2013 – 2014

Arkansas Department of Career Education
Model Framework

Course Title: **Fundamentals of Technology and Engineering-(ETE 2)**

Career Cluster: **Science, Tech, Engineering & Mathematics**

Secondary – School Improvement	
Course Number	399160
CIP Number	15.9999
Grade Level	7-8
Course Type	Core
Teacher Certification	212
CTSO	TSA
Facility Requirements	http://arkansasfacilities.arkansas.gov/SchoolFacManual.aspx
Industry Certifications	

Purpose
To provide 7th and 8th grade students with a more in-depth look at the fields of information and communication, construction, manufacturing, energy, power, and transportation technologies.

Program Structure
This program has six unit sections.

Laboratory Activities
Students will design and construct a robot that will perform a specific task in Unit4; Demonstrate the ability to build series and parallel circuits, Demonstrate an understanding and knowledge of safe practices in the classroom and laboratory, demonstrate the ability to measure current, resistance, and voltage using a digital multimeter all in Unit5; Practice using appropriate and required personal protection equipment (eye protection, ear protection, etc.) in Unit6.

Special Notes
Microsoft Office software tools, Technology Portfolio, appropriate supporting videos, and Internet access. Paper based maps that show longitude and latitude, CAD software (AutoCAD, Inventor, Sketch Up, etc.), Google Earth, Garmin Base Camp. Architectural drawings, graph paper, CAD software (AutoCAD, Inventor, Sketch Up, etc.), modeling materials, appropriate materials and tools for robotics design, materials to complete the design activity, and power and hand tools. Electronic components, digital multi-meters, Technology Portfolio, appropriate supporting videos, and Internet access appropriate materials and tools for electronics, materials to complete the design activity, and power and hand tools. Safety signs, Safety tests and study materials, Machines and tools to demonstrate safe operation, Personal Protection Equipment

Career and Technical Student Organization (CTSO)
Technology Student Association would apply here

Standards
ST-ET

Common Core State Standards Grades 9-12

ELA Speaking and Listening Standards Grades 9-10

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **SL9-10.1**
    a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. **SL9-10.1a**
    b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, and presentation of alternate views), clear goals and deadlines, and individual roles as needed. **SL9-10.1b**
    c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. **SL9-10.1c**
    d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. **SL9-10.1d**
2. Integrate multiple sources of information presented in diverse media or format(e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. **SL9-10.2**

3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. **SL9-10.3**
4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. **SL9-10.4**
5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL9-10.5**

ELA Speaking and Listening Standards Grades 11-12

1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. **SL11-12.1**
    a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. **SL11-12.1a**
    b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed. **SL11-12.1b**
    c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. **SL11-12.1c**
    d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. **SL11-12.1d**
2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. **SL11-12.2**
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used. **SL11-12.3**
4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **SL11-12.4**
5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL11-12.5**

ELA Language Grades 9-10

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies. **L9-10.4**
    a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **L9-10.4a**
    b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy). **L9-10.4b**
    c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. **L9-10.4c**
    d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary). **L9-10.4d**
6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **L9-10.6**

ELA Language Grades 11-12

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies. **L11-12.4**
    a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. **L11-12.4a**
    b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable). **L11-12.4b**
    c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage. **L11-12.4c**
    d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary **L11-12.4d**
6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. **L11-12.6**

Reading Standards for Literacy in Science and Technical Subjects Grades 9-10

1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. **R9-10.1**
2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. **R9-10.2**

3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. **R9-10.3**
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. **R9-10.4**
5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). **R9-10.5**
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. **R9-10.6**
7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. **R9-10.7**
8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. **R9-10.8**
9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. **R9-10.9**
10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. **R9-10.10**

Reading Standards for Literacy in Science and Technical Subjects Grades 11-12

1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **R11-12.1**
2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **R11-12.2**
3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **R11-12.3**
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **R11-12.4**
5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. **R11-12.5**
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. **R11-12.6**
7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **R11-12.7**
8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **R11-12.8**
9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **R11-12.9**

10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently. **R11-12.10**

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 9-10

1. Write arguments focused on discipline-specific content. **W9-10.1**
    a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. **W9-10.1a**
    b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. **W9-10.1b**
    c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. **W9-10.1c**
    d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.1d**
    e. Provide a concluding statement or section that follows from or supports the argument presented. **W9-10.1e**
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W9-10.2**
    a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W9-10.2a**
    b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W9-10.2b**
    c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. **W9-10.2c**
    d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. **W9-10.2d**
    e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W9-10.2e**
    f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). **W9-10.2f**
3. Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. **W9-10.3**
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
    W9-10.4
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **W9-10.5**
6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. **W9-10.6**

7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **W9-10.7**
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. **W9-10.8**
9. Draw evidence from informational texts to support analysis, reflection, and research. **W9-10.9**
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **W9-10.10**

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects Grades 11-12

1. Write arguments focused on discipline-specific content. **W11-12.1**
    a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. **W11-12.1a**
    b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. **W11-12.1b**
    c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. **W11-12.1c**
    d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. **W11-12.1d**
    e. Provide a concluding statement or section that follows from or supports the argument presented. **W11-12.1e**
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **W11-12.2**
    a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. **W11-12.2a**
    b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. **W11-12.2b**
    c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. **W11-12.2c**

d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. **W11-12.2d**

e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). **W11-12.2e**

3. Write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results. **W11-12.3**
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. **W11-12.4**
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. **W11-12.5**
6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information. **W11-12.6**
7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **W11-12.7**
8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **W11-12.8**
9. Draw evidence from informational texts to support analysis, reflection, and research. **W11-12.9**
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. **W11-12.10**

Common Career Technical Core

Science, Technology, Engineering & Mathematics Career Cluster™ (ST)

1. **Apply engineering skills in a project that requires project management, process control and quality assurance.**
2. **Use technology to acquire, manipulate, analyze and report data.**
3. **Describe and follow safety, health and environmental standards related to science, technology, engineering and mathematics (STEM) workplaces.**
4. **Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career ClusterTM and the role of STEM in society and the economy.**
5. **Demonstrate an understanding of the breadth of career opportunities and means to those opportunities in each of the Science, Technology, Engineering & Mathematics Career Pathways.**
6. **Demonstrate technical skills needed in a chosen STEM field.**

Engineering & Technology Career Pathway (ST-ET)

1. **Use STEM concepts and processes to solve problems involving design and/or production.**
2. **Display and communicate STEM information.**
3. **Apply processes and concepts for the use of technological tools in STEM.**
4. **Apply the elements of the design process.**
5. **Apply the knowledge learned in STEM to solve problems.**
6. **Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.**

Science & Mathematics Career Pathway (ST-SM)

1. **Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.**
2. **Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.**
3. **Analyze the impact that science and mathematics has on society.**
4. **Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.**

Common Career and Technical Core Career Ready Practices (CCTC CRP)

1. Act as a responsible and contributing citizen and employee. **CRP1**
2. Apply appropriate academic and technical skills. **CRP2**
3. Attend to personal health and financial well-being. **CRP3**
4. Communicate clearly, effectively, and with reason. **CRP4**
5. Consider the environmental, social and economic impacts of decisions. **CRP5**
6. Demonstrate creativity and innovation. **CRP6**
7. Employ valid and reliable research strategies. **CRP7**
8. Utilize critical thinking to make sense of problems and persevere in solving them. **CRP8**
9. Model integrity, ethical leadership, and effective management. **CRP9**
10. Plan education and career path aligned to personal goals.**CRP10**
11. Use technology to enhance productivity. **CRP11**
12. Work productively in teams while using cultural/global competence. **CRP12**

Arkansas Department of Career Education
Student Performance Standards

Course Title: **Fundamentals of Technology and Engineering-(ETE 2)**

Course Number: **399160**

Course Credit: **.5**

Course Description:
At the completion of the course the student will be able to:

1.0 Engineering and Technology Connections

1.1 Define technology and engineering and describe their relationship toward one another

1.2 Identify the various fields of technology and engineering

1.3 Describe the concepts of technological systems and systems thinking

1.4 Identify the parts of a technological system

2.0 Information and Communication Technologies

2.1 Define CAD/CADD - computer-aided drafting and design

2.2 Identify how a mathematical grid system is used to create 2-Dimensional (2D) and 3-Dimensional (3D) drawings using CAD software

2.3 Recognize 2-Dimensional and 3-Dimensional drawings

2.4 Define global information and global positioning systems (GIS/GPS)

2.5 Identify how global information and global positioning systems (GIS/GPS) are used to access and create geographic data

2.6 Access and analyze specific coordinates in a global information system

3.0 Construction Technologies

3.1 Identify and describe common types of architectural drawings

3.2 Understand the importance of the planning process before construction begins

3.3 Develop an architectural floor plan

3.4 Evaluate, design, and plan a civil structure using the engineering design process

4.0 Manufacturing Technologies

4.1 Understand how robotics and automation is used to manufacture products

4.2 Identify the parts and functions of a robotics system

4.3 Design a robot that will solve a materials handling problem

4.4 Design a product or system and document the process

5.0 Energy, Power and Transportation Technologies

5.1 Understand terms associated with basic electronics

5.2 Understand and recognize types of circuits

5.3 Describe electrical measuring units and use these measuring units to describe work and/or power

5.4 Identify renewable (alternative) sources of energy and understand how they can be used to do work

5.5 Design an alternative energy device that converts wind energy into mechanical power

6.0 Safety

6.1 Describe the need for safe work environments in the Engineering and Technology Educational classroom and laboratory

6.2 Describe specific procedures such as reporting illness, injuries, safety violations, etc.

6.3 Use appropriate and required personal protection equipment (eye protection, ear protection, etc.)

6.4 Describe machine and tool safety practices and procedures

Standard 1.0 Engineering and Technology Connections			
Performance Indicator 1.1 **Define technology and engineering and describe their relationship toward one another**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
1.1.1 Comprehends ideas and concepts related to technology and engineering. Communicates thoughts, ideas, or facts in written form in a clear, concise manner.	Students will participate in discussions and readings concerning technology and engineering	RL 7.2 RL 7.4 W 7.1 RL8.2 RL8.4 W.8.2	CRP 2, 6, 11
1.1.2 Comprehends ideas and concepts related to technology	Students will develop a Technology Portfolio that demonstrates the relationship between technology and engineering	RI 7.1 W 8.6	CRP 11
Performance Indicator 1.2 **Identify the various fields of technology and engineering**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
1.2.1 Comprehends ideas and concepts related to engineering. Communicates thoughts, ideas, or facts in written form in a clear, concise manner.	Students will participate in discussions and readings concerning the various fields of engineering	W 7.2 W 8.2	CRP1,7
1.2.2 Determines what information is needed.	Students will work in groups to research a specific field of engineering	L 7.3 L 8.3	CRP 10

1.2.3 Applies/Uses technical terms as appropriate to audience. Comprehends ideas and concepts related to engineering.	Students will develop a presentation on a field of engineering	L 7.1 L 8.1	CRP10
1.2.4 Works effectively with others to reach a common goal. Composes and creates documents – letters, manuals, reports, proposals, graphs, flow charts, etc. Writing Describes/Explains significance of integrity, honesty, and work ethics.	Students will add their presentation to their Technology Portfolio Students will develop a flowchart that identifies the parts of a technological system	W 7.6 W 8.6	CRP 4, 10,11
Performance Indicator 1.3 **Describe the concepts of technological systems and systems thinking**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
1.3.1 Comprehends ideas and concepts related to technology and engineering. Comprehends written information for main ideas.	Students will participate in discussions and readings concerning technological systems	RI 7.1 RI 8.1	CRP 2,4,8

Performance Indicator 1.4 **Identify the parts of a technological system**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
1.4.1 Composes and creates documents – letters, manuals, reports, proposals, graphs, flow charts, etc.	Students will develop a flowchart that identifies the parts of a technological system	W 7.6 W 8.6	CDRP 2
1.4.2 Organizes information into an appropriate format.	Students will add their flowchart to their Technology Portfolio	W.7.6 W 8.6	CRP2

Standard 2.0 Information and Communication Technologies			
Performance Indicator 2.1 **Define CAD/CADD - computer-aided drafting and design**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
2.1.1 Comprehends ideas and concepts related to computer-aided drafting and design.	Participate in discussions and readings concerning CAD/CADD - computer-aided drafting and design	SG8.1, 8.2, 8.4, 8.5 SL 8.1 7GA 2,3 8GA 1,2,4,5	CRP 2,6
Performance Indicator 2.2 **Identify how a mathematical grid system is used to create 2-Dimensional (2D) and 3-Dimensional (3D) drawings using CAD software**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
2.2.1 Comprehends ideas and concepts related to	Students will view an instructor led demonstration using CAD software and the use of a mathematical grid	SG8.1, 8.2, 8.4, 8.5 7GA 2,3	CRP 2, 6

CAD.	systems used in drawing on the computer	8GA 1,2,4,5	
2.2.2 Comprehends mathematical ideas and concepts related to CAD. Comprehends ideas and concepts related to the use of CAD and a mathematical grid system.	Students will use CAD software to plot points on an X,Y, and Z axis	SG8.1, 8.2, 8.4, 8.5	CRP 2,6
Performance Indicator 2.3 Recognize 2-Dimensional and 3-Dimensional drawings	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
2.3.1 Constructs geometric figures. Uses basic geometric symbols, terms, principles, and formulas. Visualizes a finished product.	Students will identify and create 2D and 3D drawings using CAD software	SG8.1, 8.2, 8.4, 8.5 8 G A.4	CRP2,6

Performance Indicator 2.4 **Define global information and global positioning systems (GIS/GPS)**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
2.4.1 Communicates thoughts, ideas, or facts in written form in a clear, concise manner. Uses logic to draw conclusions from available information.	Participate in discussions and readings concerning global information and global positioning systems (GIS/GPS)	7GB 6, SL 8.1	CRP 5,6,7,8
Performance Indicator 2.5 **Identify how global information and global positioning systems (GIS/GPS) are used to access and create geographic data**	**Recommended Applications/Activity**	**CCSS Standards**	**CCTC Standards**
2.5.1 Organizes information into an appropriate format. Communicates a thought, idea, or fact in spoken form.	Students will identify longitude and latitude coordinates using mapping software	W. 8.2 SL 8.2	CRP 4
2.5.2 Combines ideas or information in a new way	Students access and create geographic data using mapping software	W 8.2	CRP 2,11
Performance Indicator 2.6 **Access and analyze specific coordinates in a global information system**	**Recommended Applications/Activity**	**CCSS Standards**	**CCTC Standards**

2.6.1 Communicates thoughts, ideas, or facts in written form in a clear, concise manner. Records data related to global information systems. Uses logic to draw conclusions from available information.	Students will use mapping software to access and analyze longitude and latitude coordinates	SL 8.4	CRP 4, 11

Standard 3.0 Construction Technologies			
Performance Indicator 3.1 Identify and describe common types of architectural drawings	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.1.1 Comprehends ideas and concepts related to construction	Students will be presented with architectural drawings, including: floor plans, elevations, and schedules		CRP 2,4,5,6
3.1.2 Communicates thoughts, ideas, or facts in written form in a clear, concise manner.	Participate in discussions about the types of drawings required for residential and commercial construction	SL 8.4	CRP 4
Performance Indicator 3.2 Understand the importance of the planning process before construction begins	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.2.1 Comprehends ideas and concepts related to the planning process in construction.	Participate in discussions and reading about the importance of planning before construction begins	SL 8.1	CRP 4,6,7
Performance Indicator 3.3 Develop an architectural floor plan	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.3.1 Draws to scale. Determines quantities/measurements in English and metric units. Visualizes a finished product. Applies rules and principles to a new situation.	Students will design a small residential structure, such as weekend cabin or portable disaster shelter, by sketching plan and elevation views of their design	7RPA1 8GA 1	CRP 6,8,12

Performance Indicator 3.4 **Evaluate, design, and plan a civil structure using the engineering design process**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
3.4.1 Draws to scale. Reads measurements from common measuring Devices. Constructs model to depict basic concept of construction. Creates new design by applying specified Criteria.	Students will design a scaled or full-size civil structure (such as walking bridge or walking trail in the community using recycled or free materials) with predetermined limitations and constraints	7RPA 1 8GA1, 2	CRP 2,3,4,5,6,7,8,9,12

Standard 4.0 Manufacturing Technologies			
Performance Indicator 4.1 **Understand how robotics and automation is used to manufacture products**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.1.1 Comprehends ideas and concepts related to robotics and automation. Takes an interest in what others say and do.	Participate in a field trip to local automated manufacturing facility	SL 8.2	CRP 2,5,8
Performance Indicator 4.2 **Identify the parts and functions of a robotics system**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.2.1 Comprehends ideas and concepts related to	Participate in readings and discussions about the key elements of a robotics system		ST 1

robotics. Applies information to new situations. Comprehends ideas and concepts related to manufacturing.			
Performance Indicator 4.3 **Design a robot that will solve a materials handling problem**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.3.1 Applies scientific principles related to robotics. Calculates different units of measurement. Creates new design by applying specified criteria. Demonstrates logical reasoning in reaching a conclusion.	Students will design and construct a robot that will perform a specific task	7RPA 1, 3 7NSA 3 7GB 6	CRP 2,11

Performance Indicator 4.4 **Design a product or system and document the process**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
4.4.1 Applies knowledge to complete a practical task. Uses equipment and techniques appropriate in the field of invention and innovation.	Students will design and manufacture a product, device, or system using the engineering design process	7GB 4, 5, 6 7GBA 1, 2, 3, 4	CRP 2,6,8,9,11,12
4.4.2 Applies new knowledge and skills to manufacturing.	Students will document their design and add this information to their portfolio		ST ET 1CRP4

Standard 5.0 Energy, Power and Transportation Technologies			
Performance Indicator 5.1 Understand terms associated with basic electronics	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.1.1 Comprehends ideas and concepts related to energy and power. Communicates thoughts, ideas or facts in written form in a clear, concise manner.	Participate in discussions and readings concerning electronics and electrical components	RI 8.1	CRP 4
5.1.2 Applies information and concepts derived from printed materials. Comprehends ideas and concepts related to energy and power.	Define terms associated with basic electronics, including: circuit, conductor, insulator, current, voltage, resistance, fuse, and ground	RI 8.1	CRP 1
Performance Indicator 5.2 Understand and recognize types of circuits	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.2.1 Comprehends ideas and concepts related to energy and power. Performs experiment as specified. Tracks and evaluates results.	Demonstrate the ability to build series and parallel circuits	RI 8.1	CRP 6

Performance Indicator 5.3 **Describe electrical measuring units and use these measuring units to describe work and/or power**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.3.1 Composes and creates documents, letters, manuals, reports, proposals, graphs, flow charts, etc. Comprehends ideas and concepts related to energy and power.	Demonstrate an understanding and knowledge of safe practices in the classroom and laboratory	W 8.2	CRP 1
5.3.2 See relationship between two or more ideas, objects, or situations.	Demonstrate the ability to measure current, resistance, and voltage using a digital multimeter		CRP 8
Performance Indicator 5.4 **Identify renewable (alternative) sources of energy and understand how they can be used to do work**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.4.1Comprehends ideas and concepts related to energy and power. Communicates thoughts, ideas or facts in written form in a clear, concise manner.	View a presentation and participate in a discussion of renewable energy technology	SL 8.4	CRP 8

Performance Indicator 5.5 **Design an alternative energy device that converts wind energy into mechanical power**	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
5.5.1 Applies scientific principles related to renewable energy. Calculates different units of measurement. Combines ideas or information in a new way. Creates new design by applying specified criteria. Demonstrates logical reasoning in reaching a conclusion. Draws conclusions from observations, evaluates conditions, and gives possible solutions.	Solve design problems related to renewable energy technology	7 RPA 1, 2, 3 7EEB 3	CRP 7,8,12

Standard 6.0 Safety			
Performance Indicator 6.1 Describe the need for safe work environments in the Engineering and Technology Educational classroom and laboratory	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
6.1.1 Imagines the flow of work activities from narrative descriptions. Applies new knowledge and skills to safety.	Maintain personal safety, workplace safety, hazard avoidance, safety information systems, protective clothing, fall protection, first aid, ergonomics, and environmental safety		CRP 1
6.1.2 Makes connections between seemingly unrelated ideas. Pays close attention to details.	Explore implemented safety procedures and discuss classroom and laboratory safety		CRP 3,4
Performance Indicator 6.2 Describe specific procedures such as reporting illness, injuries, safety violations, etc.	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
6.2.1 Listens and follows directions	Demonstrate understanding of specific work procedures such as reporting illness, injuries, safety violations, etc.	SL 8.1	CRP 3
Performance Indicator 6.3 Use appropriate and required personal protection equipment (eye protection, ear protection, etc.)	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
6.3.1 Devises and	Practice using appropriate and required personal		CRP 8

implements a plan of action to resolve a problem	protection equipment (eye protection, ear protection, etc.)		
Performance Indicator 6.4 Describe machine and tool safety practices and procedures	**Recommended Application/Activity**	**CCSS Standards**	**CCTC Standards**
6.4.1 Demonstrates decision-making skills. Comprehends written specifications and applies them to a task.	Demonstrate the ability to safely use common tools and machines found in given industrial settings	SL 8.1	CRP 8
6.4.2 Reads and follows instructions to operate technical equipment	Demonstrate the ability to pass given safety tests that show evidence of personal safety competence on given tools and machinery	SL 8.1	CRP 4, 10
6.4.3 Uses standard occupational resource materials.	Participate in a discussion concerning securing machinery, securing guards and safety devices, slipping hazards, eye and ear protection, adequate space around machinery, machine vibration, hand feeding and retrieval tools, power transmission parts, blade and cutter safety, worker position safety, safe procedures for adjusting or repairing machinery, shear points, falling objects, flying objects, rotating parts, moving surfaces, etc.		CRP 3
6.4.4 Follows safety guidelines.	Design and post a set of rules for machine safety, personal safety, hazard safety issues, rules for horseplay, materials safety, combustible materials, etc.		CRP 3
6.4.5 Participates in conversation, discussion, and group presentations. Comprehends ideas and concepts related to machine and tool safety.	Operate tools and equipment in a safe and hazard free manner to the satisfaction of the course instructor	SL 8.1	CRP 3,9