Course Title: **Applied Engineering Technology I**
Course Number: **8401110**
Course Credit: **1**

Course Description:
This course helps students understand the field of engineering/engineering technology and prepares them for postsecondary engineering programs by developing a more in-depth mastery of the associated mathematics, science, and technology knowledge and skills. The course also includes essential concepts of technology and design, as well as concerns about the social and political implications of technological change.

CTE Standards and Benchmarks
01.0   Demonstrate an understanding of the characteristics and scope of technology. – The student will be able to:
01.01   Discuss the nature and development of technological knowledge and processes.
01.02   Explain the rapid increase in the rate of technological development and diffusion.
01.03   Conduct specific goal-directed research related to inventions and innovations.
01.04   Discuss current technological developments that are/were driven by profit motive and the market.
01.05   Explain how technological progress promotes advancement of science and mathematics.
01.06   Describe ways in which technology helps to shape social, cultural, political, and economic aspects of society.
01.07   Describe how the development of many tools and machines were based more on technological know-how rather than scientific knowledge.
02.0   Demonstrate an understanding of the core concepts of technology. – The student will be able to:
02.01   Explain systems thinking and the relationship between logic, creativity, and compromise in solving complex problems.
02.02   Describe technological systems and their role within larger technological, social, and environmental systems.
02.03   Describe the trade-offs between competing values (e.g., availability, cost, desirability, waste, et al) in the selection of resources.
02.04   Identify the criteria and constraints of a product or system and determine how they affect the final design and development.
02.05   List strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints.
02.06   Identify new technologies that create new processes.
02.07   Describe a quality control process to ensure that a product, service or system meets established criteria.

CTE Standards and Benchmarks

	02.08	Describe management and associated dynamics as they relate to technological development.
03.0	Demonstrate an understanding of the attributes of design. – The student will be able to:	
	03.01	Describe the essential activities that comprise the design process.
	03.02	Write a problem statement in sufficient clarity to enable design goals, requirements, and constraints to be identified.
	03.03	Critique the design of a solution and revise the design as needed.
	03.04	Explain how a design's criteria, constraints, and efficiency can compete with each other.
	03.05	Identify the factors that ensure the sustainability of an engineering design.
	03.06	Identify safety considerations when designing a product.
04.0	Demonstrate an understanding of the engineering design process. – The student will be able to:	
	04.01	Describe the sequence of steps and associated activities involved in applying the engineering design process.
	04.02	Compare and contrast creative and analytic problem-solving strategies to the engineering design process.
	04.03	Discuss why the engineering design process must begin with a clearly stated problem.
	04.04	Explain the relationship between design criteria and design constraints.
	04.05	Demonstrate brainstorming techniques.
	04.06	Describe the role of computer and mathematical models in the engineering design process.
	04.07	Explain the forms of analysis used in evaluating potential solutions, particularly those forms associated with engineering principles, estimation, economics, and worst case scenario.
	04.08	Describe a decision table and how it is used to evaluate proposed solutions to an engineering problem.
05.0	Describe the functional characteristics of the engineering design team. – The student will be able to:	
	05.01	Describe how work breakdown structure (WBS) impacts the makeup and organization of an engineering design team.
	05.02	Compare functional and hierarchical schemes for organizing an engineering design team.
	05.03	Describe the function of management in general and project management in particular.
	05.04	Describe a typical design project team structure.
	05.05	Outline a research methodology.

CTE Standards and Benchmarks	
	05.06 Explain the role of ethics as a part of responsible decision making.
06.0	Demonstrate computer-aided design knowledge and skills. – The student will be able to:
	06.01 Create an orthographic drawing using a CAD software platform.
	06.02 Create a part using a solid modeling CAD software platform.
	06.03 Create an assembly using a solid modeling CAD software platform.
	06.04 Create a bill of materials generated from a CAD application.
07.0	Demonstrate foundational knowledge and skills associated with the design of a mechanical system. – The student will be able to:
	07.01 Measure and calculate dimensions of parts using metric and customary systems.
	07.02 Define and calculate quantities involving mass, weight, force, torque, friction, and resistance.
	07.03 Identify simple machines.
	07.04 Calculate mechanical advantage.
	07.05 Assemble, operate, and identify the parts of a mechanical system.
08.0	Demonstrate technical knowledge and skills for machining. - The student will be able to:
	08.01 Measure dimensions using precision measurement tools, such as rulers, scales, calipers, and micrometers.
	08.02 Identify appropriate tools for machining purposes (e.g., drilling, turning, milling, sawing, and grinding).
	08.03 Explain steps for assembly and fabrication of products.
09.0	Demonstrate foundational technical knowledge and skills associated with the design of fluid systems. – The student will be able to:
	09.01 Define and differentiate between absolute, gauge, and atmospheric pressure.
	09.02 Measure and calculate pressure and flow rate.
	09.03 Differentiate between pneumatics and hydraulics.
	09.04 Draw schematics for series, parallel, and combination circuits.
10.0	Demonstrate foundational technical knowledge and skills associated with the design of thermal systems. – The student will be able to:
	10.01 Define and differentiate between heat and temperature.

	10.02	Describe the three laws of thermodynamics as they relate to the design of a thermal system.
11.0		Demonstrate foundational knowledge and skills associated with the design of electrical and electronic systems. – The student will be able to:
	11.01	Compare and contrast basic electronic components (e.g., resistor, capacitor, transistor, coil, diode).
	11.02	Read schematics to identify individual values and function of component parts.
	11.03	Define and calculate quantities involving charge, voltage, current, resistance, impedance, inductance, and capacitance.
	11.04	Draw schematics for series, parallel, and combination circuits.
	11.05	Describe the differences between a series and a parallel circuit.
	11.06	Differentiate between alternating and direct current.
	11.07	Measure voltage, current, resistance, and capacitance using a multimeter.
	11.08	Define and calculate quantities using Ohm's Law.
	11.09	Define and calculate quantities using Watt's Law.
	11.10	Define and calculate quantities using Kirchhoff's voltage and current laws.
	11.11	Solder electronic components.
12.0		Demonstrate technical knowledge and skills in the designing, engineering, and analysis of constructed works. – The student will be able to:
	12.01	Define terminology associated with engineering products and systems.
	12.02	Define and describe the experimental method as it is applied to design.
	12.03	Describe simulation.
	12.04	Prepare a model of a design solution to an engineering problem.
	12.05	Prepare a graphical solution to an engineering problem.
	12.06	Prepare a mathematical solution to an engineering problem (using either a calculator or computer).
	12.07	Present a technical report on an engineering design problem, concept or issue.
13.0		Identify computer components and their functions. – The student will be able to:
	13.01	Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling, etc.).

	13.02	Identify various computer input devices (e.g., mouse, keyboard, phone, camera) and describe their use.
	13.03	Identify various computer output devices (e.g., monitor, printer, phone) and describe their use.
	13.04	Identify various storage devices (e.g., flash drive, iPod, phone, external hard drive, etc.)
14.0	Demonstrate proficiency with common computer peripherals, including connections to standard input and output devices. – The student will be able to:	
	14.01	Identify the types and purposes of common input devices (e.g., mouse, keyboard, camera, microphone, scanner).
	14.02	Identify the types and purposes of specialized input devices (e.g., digital cameras, mobile devices, GPS devices).
	14.03	Describe the types and purposes of various computer connection ports (e.g., USB, firewire, parallel, serial, Ethernet, et al).
	14.04	Connect an input device (e.g., mouse, keyboard, cell phone, camera, et al) and verify proper operation.
	14.05	Connect an output device (e.g., printer, monitor, projector, et al) and verify proper operation.
15.0	Demonstrate knowledge of computer file management. – The student will be able to:	
	15.01	Describe and use conventional file naming conventions.
	15.02	Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).
	15.03	Be able to identify file types by extension (e.g., .doc, .txt, .wav, xls, etc.).
16.0	Demonstrate proficiency using the Internet to locate information. – The student will be able to:	
	16.01	Identify and use web terminology.
	16.02	Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).
	16.03	Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).
	16.04	Demonstrate proficiency using search engines, including Boolean search techniques.
	16.05	Apply the rules for properly citing works or other information obtained from the Internet.
	16.06	Identify and apply Copyright Fair Use guidelines.
	16.07	Evaluate online information for credibility and quality using basic guidelines and indicators (e.g. authority, affiliation, purpose, etc.).
17.0	Demonstrate an understanding of Internet safety and ethics. – The student will be able to:	
	17.01	Describe cyber-bullying and its impact on perpetrators and victims.

	17.02	Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.
	17.03	Demonstrate proficiency running an antivirus scan to remove viruses and malware.
	17.04	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, and Twitter) and ways to mitigate these risks.
	17.05	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.
	17.06	Adhere to Acceptable Use Policies when accessing the Internet.
18.0		Develop and apply word processing and document manipulation skills. – The student will be able to:
	18.01	Apply and adjust margins, tabs, line spacing and paragraph indents.
	18.02	Insert and manipulate text, graphics/images, and WordArt.
	18.03	Format text using the font interface and styles interface.
	18.04	Adjust the size, position, and layout wrapping settings of a graphic/image.
	18.05	Use the status bar to determine the number of pages, words, and characters in a document.
	18.06	Insert codes for current date and time.
	18.07	Copy text between documents using mouse, menu, and keyboard techniques.
	18.08	Move text in a document using mouse, menu, and keyboard techniques.
	18.09	Create bulleted and numbered lists.
	18.10	Create a table – Inserting, moving and entering data.
	18.11	Create a table – format rows, columns and cells.
	18.12	Insert page breaks.
	18.13	Adjust magnification of document display single and multiple pages.
	18.14	Understand printing options including shrink to fit, gutters, and document orientation.
	18.15	Create a report or essay that contains a title page, text, a graphic/image, and WordArt.
19.0		Develop and apply fundamental spreadsheet skills. – The student will be able to:
	19.01	Describe a spreadsheet and the ways in which it may be used.

CTE Standards and Benchmarks
19.02 Identify the parts of the spreadsheet display.
19.03 Insert and format text information into cells.
19.04 Insert and format numeric information into cells.
19.05 Insert and format date and time information into cells.
19.06 Select multiple cells using the mouse.
19.07 Copy information from one or more cells to another part of the spreadsheet.
19.08 Move information from one or more cells to another part of the spreadsheet.
19.09 Sum the numeric values of multiple cells.
19.10 Use the sort function to alphabetize a table of information.
19.11 Create and navigate through a worksheet.
19.12 Change column width and row height.
19.13 Insert columns and rows.
19.14 Merge cells.
19.15 Use Undo and Redo features.
19.16 Insert arithmetic formulas into a spreadsheet.
19.17 Create and print a table that displays and sums the quantities or values of different categories of data.
19.18 Create a chart based on data sets defined in a spreadsheet.
19.19 Adjust chart types to appropriately represent base data.
19.20 Create formulas using multiple cells and higher level functions which are dependent on other referenced cells (sqrt, avg, stddev, etc)
19.21 Apply references to cells to be used as variables in multiple locations.
20.0 Demonstrate safe and appropriate use of tools. – The student will be able to:
20.01 Select appropriate tools, procedures, and/or equipment.
20.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.

CTE Standards and Benchmarks
20.03   Follow laboratory safety rules and procedures.
20.04   Demonstrate good housekeeping at workstation within total laboratory.
20.05   Identify color-coding safety standards.
20.06   Explain fire prevention and safety precautions and practices for extinguishing fires.
20.07   Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

Course Title: **Applied Engineering Technology II**
Course Number: **8401120**
Course Credit: **1**

Course Description:
This course provides students with opportunities to further their mastery of engineering-related math and science principles to design solutions to real world problems. The course also includes a more in-depth look into the relationship between technology and design.

CTE Standards and Benchmarks
21.0 Demonstrate an understanding of the various approaches used in problem solving. – The student will be able to:
21.01 Employ research and development processes to assess the functional, economic, and ethical viability of a product or prototype.
21.02 Research a problem and determine the most appropriate problem-solving method to employ.
21.03 Determine whether the solution to a specific problem is technology-based.
21.04 Utilize a multidisciplinary approach to solving technological problems.
22.0 Demonstrate the abilities to apply the design process. – The student will be able to:
22.01 Determine whether a design problem is worthy of being resolved or addressed.
22.02 Identify the criteria and constraints associated with a design problem and select the most appropriate solution based on pre-determined factors.
22.03 Evaluate the quality, efficiency, and productivity of an existing or proposed design and refine the design accordingly.
22.04 Evaluate an existing design using conceptual, physical, and mathematical models and note aspects for improvement.
22.05 Devise and develop a problem solution using the design process.
22.06 Create and deliver a slide presentation to communicate the design process and final solution to a design problem.
23.0 Demonstrate proficiency in using presentation software. – The student will be able to:
23.01 Describe presentation software and the ways in which it may be used.
23.02 Create a Slide Master.
23.03 Adjust presentation format using the Slide Master.
23.04 Add and format titles, subtitles, and talking points to a presentation slide.
23.05 Insert date and time codes and slide numbers to slides.

CTE Standards and Benchmarks
	23.06	Insert and format images/graphics onto slides.
	23.07	Insert new or duplicate slides.
	23.08	Adjust slide transition to include animation.
	23.09	Insert and adjust sound settings and timing in presentation.
	23.10	Adjust the sequence of slides in the presentation.
	23.11	Produce a presentation that includes text, graphics, and digital images and present it using a projection system.
	23.12	Adjust Slide Show Set-up to loop show continuously.
24.0	Perform advanced study and technical skills related to engineering technology. – The student will be able to:
	24.01	Identify an engineering problem or product for improvement using engineering design methodology.
	24.02	Develop a written plan of work for the engineering team to carry out the project.
	24.03	Show evidence of technical research in support of the project.
	24.04	Perform skills related to the engineering project.
	24.05	Complete the project as planned.
	24.06	Demonstrate the engineering design solution to a fluid system problem.
	24.07	Demonstrate the engineering design solution to an electrical system problem.
	24.08	Demonstrate the engineering design solution to a thermal system problem.
	24.09	Demonstrate and present the engineering design solution to a mechanical system problem.
	24.10	Formulate conclusions based on the analysis of engineered products.
25.0	Demonstrate fundamental math and science knowledge and skills for mechanical systems. – The student will be able to:
	25.01	Define and calculate quantities using Hooke's Law of Elasticity.
	25.02	Assemble, operate, and identify the parts of a mechanical system.
	25.03	Demonstrate and apply principles of force, work, rate, resistance, energy, power, and force transformers relating to mechanical systems.
	25.04	Calculate the mechanical advantage of a mechanical system

CTE Standards and Benchmarks

	25.05 Design a mechanical system to demonstrate knowledge of mechanical advantage.
26.0	Demonstrate technical knowledge and skills for fluid systems. – The student will be able to:
	26.01 Define and calculate quantities using Boyle's Law.
	26.02 Assemble, operate, and identify the parts of a fluid system.
	26.03 Demonstrate and apply principles of force, work, rate, resistance, energy, power, and force transformers relating to fluid systems.
	26.04 Compute the mechanical advantage of a fluid system.
	26.05 Compute the change in height in the output piston based on change in input piston and relative sizes.
	26.06 Design a fluid system to demonstrate knowledge of mechanical advantage.
27.0	Demonstrate technical knowledge and skills for thermal systems. – The student will be able to:
	27.01 Define and calculate quantities of heat and temperature.
	27.02 Assemble, operate, and identify the parts of a thermal system.
	27.03 Demonstrate and apply principles of force, work, rate, resistance, energy, power, and force transformers relating to fluid systems.
	27.04 Compute the efficiency of a thermal system.
	27.05 Explain the steps in a PV diagram including the phases where work is done.
28.0	Demonstrate technical knowledge and skills associated with the design of electrical and electronic systems. – The student will be able to:
	28.01 Assemble, operate, and identify the parts of an electrical system.
	28.02 Demonstrate and apply principles of force, work, rate, resistance, energy, power, and force transformers relating to electrical systems.
	28.03 Understand the connectivity between the major components. Identify Address and data buses, power signals and peripheral devices.
	28.04 Recognize the schematic symbols for basic electronic components (e.g., resistors, capacitors, inductors, transistors, and black box components such as microprocessors).
	28.05 Describe basic logic devices (e.g., AND, NAND, OR, NOR) and their role in the design of electrical/electronic systems.
	28.06 Create and apply the truth tables for the basic logical elements (i.e., AND, NAND, OR, and NOR gates).
	28.07 Identify electrical connections between devices on an electrical schematic.

CTE Standards and Benchmarks	
28.08	Use Boolean algebra to minimize logic equations and implement them in breadboard devices.
28.09	Design and create a prototype of a basic electronic system to demonstrate knowledge of DC series and parallel logic circuitry.
29.0	Demonstrate safe and appropriate use of basic tools and machines. – The student will be able to:
29.01	Select appropriate tools, procedures, and/or equipment.
29.02	Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.
29.03	Follow laboratory safety rules and procedures.
29.04	Demonstrate good housekeeping at workstation within total laboratory.
29.05	Identify color-coding safety standards.
29.06	Explain fire prevention and safety precautions and practices for extinguishing fires.
29.07	Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

Course Title: **Applied Engineering Technology III**
Course Number: **8401130**
Course Credit: **1**

Course Description:
This course provides opportunities for students to apply their acquired knowledge and skills in engineering scenarios. The course features multiple options for providing context-based projects oriented to specific fields of engineering. This feature enables instruction in complex projects involving multi-faceted project teams by providing instruction oriented to four key engineering disciplines: mechanical, electrical, civil, and environmental. **Students need only complete standards #43 and #44 for <u>one</u> of the engineering disciplines, in addition to the other standards.**

CTE Standards and Benchmarks

30.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology. – The student will be able to:
	30.01 Discuss changes in cultural, social, economic, and political behavior caused by the use of technology.
	30.02 Describe the consequences of weighing the trade-offs between the positive and negative effects of technology.
	30.03 Discuss the ethical considerations in developing, selecting, and using technology.
	30.04 Debate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another.
31.0	Demonstrate an understanding of the effects of technology on the environment. – The student will be able to:
	31.01 Describe the trade-offs of developing technologies to reduce the use of resources.
	31.02 Describe how the alignment of technological and natural processes impacts the environment.
	31.03 Identify technologies developed for the purpose of reducing negative consequences of other technologies.
	31.04 Debate the implementation of technologies having positive and negative effects on the environment.
32.0	Demonstrate the abilities to assess the impact of products and systems. – The student will be able to:
	32.01 Collect information and evaluate its quality.
	32.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.
	32.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.
	32.04 Design forecasting techniques to evaluate the results of altering natural systems.
33.0	Successfully work as a member of a team. – The student will be able to:
	33.01 Accept responsibility for specific tasks in a given situation.

	33.02	Maintain a positive relationship with other team members.
	33.03	Document progress, and provide feedback on work accomplished in a timely manner.
	33.04	Complete assigned tasks in a timely and professional manner.
	33.05	Reassign responsibilities when the need arises.
	33.06	Complete daily tasks as assigned on one's own initiative.
34.0	Plan, organize, and carry out a project plan. – The student will be able to:	
	34.01	Determine the scope of a project.
	34.02	Organize the team according to individual strengths.
	34.03	Assign specific tasks within a team.
	34.04	Determine project priorities.
	34.05	Identify required resources.
	34.06	Record project progress in a process journal.
	34.07	Record and account for budget expenses during the life of the project.
	34.08	Carry out the project plan to successful completion and delivery.
35.0	Manage resources. – The student will be able to:	
	35.01	Identify required resources and associated costs for each stage of the project plan.
	35.02	Create a project budget based on the identified resources.
	35.03	Determine the methods needed to acquire needed resources.
	35.04	Demonstrate good judgment in the use of resources.
	35.05	Recycle and reuse resources where appropriate.
	35.06	Demonstrate an understanding of proper legal and ethical waste disposal.
36.0	Use tools, materials, and processes in an appropriate and safe manner. – The student will be able to:	
	36.01	Identify the proper tool for a given job.

	36.02	Use tools and machines in a safe manner.
	36.03	Adhere to laboratory safety rules and procedures.
	36.04	Identify the application of processes appropriate to the task at hand.
	36.05	Identify materials appropriate to their application.

Mechanical Engineering Discipline

43.0		Demonstrate an understanding of design and development of solutions involving mechanical engineering, their environments, and their associated design constraints. – The student will be able to:
	43.01	Describe mechanically engineered assemblies used in industrial manufacturing, the technologies they employ, their design criteria, and constraints.
	43.02	Describe mechanically engineered assemblies used in aviation and aerospace, the technologies they employ, their design criteria, and constraints.
	43.03	Describe mechanically engineered assemblies used in hazardous or dangerous environments (e.g., underground, damaged buildings, et al), the technologies they employ, their design criteria, and constraints.
	43.04	Describe mechanically engineered assemblies used in the medical field, the technologies they employ, their design criteria, and constraints.
	43.05	Describe mechanically engineered assemblies used in underwater environments, the technologies they employ, their design criteria, and constraints.
	43.06	Describe mechanically engineered assemblies used in high speed/repetitive manufacturing or processing environments, the technologies they employ, their design criteria, and constraints.
44.0		Design and build a mechanically engineered solution suitable for a particular application in a defined environment. – The student will be able to:
	44.01	Design and build a solution to a problem using the principles of mechanical engineering.
	44.02	Incorporate principles of electricity, thermodynamics, hydraulics, and pneumatics, as appropriate, into the design of a mechanically engineered solution.
	44.03	Incorporate at least one advanced feature into the solution's design.
	44.04	Create a project portfolio describing the project and the solution, including drawings and specifications, the tasks and rationale, process journal, budget report, and the results.
	44.05	Present your portfolio to a review committee.

Electrical Engineering Discipline

43.0		Demonstrate an understanding of design and development of solutions involving electrical engineering, their environments, and their associated design constraints. – The student will be able to:
	43.01	Describe electrical engineering applications used in power distribution and transmission systems, the technologies they employ, their design criteria, and constraints.

	43.02	Describe electrical engineering applications used in control systems (e.g., PLC's, microcontrollers), the technologies they employ, their design criteria, and constraints.
	43.03	Describe electrical engineering applications used in DC and AC electronics, the technologies they employ, their design criteria, and constraints.
	43.04	Describe electrical engineering applications used in signal processing and telecommunications, the technologies they employ, their design criteria, and constraints.
	43.05	Describe electrical engineering applications used in sensors and instrumentation applications, the technologies they employ, their design criteria, and constraints.
	43.06	Describe electrical engineering applications used in consumer electronics and computer applications, the technologies they employ, their design criteria, and constraints.
44.0	Design and build a mechanically engineered solution suitable for a particular application in a defined environment. – The student will be able to:	
	44.01	Design and build a solution to a problem using the principles of electrical engineering.
	44.02	Incorporate principles of electricity, AC/DC circuits and electronics, microcontrollers or PLC's, electronic sensors, transducers and instrumentation, or communications/RF systems, as appropriate, into the design of an electrically engineered solution.
	44.03	Incorporate at least one advanced feature into the solution's design.
	44.04	Create a project portfolio describing the project and the solution, including drawings and specifications, the tasks and rationale, process journal, budget report, and statistical analysis of the results.
	44.05	Present your portfolio to a review committee.
Civil Engineering Discipline		
43.0	Demonstrate an understanding of design and development of solutions involving civil engineering, their environments, and their associated design constraints. – The student will be able to:	
	43.01	Describe civil engineered solutions used in coastal area planning, construction and structural design, transportation, GIS and surveying, urban and water resources.
	43.02	Describe civil engineering solutions, the technologies they employ, their design criteria, and constraints.
	43.03	Describe civil engineering solutions used in coastal areas (e.g. bridges, dams, locks, levees, waterways, ports, etc.), the technologies they employ, their design criteria, and constraints.
	43.04	Describe civil engineering solutions used in structural design and structural analysis of buildings, bridges, towers, tunnels, etc. , the technologies they employ, their design criteria, and constraints.
	43.05	Describe civil engineering solutions used in designing, constructing, and maintaining transportation infrastructure (e.g. including roadways, railways, airports and mass transit systems, et al.).
	43.06	Describe technologies used in the basics of surveying and mapping, as well as geographic information systems to correctly size and position structures, and lay out routes for railways, roadways, and pipelines.

CTE Standards and Benchmarks	
43.07	Describe civil engineering solutions used in urban and metropolitan planning (e.g. designing, constructing, and maintaining streets, sidewalks, water supply networks, sewers, street lighting, solid waste management and disposal, public parks, et al), the technologies they employ, their design criteria, and constraints.
44.0	Design and build a mechanically engineered solution suitable for a particular application in a defined environment. – The student will be able to:
44.01	Design and build a solution to a problem using the principles of civil engineering.
44.02	Incorporate one or more principles of structural design and analysis, surveying, planning and design of traffic system logistics, coastal defense, materials science, water resource and waste management, or urban planning as appropriate, into the design of a civil engineering solution.
44.03	Incorporate at least one advanced feature into the solution's design.
44.04	Create a project portfolio describing the project and the solution, including drawings and specifications, the tasks and rationale, process journal, budget report, and the results.
44.05	Present your portfolio to a review committee.
Environmental Engineering Discipline	
43.0	Demonstrate an understanding of design and development of solutions involving environmental engineering, their environments, and their associated design constraints. – The student will be able to:
43.01	Describe environmental engineered solutions, the technologies they employ, their design criteria, and constraints.
43.02	Describe environmental engineered solutions related to water supply and treatment, the technologies they employ, their design criteria, and constraints.
43.03	Describe environmental engineered solutions related to waste management, the technologies they employ, their design criteria, and constraints.
43.04	Describe environmental engineered solutions related to air and water pollution, the technologies they employ, their design criteria, and constraints.
43.05	Describe environmental engineered solutions related to coastal and intercoastal environments, the technologies they employ, their design criteria, and constraints.
43.06	Describe environmental engineered solutions related to agricultural environments, the technologies they employ, their design criteria, and constraints.
43.07	Describe environmental engineered solutions related to industrial environments, the technologies they employ, their design criteria, and constraints.
44.0	Design and build an environmental engineered solution suitable for a particular application in a defined environment. – The student will be able to:
44.01	Design and build a solution to a problem using the principles of environmental engineering.
44.02	Incorporate principles of contamination control, pollution control, emission control, hazardous material disposal, and physical, biological, and chemical processes, as appropriate, into the design of an environmental engineered solution.
44.03	Incorporate at least one advanced feature into the solution's design.

CTE Standards and Benchmarks
44.04   Create a project portfolio describing the project and the solution, including drawings and specifications, the tasks and rationale, process journal, budget report, and the results.
44.05   Present your portfolio to a review committee.