technological Design

NCCTE.TE12.01.00 - Understand Technological Design.
  - NCCTE.TE12.01.01 - Describe how the nature and development of technological knowledge and processes are functions of the setting.
  - NCCTE.TE12.01.02 - Describe changes in the body of scientific knowledge that are small modifications of prior knowledge.

NCCTE.TE12.02.00 - Apply Technological Design skills and Concepts.
  - NCCTE.TE12.02.01 - Give an example of a design problem that is not clearly defined.
  - NCCTE.TE12.02.02 - Define a prototype as a working model used to test a design concept.
NCCTE.TE12.02.03 - Fabricate a prototype to test a design concept by making actual observations and necessary adjustments.

NCCTE.TE12.03.00 - Understand Technological Design Fundamentals.
- NCCTE.TE12.03.01 - Recall that systems thinking requires logic, creativity, and compromise.
- NCCTE.TE12.03.02 - Apply systems thinking with appropriate compromises to solve complex real-life problems.
- NCCTE.TE12.03.03 - Implement mathematical modeling in engineering design to simulate how a proposed system might behave.
- NCCTE.TE12.03.04 - Define a system by specifying its boundaries and sub-systems, its relationship to other systems, and identifying its inputs and outputs.
- NCCTE.TE12.03.05 - Describe the components of a system, especially those in the feedback loop that affect the stability of a technological system.
- NCCTE.TE12.03.06 - Explain that fully automatic systems require human control at some point.
- NCCTE.TE12.03.07 - Explain that the stability of a system can be greater with the appropriate feedback mechanisms.
- NCCTE.TE12.03.08 - Specify requirements of a product or system that involve the identification of criteria and constraints.
- NCCTE.TE12.03.09 - Determine how criteria and constraints affect the final design and development of a product or system.
- NCCTE.TE12.03.10 - Distinguish between the various layers of controls and feedback loops that provide information in complex systems.
- NCCTE.TE12.03.11 - Explain that complex systems have layers of controls that operate particular parts of a system or control other controls that operate parts of the system.
- NCCTE.TE12.03.12 - Explain that the more parts and connections a system has, the more ways it can go wrong.
- NCCTE.TE12.03.13 - Describe components of a complex system that detect, back up, bypass, or compensate for minor failures.
- NCCTE.TE12.03.14 - Describe the patenting process and its importance to the development of products and services.
- NCCTE.TE12.03.15 - Determine the social and economic forces that influence how a given technology will be developed and used.
- NCCTE.TE12.03.16 - Demonstrate the process of checking, critiquing, redefining, and improving design ideas.
- NCCTE.TE12.03.17 - Describe a situation where the requirements of a design, such as criteria, constraints, and efficiency compete with each other.
- NCCTE.TE12.03.18 - Explain that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
- NCCTE.TE12.03.19 - Communicate technological knowledge and processes using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.
- NCCTE.TE12.03.20 - Write equivalent forms of equations, inequalities and systems of equations and solve them with fluency - mentally or with paper and pencil and simple cases and using technology in all cases.
- NCCTE.TE12.03.21 - Use symbolic algebra to represent and explain mathematical relationships.

NCCTE.TE12.04.00 - Understand the Relationship Between Technology and Society.
NCCTE.TE12.04.01 - Compare trade-offs between competing values such as availability, cost, desirability, and waste, when selecting resources to solve technological problems.

NCCTE.TE12.04.02 - Consider key questions that arise concerning possible alternatives such as who benefits and who suffers, financial and social costs, possible risks, resources used, and waste disposal when deciding on proposals to introduce new technologies or curtail existing ones.

NCCTE.TE12.04.03 - Explain that benefits and costs of proposed choices include consequences that are long-term as well as short-term and indirect as well as direct.

NCCTE.TE12.04.04 - Provide examples of technology transfer occurring when a new user applies an existing innovation developed for one purpose in a different function.

NCCTE.TE12.04.05 - Provide examples of technological innovation resulting when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.

NCCTE.TE12.04.06 - Identify innovations in mathematics that presented new problems to be solved that were the results of developments in science or technology.

NCCTE.TE12.04.07 - Identify new scientific knowledge that is the result of technological problems and advances.

NCCTE.TE12.04.08 - Identify technological problems and advances that are the results of new scientific knowledge.

NCCTE.TE12.04.09 - Distinguish between ethical considerations that are important in the development, selection, and use of technologies.

NCCTE.TE12.04.10 - Analyze the risks to society posed by scientific research and the scientist's decision whether to continue the research based on personal as well as professional ethics.

NCCTE.TE12.04.11 - Compare the advantages and disadvantages between various trade-offs that must be considered when new technologies, such as increased production vs. environmental harm in agriculture, are developed.

NCCTE.TE12.04.12 - Devise technologies to reduce the negative impacts of other technologies.

NCCTE.TE12.04.13 - Consider societal opinions and demands in addition to corporate culture when deciding whether or not to develop certain technologies.

NCCTE.TE12.04.14 - Recognize that technology usually affects society more directly than science does because technology solves practical problems and serves human needs.

NCCTE.TE12.04.15 - Recognize that science affects society by stimulating and satisfying people's curiosity and challenging their views of what the world is like.

NCCTE.TE12.05.00 - Understand the Designed World.

NCCTE.TE12.05.01 - Develop and produce a product or system using a design process.

NCCTE.TE12.05.02 - Demonstrate knowledge of artificial ecosystems and the effects of technological development on flora and fauna through engineering design and management of agricultural systems.

NCCTE.TE12.05.03 - Classify energy resources as renewable or nonrenewable.

NCCTE.TE12.05.04 - Distinguish between the source of energy, the process, and the load of a power system.

NCCTE.TE12.05.05 - Compare the processes and innovative techniques used in the design of intelligent and non-intelligent transportation systems.

NCCTE.TE12.05.06 - Classify goods as durable or non-durable depending on the amount of time they have been designed to operate.

NCCTE.TE12.05.07 - Describe an historical event where the interchangeability of parts increased the effectiveness of the manufacturing process.

NCCTE.TE12.05.08 - Describe a number of requirements that determines the design of structures.

NCCTE.TE12.05.09 - Describe prefabricated materials that are used in the construction of structures.
Course: Engineering Design

NCCTE.2015.TE13 - Engineering Design

NCCTE.2015.TE13.01.00 - Fundamentals of Engineering Design: Understand the fundamental principles which impact human thinking and actions when engaged in the process of designing technological products.
  
  NCCTE.2015.TE13.01.01 - Understand how Human Factors impact Design.
  NCCTE.2015.TE13.01.02 - Understand how Environmental Factors impact Design.
  NCCTE.2015.TE13.01.03 - Understand how Industrial Factors impact Design.
  NCCTE.2015.TE13.01.04 - Understand and Apply Research techniques and tools.
  NCCTE.2015.TE13.01.05 - Analyze Market and Profit Influence.
  NCCTE.2015.TE13.01.06 - Apply the Engineering Design Process.
  NCCTE.2015.TE13.01.07 - Identify and Prioritize Design Constraints.

NCCTE.2015.TE13.02.00 - Elements of Design: Apply scientific concepts and mathematical calculations used by engineers and designers for specific applications in Design.
  
  NCCTE.2015.TE13.02.01 - Apply critical factors that lead to design improvements.
  NCCTE.2015.TE13.02.02 - Evaluate design requirements to obtain an optimum solution.
  NCCTE.2015.TE13.02.03 - Analyze the 9 Core Technologies.
  NCCTE.2015.TE13.02.04 - Evaluate competing design values to optimize critical decisions.

NCCTE.2015.TE13.03.00 - Modeling, Prototyping, and Protecting Ideas: Apply structured design concepts to solve diverse engineering problems.
  
  NCCTE.2015.TE13.03.01 - Analyze diverse examples of Technology Transfer.
  NCCTE.2015.TE13.03.02 - Understand the importance of the Patent Process
  NCCTE.2015.TE13.03.03 - Apply Engineering Resources to solve specific design problems.
  NCCTE.2015.TE13.03.04 - Apply Material Science concepts.
  NCCTE.2015.TE13.03.05 - Evaluate the role of creativity in diverse design activities.
  NCCTE.2015.TE13.03.06 - Understand patents, criteria, constraints and other design requirements.

NCCTE.2015.TE13.04.00 - Product, Systems Engineering and Analysis Management: Apply project management through the Engineering Design Process.
  
  NCCTE.2015.TE13.04.01 - Apply contemporary project management.
  NCCTE.2015.TE13.04.02 - Apply a quality assurance methods to ensure optimum performance.
  NCCTE.2015.TE13.04.03 - Evaluate the results of the Engineering Design Process.

NCCTE.TE13 - Engineering Design

NCCTE.TE13.01.00 - Understand Fundamentals of Engineering Design.
  
  NCCTE.TE13.01.01 - Relate the nature of scientific discovery and the development of technological knowledge, products and systems.
  NCCTE.TE13.01.02 - Explain the nature of engineering design including the concept of ill-structured problem solving.
  NCCTE.TE13.01.03 - Contrast between the requirements of an engineering design, such as criteria, constraints, and efficiency, and describe how they sometimes compete with each other.
  NCCTE.TE13.01.04 - Apply logic and creativity with appropriate compromises in complex engineering problems.
  NCCTE.TE13.01.05 - Explain how the stability of a technological system is influenced by all of the components in the system, especially those in the feedback loop.
NCCTE.TE13.01.06 - Develop and produce a product or system using a design process.
NCCTE.TE13.01.07 - Explain how the identification of the criteria and constraints of a product or system affect the final design and development.
NCCTE.TE13.01.08 - Summarize how optimization is used as an ongoing process or methodology for designing or making a product and is dependent on criteria and constraints.
NCCTE.TE13.01.09 - Describe how humans devise technologies to reduce the negative consequences of other technologies.
NCCTE.TE13.01.10 - Predict how new technologies create the need for new processes.
NCCTE.TE13.01.11 - Compare and contrast between the competing influences of social, cultural, and corporate pressures on the development of new technological systems and products.
NCCTE.TE13.01.12 - Differentiate between renewable and nonrenewable energy resources as a source of material for new technological products and systems.
NCCTE.TE13.01.13 - Demonstrate the ability to apply the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
NCCTE.TE13.01.14 - Demonstrate the ability to use creativity, resourcefulness, and the ability to visualize and think abstractly.
NCCTE.TE13.01.15 - Identify technological products that utilize thermal, radiant, electrical, mechanical, chemical, and nuclear energy systems and differentiate between them.
NCCTE.TE13.01.16 - Demonstrate the ability to apply the process of engineering design while taking into account a number of related factors.

NCCTE.TE13.02.00 - Apply Elements of Design Concepts.
NCCTE.TE13.02.01 - Demonstrate the ability to apply the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
NCCTE.TE13.02.02 - Justify how humans devise technologies to reduce the negative consequences of other technologies.
NCCTE.TE13.02.03 - Summarize the consideration of resource reduction and tradeoffs in an engineering design project.
NCCTE.TE13.02.04 - Describe how the resources used to create a technological device or system involves trade-offs between competing values, such as availability, cost, desirability, and waste.
NCCTE.TE13.02.05 - Develop and produce a product or system using a design process.
NCCTE.TE13.02.06 - Demonstrate how optimization is used as an ongoing process or methodology for designing or making a product and is dependent on criteria and constraints.
NCCTE.TE13.02.07 - Demonstrate the ability to apply the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
NCCTE.TE13.02.08 - Use established design principles to evaluate existing designs, to collect data, and to guide the design process.
NCCTE.TE13.02.09 - Defend ethical considerations and decisions made during the development of
NCCTE.TE13.02.10 - Critique the role the transfer of a technology from one society to another played in causing cultural, social, economic, and political changes affecting both societies to varying degrees.
NCCTE.TE13.02.11 - Demonstrate the ability to apply the process of engineering design while taking into account a number of related factors.
NCCTE.TE13.02.12 - Demonstrate how the interchangeability of parts increased the effectiveness of manufacturing processes using a small manufactured product as a model.

NCCTE.TE13.03.00 - Understand Engineering Design Processes. (Structural Design: Modeling, Prototyping and Protecting Ideas)
NCCTE.TE13.03.01 - Compare the methods used to protect intellectual and technological property including patents, trademarks, and copyrights; and, prepare samples.
NCCTE.TE13.03.02 - Critique an engineering design product or system by redefining and improving the idea.
NCCTE.TE13.03.03 - Develop and produce a product or system using a design process.
NCCTE.TE13.03.04 - Select appropriate power systems for use in engineering design solutions.
NCCTE.TE13.03.05 - Demonstrate the ability to apply the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
NCCTE.TE13.03.06 - Test an engineering design concept by constructing a prototype as a working model and making observations and necessary adjustments.
NCCTE.TE13.03.07 - Select durable and non-durable goods to produce appropriate solutions to engineering design problems.
NCCTE.TE13.03.08 - Explain the requirements needed to design a structure.
NCCTE.TE13.03.09 - Communicate and summarize the results of a model designed to solve a given engineering design problem using graphic and electronic means.
NCCTE.TE13.03.10 - Use prefabricated materials to construct products.

NCCTE.TE13.04.00 - Understand Production and Systems Engineering and Analysis.
NCCTE.TE13.04.01 - Identify quality control mechanisms in a planned process to ensure that a product, service, or system meets established criteria.
NCCTE.TE13.04.02 - Manage an engineering design project by using the processes of planning, organizing, and controlling work.
NCCTE.TE13.04.03 - Explain technological control systems and feedback loops used to provide information during technological design application.
NCCTE.TE13.04.04 - Demonstrate the ability to apply the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.
NCCTE.TE13.04.05 - Communicate using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.
NCCTE.TE13.04.06 - Prepare a manufacturing plan for a model or prototype and identify the appropriate manufacturing method needed to efficiently product quantities of the finished product or system.
NCCTE.TE13.04.07 - 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.

NCCTE.TE13.04.08 - Demonstrate technology transfer by applying an existing innovation developed for one purpose in a different function.

NCCTE.TE13.04.09 - Develop and produce a product or system using a design process.

NCCTE.TE13.04.10 - Illustrate how technological ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields through technological innovation.

NCCTE.TE13.04.11 - Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

NCCTE.TE13.04.12 - Predict the future role of technology in the creation of artificial ecosystems for humans and animals.

Course: Principles of Technology I

NCCTE.TE21 - Principles of Technology I

NCCTE.TE21.01.00 - Analyze and apply the concept of forces in mechanical systems.
  NCCTE.TE21.01.01 - Evaluate the effects of balanced and unbalanced forces.
  NCCTE.TE21.01.02 - Use laboratory equipment to solve mechanical problems.

NCCTE.TE21.02.00 - Analyze and apply the concept of pressure in fluid systems.
  NCCTE.TE21.02.01 - Evaluate the effects of fluid pressure.
  NCCTE.TE21.02.02 - Use laboratory equipment to solve fluid pressure problems.

NCCTE.TE21.03.00 - Analyze and apply the concept of voltage in electrical systems.
  NCCTE.TE21.03.01 - Evaluate the effects of voltage difference.
  NCCTE.TE21.03.02 - Use laboratory equipment to solve voltage problems.

NCCTE.TE21.04.00 - Analyze and apply the concept of force in thermal systems.
  NCCTE.TE21.04.01 - Evaluate the effects of temperature difference.
  NCCTE.TE21.04.02 - Use laboratory equipment to solve problems in thermal systems.

NCCTE.TE21.05.00 - Analyze and apply the concept of work in mechanical systems.
  NCCTE.TE21.05.01 - Evaluate relationships between force and distance.
  NCCTE.TE21.05.02 - Use laboratory equipment to solve mechanical work problems.

NCCTE.TE21.06.00 - Analyze and apply the concept of work in fluid systems.
  NCCTE.TE21.06.01 - Evaluate relationships between pressure and volume.
  NCCTE.TE21.06.02 - Use laboratory equipment to solve fluid work problems.

NCCTE.TE21.07.00 - Analyze and apply the concept of work in electrical systems.
  NCCTE.TE21.07.01 - Evaluate relationships between voltage and charge.
  NCCTE.TE21.07.02 - Use laboratory equipment to solve electrical work problems.

NCCTE.TE21.08.00 - Analyze and apply the concept of rate in mechanical systems.
  NCCTE.TE21.08.01 - Evaluate relationships between distance and time.
  NCCTE.TE21.08.02 - Use laboratory equipment to solve mechanical rate problems.
NCCTE.TE21.09.00 - Analyze and apply the concept of rate in fluid systems.  
   NCCTE.TE21.09.01 - Evaluate relationships between volume flow and time.  
   NCCTE.TE21.09.02 - Use laboratory equipment to solve fluid rate problems.

NCCTE.TE21.10.00 - Analyze and apply the concept of rate in electrical systems.  
   NCCTE.TE21.10.01 - Evaluate relationships between charge moved and time.  
   NCCTE.TE21.10.02 - Use laboratory equipment to solve electrical rate problems.

NCCTE.TE21.11.00 - Analyze and apply the concept of rate in thermal systems.  
   NCCTE.TE21.11.01 - Evaluate relationships between heat flow and time.  
   NCCTE.TE21.11.02 - Use laboratory equipment to solve thermal rate problems.

NCCTE.TE21.12.00 - Analyze and apply the concept of resistance in mechanical systems.  
   NCCTE.TE21.12.01 - Evaluate the effects of friction and drag in mechanical systems.  
   NCCTE.TE21.12.02 - Use laboratory equipment to solve mechanical resistance problems.

NCCTE.TE21.13.00 - Analyze and apply the concept of resistance in fluid systems.  
   NCCTE.TE21.13.01 - Evaluate the effects of fluid resistance.  
   NCCTE.TE21.13.02 - Use laboratory equipment to solve fluid resistance problems.

NCCTE.TE21.14.00 - Analyze and apply the concept of resistance in electrical systems.  
   NCCTE.TE21.14.01 - Evaluate the effects of electrical resistance.  
   NCCTE.TE21.14.02 - Use laboratory equipment to solve electrical resistance problems.

NCCTE.TE21.15.00 - Analyze and apply the concept of resistance in thermal systems.  
   NCCTE.TE21.15.01 - Evaluate the effects of thermal resistance and conductivity.  
   NCCTE.TE21.15.02 - Use laboratory equipment to solve thermal resistance problems.

NCCTE.TE21.16.00 - Analyze and apply the concept of potential energy in mechanical and fluid systems.  
   NCCTE.TE21.16.01 - Evaluate the effects of potential energy.  
   NCCTE.TE21.16.02 - Use laboratory equipment to solve potential energy problems.

NCCTE.TE21.17.00 - Analyze and apply the concept of kinetic energy in mechanical and fluid systems.  
   NCCTE.TE21.17.01 - Evaluate the effects of kinetic energy.  
   NCCTE.TE21.17.02 - Use laboratory equipment to solve kinetic energy problems.

NCCTE.TE21.18.00 - Analyze and apply the concept of potential energy in electrical systems.  
   NCCTE.TE21.18.01 - Evaluate the effect of capacitance and inductance.  
   NCCTE.TE21.18.02 - Use laboratory equipment to solve electrical energy problems.

NCCTE.TE21.19.00 - Analyze and apply the concept of energy in thermal systems.  
   NCCTE.TE21.19.01 - Evaluate the effects of heat and energy transfer.  
   NCCTE.TE21.19.02 - Use laboratory equipment to solve thermal energy problems.

NCCTE.TE21.20.00 - Analyze and apply the concept of power in mechanical systems.  
   NCCTE.TE21.20.01 - Evaluate the effects of mechanical power applications.  
   NCCTE.TE21.20.02 - Use laboratory equipment to solve mechanical power problems.
NCCTE.TE21.21.00 - Analyze and apply the concept of power in fluid systems.
   NCCTE.TE21.21.01 - Evaluate the effects of fluid power applications.
   NCCTE.TE21.21.02 - Use laboratory equipment to solve fluid power problems.

NCCTE.TE21.22.00 - Analyze and apply the concept of power in electrical systems.
   NCCTE.TE21.22.01 - Evaluate the effects of electrical power applications.
   NCCTE.TE21.22.02 - Use laboratory equipment to solve electrical power problems.

Course: Principles of Technology II

NCCTE.TE22 - Principles of Technology II
   NCCTE.TE22.01.00 - Analyze and apply the concept of force transformers in linear mechanical systems.
      NCCTE.TE22.01.01 - Evaluate inputs and outputs of linear mechanical force transformers.
      NCCTE.TE22.01.02 - Use laboratory equipment to solve linear mechanical force transformer problems.

   NCCTE.TE22.02.00 - Analyze and apply the concept of force transformer in rotational mechanical systems.
      NCCTE.TE22.02.01 - Evaluate inputs and outputs of rotational mechanical force transformers.
      NCCTE.TE22.02.02 - Use laboratory equipment to solve rotational mechanical force transformer problems.

   NCCTE.TE22.03.00 - Analyze and apply the concept of force transformers in fluid systems.
      NCCTE.TE22.03.01 - Evaluate inputs and outputs of fluid force transformers.
      NCCTE.TE22.03.02 - Use laboratory equipment to solve fluid force transformer problems.

   NCCTE.TE22.04.00 - Analyze and apply the concept of force transformer in electricity systems.
      NCCTE.TE22.04.01 - Evaluate inputs and outputs of electrical force transformers.
      NCCTE.TE22.04.02 - Use laboratory equipment to solve electrical force transformer problems.

   NCCTE.TE22.05.00 - Analyze and apply the concept of linear momentum.
      NCCTE.TE22.05.01 - Evaluate relationships between linear momentum and impulse.
      NCCTE.TE22.05.02 - Use laboratory equipment to solve linear momentum and impulse problems.

   NCCTE.TE22.06.00 - Analyze and apply the concept of angular momentum.
      NCCTE.TE22.06.01 - Evaluate relationships between angular momentum and impulse.
      NCCTE.TE22.06.02 - Use laboratory equipment to solve angular momentum and impulse problems.

   NCCTE.TE22.07.00 - Analyze and apply the concept involving the characteristics of waves.
      NCCTE.TE22.07.01 - Evaluate wave form characteristics.
      NCCTE.TE22.07.02 - Use laboratory equipment to solve wave problems.

   NCCTE.TE22.08.00 - Analyze and apply the concept involving the applications of waves and vibrations.
      NCCTE.TE22.08.01 - Evaluate the effects of waves and vibrations.
      NCCTE.TE22.08.02 - Use laboratory equipment to solve wave application problems.

   NCCTE.TE22.09.00 - Analyze and apply the concepts of energy conversions.
      NCCTE.TE22.09.01 - Evaluate mechanical energy conversion.
      NCCTE.TE22.09.02 - Use laboratory equipment to solve mechanical energy conversion problems.
NCCTE.TE22.10.00 - Analyze and apply the concepts of energy conversion in fluid energy systems.
   NCCTE.TE22.10.01 - Evaluate fluid energy conversion.
   NCCTE.TE22.10.02 - Use laboratory equipment to solve fluid energy conversion problems.

NCCTE.TE22.11.00 - Analyze and apply the concept of energy conversion in electrical systems.
   NCCTE.TE22.11.01 - Evaluate electrical energy conversion.
   NCCTE.TE22.11.02 - Use laboratory equipment to solve electrical energy conversion problems.

NCCTE.TE22.12.00 - Analyze and apply the concepts of energy conversion in thermal energy systems.
   NCCTE.TE22.12.01 - Evaluate thermal energy conversion.
   NCCTE.TE22.12.02 - Use laboratory equipment to solve thermal energy conversion problems.

NCCTE.TE22.13.00 - Analyze and apply the concept of transducers in mechanical systems.
   NCCTE.TE22.13.01 - Evaluate the application of mechanical transducers.
   NCCTE.TE22.13.02 - Use transducers to solve mechanical problems.

NCCTE.TE22.14.00 - Analyze and apply the concept of transducers in fluid systems.
   NCCTE.TE22.14.01 - Evaluate fluid transducers.
   NCCTE.TE22.14.02 - Use transducers to solve fluid problems.

NCCTE.TE22.15.00 - Analyze and apply the concepts of transducers in electrical systems.
   NCCTE.TE22.15.01 - Evaluate electrical transducers.
   NCCTE.TE22.15.02 - Use transducers to solve electrical problems.

NCCTE.TE22.16.00 - Analyze and apply the concept of transducers in thermal systems.
   NCCTE.TE22.16.01 - Evaluate thermal transducers.
   NCCTE.TE22.16.02 - Use transducers to solve thermal problems.

NCCTE.TE22.17.00 - Analyze and apply the concept of radiation.
   NCCTE.TE22.17.01 - Explore the characteristics of electromagnetic radiation.
   NCCTE.TE22.17.02 - Explore the characteristics of nuclear radiation.

NCCTE.TE22.18.00 - Analyze and apply the concepts of light and optic systems.
   NCCTE.TE22.18.01 - Evaluate light reflection and refraction.
   NCCTE.TE22.18.02 - Evaluate interference and diffraction.
   NCCTE.TE22.18.03 - Evaluate the effects of laser light.
   NCCTE.TE22.18.04 - Evaluate the effects of optical systems.

NCCTE.TE22.19.00 - Analyze and apply the concept of time constants.
   NCCTE.TE22.19.01 - Explore time constants in the mechanical and fluid energy systems.
   NCCTE.TE22.19.02 - Explore time constants in the electrical and thermal energy systems.

NCCTE.TE22.20.00 - Develop presentation on the concepts of radiation, light and optics, or time constants.
   NCCTE.TE22.20.01 - Use laboratory equipment to solve problems in radiation, light and optics, or time constants.
   NCCTE.TE22.20.02 - Present lecture and demonstration on the concepts of radiation, light and optics,
or time constants.

Course: Scientific and Technical Visualization I

**NCCTE.TS21** - Scientific and Technical Visualization I

- **NCCTE.TS21.01.00** - Explain basic business meeting skills and goal setting.
- **NCCTE.TS21.01.01** - Identify basic business meeting procedures.
- **NCCTE.TS21.01.02** - Establish personal and organizational goals.

- **NCCTE.TS21.02.00** - Recognize the history and impact of scientific & technical visualization.
- **NCCTE.TS21.02.01** - Describe the historical significance of scientific & technical visualization.
- **NCCTE.TS21.02.02** - Describe the technological advancements of scientific & technical visualization.
- **NCCTE.TS21.02.03** - Recognize types of scientific & technical visualization and related careers.

- **NCCTE.TS21.03.00** - Analyze the use of visualization tools.
- **NCCTE.TS21.03.01** - Describe basic computer hardware and software.
- **NCCTE.TS21.03.02** - Interpret the use and application of different types of software programs.
- **NCCTE.TS21.03.03** - Summarize the ethical use of electronic media.
- **NCCTE.TS21.03.04** - Demonstrate basic computer knowledge.

- **NCCTE.TS21.04.00** - Apply basic principles of visualization.
- **NCCTE.TS21.04.01** - Describe design fundamentals.
- **NCCTE.TS21.04.02** - Interpret color and its applications.
- **NCCTE.TS21.04.03** - Discuss vector and bitmap images.
- **NCCTE.TS21.04.04** - Identify effective 2D presentation techniques.
- **NCCTE.TS21.04.05** - Describe 2D software applications and their basic functions.
- **NCCTE.TS21.04.06** - Demonstrate effective presentation techniques using appropriate design fundamentals.

- **NCCTE.TS21.05.00** - Synthesize data for scientific & technical visualizations.
- **NCCTE.TS21.05.01** - Evaluate methods for displaying data using charts and graphs.
- **NCCTE.TS21.05.02** - Describe the steps of a design brief.
- **NCCTE.TS21.05.03** - Interpret data for use in charts and graphs.
- **NCCTE.TS21.05.04** - Apply data to make an appropriate graph.

- **NCCTE.TS21.06.00** - Demonstrate visualization processes.
- **NCCTE.TS21.06.01** - Recognize digital image formats.
- **NCCTE.TS21.06.02** - Summarize basic 3D modeling concepts.
- **NCCTE.TS21.06.03** - Recognize basic rendering techniques.
- **NCCTE.TS21.06.04** - Summarize basic animation techniques.
- **NCCTE.TS21.06.05** - Produce a 3D model with animation and rendering.

Course: Scientific and Technical Visualization II

**NCCTE.TS22** - Scientific and Technical Visualization II

- **NCCTE.TS22.01.00** - Explain oral communication and job seeking skills.
- **NCCTE.TS22.01.01** - Describe how to deliver an extemporaneous technical presentation.
- **NCCTE.TS22.01.02** - Prepare an extemporaneous technical presentation.
- **NCCTE.TS22.01.03** - Specify how to complete a letter of application, a job application, and a job
NCCTE.TS22.02.00 - Apply advanced tools of visualization.  
NCCTE.TS22.02.01 - Describe how computers store information.  
NCCTE.TS22.02.02 - Define how to apply pixel values to digital images.  
NCCTE.TS22.02.03 - Apply pixel values to digital images.  
NCCTE.TS22.02.04 - Identify trends in scientific & technical visualization tools.  

NCCTE.TS22.03.00 - Demonstrate advanced principles of visualization.  
NCCTE.TS22.03.01 - Recognize advanced 2D design concepts.  
NCCTE.TS22.03.02 - Describe advanced imaging techniques.  
NCCTE.TS22.03.03 - Identify advanced presentation techniques.  
NCCTE.TS22.03.04 - Demonstrate advanced presentation techniques.  
NCCTE.TS22.03.05 - Identify basic web page design.  
NCCTE.TS22.03.06 - Demonstrate basic web page design.  

NCCTE.TS22.04.00 - Demonstrate advanced visualization processes.  
NCCTE.TS22.04.01 - Summarize advanced 3D modeling.  
NCCTE.TS22.04.02 - Interpret advanced animation techniques.  
NCCTE.TS22.04.03 - Describe video-editing techniques.  
NCCTE.TS22.04.04 - Demonstrate video-editing techniques.  

NCCTE.TS22.05.00 - Demonstrate advanced scientific visualization.  
NCCTE.TS22.05.01 - Recognize cells and their parts.  
NCCTE.TS22.05.02 - Create a visualization of the cell and its parts.  
NCCTE.TS22.05.03 - Recognize plate tectonics.  
NCCTE.TS22.05.04 - Create a visualization of plate tectonics.  
NCCTE.TS22.05.05 - Describe DNA and gel electrophoresis.  
NCCTE.TS22.05.06 - Create a visualization of DNA and gel electrophoresis.  
NCCTE.TS22.05.07 - Explain different simple machines.  
NCCTE.TS22.05.08 - Create a visualization of simple machines.  
NCCTE.TS22.05.09 - Create an advanced visualization.  

NCCTE.TS22.06.00 - Demonstrate preparedness for the future.  
NCCTE.TS22.06.01 - Summarize different types of portfolios.  
NCCTE.TS22.06.02 - Synthesize an electronic portfolio.  

Course: Game Art and Design  
NCCTE.TS31 - Game Art and Design  
NCCTE.TS31.01.00 - Unit 1: Understand basic history of game design.  
NCCTE.TS31.01.01 - Recall the general history and development of gaming, non-electronic and electronic.  
NCCTE.TS31.01.02 - Explain how technology and ethics have affected game development.  
NCCTE.TS31.01.03 - Summarize the current state and future trends in game development.  

NCCTE.TS31.02.00 - Unit 2: Analyze job readiness in the game industry.  
NCCTE.TS31.02.01 - Recognize the skills necessary to work in the game industry.
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NCCTE.TS31.02.02 - Analyze team structure in game design.
NCCTE.TS31.02.03 - Execute the documents necessary to enter the game industry.

NCCTE.TS31.03.00 - Unit 3: Apply game culture and game play.
  NCCTE.TS31.03.01 - Recognize social game interaction.
  NCCTE.TS31.03.02 - Summarize formal game elements.
  NCCTE.TS31.03.03 - Categorize game theory and genres.
  NCCTE.TS31.03.04 - Execute sample games from selected genres.

NCCTE.TS31.04.00 - Unit 4: Produce Game prototypes.
  NCCTE.TS31.04.01 - Exampling game conceptualization including brain storming, sketching, and storyboarding.
  NCCTE.TS31.04.02 - Execute a game design document.
  NCCTE.TS31.04.03 - Create an original board game.
  NCCTE.TS31.04.04 - Evaluate the board game design using game design parameters.

NCCTE.TS31.05.00 - Unit 5: Create 3D assets used in games.
  NCCTE.TS31.05.01 - Execute 3D modeling including polygonal modeling.
  NCCTE.TS31.05.02 - Execute 3D textures and maps.
  NCCTE.TS31.05.03 - Produce two related game levels and a 3D character.

NCCTE.TS31.06.00 - Unit 6: Apply 2D game design.
  NCCTE.TS31.06.01 - Recognize a basic 2D game engine interface and correct terminology.
  NCCTE.TS31.06.02 - Illustrate 2D game sprites, actions, events, and sounds.
  NCCTE.TS31.06.03 - Execute 2D games that represent different genres.
  NCCTE.TS31.06.04 - Illustrate 2D game levels.

NCCTE.TS31.07.00 - Unit 7: Create 2D games.
  NCCTE.TS31.07.01 - Summarize the development process of 2D game design.
  NCCTE.TS31.07.02 - Produce original 2D backgrounds and sprites.
  NCCTE.TS31.07.03 - Produce an original 2D game using existing game theory and design.
  NCCTE.TS31.07.04 - Critique 2D games.