

Seymour Public Schools Curriculum

Alternative Energy Engineering 1

Unit 1

Alternative Energy Engineering Careers, Goals Expectations

Narrative.....In the world of alternative energy there is a high demand for competent, skilled and driven engineers. The entire alternative energy industry is driven and ran by these engineers. One of the fastest growing job markets for engineers is in the energy trades. Oil companies are recognizing the facts that they need new ways to make money through energy sources. These new crop of engineers they are hiring are focused on the alternative energy sector of the market. There are so many different types of alternative energy technologies being developed that the future engineers of the world are able to pick and choose their specialties to focus their energy on. The students will be able to explore the different types of engineering jobs that are available. The students will be exploring the expectations of these engineers and goals to meet those expectations.

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Grade: 10-11	<p style="text-align: center;">Subject: Technology Education- Alternative Energy Engineering 1 Current Engineering Jobs Future Engineering Jobs</p>
CTE Standard	<p><i>Pre-Engineering Technology Standards</i> A. Career Awareness: Identify and describe various careers in the engineering field including educational requirements and ethical expectations.</p> <p><i>READING STANDARDS</i> 6) <i>MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</p>
Enduring Understanding	<ul style="list-style-type: none"> ● Alternative energy technologies have many opportunities for engineering careers ● Engineers are an important factor in today’s energy market. ● Engineers must work under strict guidelines and regulations. ● Engineers work as a team to solve multiple problems in today’s workforce. ● Problem solving skills is important to development as an engineer.
Essential Questions	<ul style="list-style-type: none"> ● What can an individual do to prepare for the type of engineering job they desire? ● Which engineering career is the best for my interests? ● What types of alternative energy engineering careers are available? ● How do the different types of engineering jobs differ from one another? ● What are the expectations of an engineer? ●

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Content Standard:	<p><i>Pre-Engineering Technology Standards</i></p> <p><i>A. Career Awareness: Identify and describe various careers in the engineering field including educational requirements and ethical expectations.</i></p> <ol style="list-style-type: none">1. Describe major engineering fields.2. Identify functions of an engineer.3. Identify educational requirements for an engineer.4. Describe ethics related to engineering situations (e.g., environmental, sustainable engineering, medical, and corrupt practices.) <p>READING STANDARDS</p> <p>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</p> <ul style="list-style-type: none">• Students recognize and appreciate that contemporary and classical literature has shaped human thought• Students interpret, analyze and evaluate text in order to extend understanding and appreciation• Students communicate with others to create interpretations of written, oral and visual texts• Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text• Students use appropriate strategies before, during and after reading in order to construct meaning <p>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</p> <ul style="list-style-type: none">• Students interpret, analyze and evaluate text in order to extend understanding and appreciation• Students communicate with others to create interpretations of written, oral and visual texts• Students use appropriate strategies before, during and after reading in order to construct meaning
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<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to use vocabulary related directly to engineering:</p> <ul style="list-style-type: none"> ● Analysis ● Systems ● Communications ● Design ● Constraints ● Ethics ● Environmental Impact <p>Students will be able to discuss the differences in the types of the following engineering jobs relating to:</p> <ul style="list-style-type: none"> ● Mechanical Energy ● Geothermal ● Hydrodynamic ● Electrical 	
<p>Strategies/Modes</p> <ul style="list-style-type: none"> ● Class discussion to assess prior knowledge engineers and their jobs. ● Reading Assignments- news article handouts ● 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> ● Supplementary materials- news articles, handouts. 	<p>Assessments (examples)</p> <p>Design Brief - Career selection and educational demands</p> <p>Student Presentation</p> <p>Unit Quiz</p>

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Unit 2

Energy Overview: Current sources, Alternative sources

Narrative.....In the world we live in today society and individuals use energy at an incredible rate. Today, most of the energy consumed in the United States comes from fossil fuels — coal, petroleum, and natural gas, with crude oil-based petroleum as the dominant source of energy. Renewable energy resources supply a relatively small but steady portion, about 8% of U.S. total energy consumption. In the late 1950s, nuclear fuel began to be used to generate electricity, and in recent years has surpassed renewable energy sources. There are so many different types of energy sources in the world today that students need to realize there are endless opportunities to take advantage of this and will be able to get into industries that are going to be expanding exponentially in the coming years. These students will explore and understand the vast array of new sources of energy we can harness to not only cut the cost of energy consumption down but to save our natural resources and environment from overuse of our current energy sources.

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Grade: 10-11	<p style="text-align: center;">Subject: Technology Education- Alternative Energy Engineering 1 Current Energy Sources Alternative Energy Sources</p>
CTE Standard	<p><i>MATHEMATICS STANDARDS</i> <i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i> <i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>Pre-Engineering Technology Standards</i> <i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatic, mechanical, fluid and thermal systems</i></p>
Enduring Understanding	<ul style="list-style-type: none"> ● Alternative energies are an important part of the future of energy sources. ● Designs are processes that take time with no definite end. ● Research and investigating different options for a problems solution is key to success. ● Working as a team to solve a problem is important in today’s workforce.

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	<ul style="list-style-type: none"> • Unknown problems will develop with new designs. • Problem solving is important to development.
Essential Questions	<ul style="list-style-type: none"> • What can an individual do to change the energy consumption? • Which energy source is good for my lifestyle? • What types of alternative energies are available to me now? • How does each energy source affect me personally? Locally?
Content Standard:	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> • <i>Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.</i> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <ul style="list-style-type: none"> • <i>Select and use appropriate methods for computing to solve problem in a variety of contexts</i> • <i>Solve problems involving scientific notation and absolute value</i> • <i>Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.</i>

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READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

Pre-Engineering Technology Standards

G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.

27. Solve problems using vectoring, predict resultant forces.
28. Describe and use Ohm's and Watt's laws.
29. Describe and differentiate among series, parallel, and combination circuits.

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	<p>30. Explain AC and DC systems.</p> <p>31. Identify the causes of resistance in a fluid system.</p> <p>32. Describe components of hydraulic and pneumatic systems.</p> <p>33. Identify three ways in which heat is transferred.</p> <p>34. Explain the difference between Celsius and Fahrenheit scales.</p> <p>35. Describe heat conductors and insulators.</p> <p>36. Identify the six simple machines and their applications.</p> <p>37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems.</p> <p>38. Draw a circuit diagram and lay out the circuit.</p> <p>39. Identify direction of heat flow given differences in temperature.</p> <p>40. Describe the use of insulation to minimize heat flow.</p> <p>41. Explain furle in electrical, mechanical, fluid and thermal systems.</p> <p>42. Describe work in electrical, mechanical, fluid and thermal systems.</p> <p>43. Explain rate in electrical, mechanical, fluid and thermal systems.</p> <p>44. Describe resistance in electrical, mechanical, fluid and thermal systems.</p>
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to use vocabulary related to directly to energy sources:</p> <ul style="list-style-type: none"> ● Nuclear ● coal ● gas, ● wind ● hydro, ● solar ● fossil fuel ● natural gas ● propane ● wood <p>Students will be able to discuss the influencing factors on which energy sources are chosen in certain areas of the country or world.</p>

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- Political
- economic
- geography
- climate change
- pollution

Students will be able to explain in detail the benefits and downsides to certain types of energy sources.

- Nuclear
- coal
- gas,
- wind
- hydro
- solar
- fossil fuel
- natural gas
- propane
- wood

Students will be able to explain the different types of energy sources for

- Industries
- Residential
- Transportation

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Strategies/Modes	Materials/Resources (examples)	Assessments (examples)
<ul style="list-style-type: none">● Class discussion to assess prior knowledge on current and alternative energy sources and their uses.● Reading Assignments- news article handouts● Textbook- Powering the Future● Pages- Chapter 1, 2, 3	<ul style="list-style-type: none">● Textbook- Powering the Future by Daniel B. Botkin● Supplementary materials- news articles, handouts.	<ul style="list-style-type: none">● Observations and conversations with students throughout the lessons● Student presentation on energy source.● Student activities.

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Alternative Energy 1

Unit 3

Electrical Systems and Components:

Circuit, resistor, compositor, grid system, generators, conductors, insulators, voltage, current.

Narrative.....Electricity can be an overwhelming, complex and confusing system to most students. This unit is designed to take the complexity and confusion out of electricity to allow students to fully understand the different components that make up electrical systems. Almost every single unit that will be covered in this class will deal with electricity and how electricity is made and transported. To have this core basic understanding of how these systems work is key to having a successful class. Understanding the dangers and safety precautions that need to be taken while working with electricity is extremely important. Having a respect and understanding of electricity is key to how this course will be run while making it successful and educational. Measuring the different types of electrical AC and DC currents will allow students in this class to be successful throughout the course work.

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Grade: 10-11	Subject: Technology Education- Alternative Energy 1 Current Energy Sources Alternative Energy Sources
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>Pre-Engineering Technology Standards</i></p> <p style="padding-left: 40px;"><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p style="padding-left: 40px;"><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>

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Enduring Understanding	<ul style="list-style-type: none"> • Electrical circuits are made up of many components • Each component in an electrical circuit is an important part of the system • Electricity can be dangerous when the proper safety precautions are not taken. • The differences of AC and DC currents. • Scientific knowledge is important to all forms of learning. • Working in groups to solve problems is part of a successful plan. • Having the ability to problem solve is a useful tool throughout life.
Essential Questions	<ul style="list-style-type: none"> • What can an individual do to be safe while dealing with electricity? • What are the main differences in AC and DC currents? • What is the proper way to use a multimeter to measure electrical current? • How does electricity get transported from the source into your home in a useable manner?
Content Standard:	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> • <i>Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.</i> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING</i></p>

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PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.

- *Select and use appropriate methods for computing to solve problem in a variety of contexts*
- *Solve problems involving scientific notation and absolute value*
- *Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.*

READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

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B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.
6. Describe the process for researching known, relevant information, constraints and limitations.
7. Analyze and research between alternate solutions.
8. Develop details of a solution.
9. Build a prototype from plans.
10. Test a prototype.
11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.

27. Solve problems using vectoring, predict resultant forces.
28. Describe and use Ohm's and Watt's laws.
29. Describe and differentiate among series, parallel, and combination circuits.
30. Explain AC and DC systems.
31. Identify the causes of resistance in a fluid system.
32. Describe components of hydraulic and pneumatic systems.
33. Identify three ways in which heat is transferred.
34. Explain the difference between Celsius and Fahrenheit scales.
35. Describe heat conductors and insulators.
36. Identify the six simple machines and their applications.

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	<p>37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems.</p> <p>38. Draw a circuit diagram and lay out the circuit.</p> <p>39. Identify direction of heat flow given differences in temperature.</p> <p>40. Describe the use of insulation to minimize heat flow.</p> <p>41. Explain furl in electrical, mechanical, fluid and thermal systems.</p> <p>42. Describe work in electrical, mechanical, fluid and thermal systems.</p> <p>43. Explain rate in electrical, mechanical, fluid and thermal systems.</p> <p>44. Describe resistance in electrical, mechanical, fluid and thermal systems.</p>
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to explain the differences in important electrical circuit components.</p> <ul style="list-style-type: none"> ● Power source ● Resistors ● Generator ● conductors ● insulators ● voltage ● Current <ul style="list-style-type: none"> ● Students will be able to use a multimeter while diagnosing electrical circuits and take electrical output readings. ● Students will understand the differences in alternating current and direct current circuits. ● Students will be able to identify the correct types of electrical currents that are used for household. ● Students will be able to identify the correct type of electrical currents used in vehicles. ● Students will be able to create a basic electrical circuit. ● Students will work with models to create basic electrical circuits. ● Students will understand the safe way to use electrical systems. ● Students will be able to identify safe and unsafe ways to work with electricity.

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Strategies/Modes	Materials/Resources (examples)	Assessments (examples)
<ul style="list-style-type: none">● Class discussion● Lab activity- creating electric generators/motors● Reading Assignments- Worksheet handouts.● Textbook- Powering the Future● Pages- Chapter 10, 11, 12.	<ul style="list-style-type: none">● Textbook- Powering the Future by Daniel B. Botkin● Supplementary materials.	<ul style="list-style-type: none">● Observations and conversations with students throughout the lessons● Student activity on creating electric motors/generators- observations.

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Alternative Energy 1

Unit 4

Mechanical Energy

Narrative.....Mechanical energy influences how we live our daily lives and the way society is run. Mechanical energy is produced by of many other forms of energy such as chemical, hydro, solar, wind etc. Almost every type of energy we use in today's society is turned into mechanical energy as an output or end result of the previous type of energy. Vehicles are the number one example of mechanical energy. This unit is designed to take a look at the different aspects of vehicles and how they use energies to maximize the output that they produced. Students will have to design and engineer a mouse trap race car that demonstrates mechanical, kinetic and potential energies to meet certain requirements and guidelines. This will allow the students to get a better understanding on how energy is transferred from one form to another in a challenging and exciting manner.

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Grade: 10-11	Subject: Technology Education- Alternative Energy 1 Mechanical Energy
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> <i>• Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> <i>• Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> <i>• Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.</i> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <ul style="list-style-type: none"> <i>• Select and use appropriate methods for computing to solve problem in a variety of contexts</i> <i>• Solve problems involving scientific notation and absolute value</i> <i>• Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.</i>

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	<p>READING STANDARDS</p> <p>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</p> <p>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</p> <p>Pre-Engineering Technology</p> <p>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</p> <p>E. Teamwork: Explain the characteristics of an effective design team and the process.</p> <p>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</p>
<p>Enduring Understanding</p>	<ul style="list-style-type: none"> ● Designs are processes that take time with no definite end. ● Research and investigating different options for a problems solution is key to success. ● Working as a team to solve a problem is important in today’s workforce. ● Every role in a design team is as important as the next. ● The design brief process is a never ending process.

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<p>Essential Questions</p>	<ul style="list-style-type: none"> • Where can you find mechanical energy in everyday life? • How can mechanical energy be only potential or kinetic and not come from another source? • What ways does mechanical energy create other forms of energy? • What ways can we help influence the efficiency and power from mechanical energy? • What are the processes of design?
<p>Content Standard:</p>	<p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <ul style="list-style-type: none"> • <i>Students recognize and appreciate that contemporary and classical literature has shaped human thought</i> • <i>Students interpret, analyze and evaluate text in order to extend understanding and appreciation</i> • <i>Students communicate with others to create interpretations of written, oral and visual texts</i> • <i>Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text</i> • <i>Students use appropriate strategies before, during and after reading in order to construct meaning</i> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <ul style="list-style-type: none"> • <i>Students interpret, analyze and evaluate text in order to extend understanding and appreciation</i> • <i>Students communicate with others to create interpretations of written, oral and visual texts</i> • <i>Students use appropriate strategies before, during and after reading in order to</i>

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construct meaning

Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.
6. Describe the process for researching known, relevant information, constraints and limitations.
7. Analyze and research between alternate solutions.
8. Develop details of a solution.
9. Build a prototype from plans.
10. Test a prototype.
11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.
21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).

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	<p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p> <ol style="list-style-type: none"> 27. Solve problems using vectoring, predict resultant forces. 28. Describe and use Ohm's and Watt's laws. 29. Describe and differentiate among series, parallel, and combination circuits. 30. Explain AC and DC systems. 31. Identify the causes of resistance in a fluid system. 32. Describe components of hydraulic and pneumatic systems. 33. Identify three ways in which heat is transferred. 34. Explain the difference between Celsius and Fahrenheit scales. 35. Describe heat conductors and insulators. 36. Identify the six simple machines and their applications. 37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems. 38. Draw a circuit diagram and lay out the circuit. 39. Identify direction of heat flow given differences in temperature. 40. Describe the use of insulation to minimize heat flow. 41. Explain furl in electrical, mechanical, fluid and thermal systems. 42. Describe work in electrical, mechanical, fluid and thermal systems. 43. Explain rate in electrical, mechanical, fluid and thermal systems. 44. Describe resistance in electrical, mechanical, fluid and thermal systems
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to describe how mechanical energy is influenced greatly by other forms of energy.</p> <p>Students will know essential vocabulary related to mechanical energy: kinetic, potential, heat, friction, drive train, gears, gear ratios, leverage, rotational force.</p> <p>Students will be able to design, construct, test and redesign a mouse trap drag car.</p> <p>Students will be able to explain the design brief process and why it is important to development of technology today.</p>

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Strategies/Modes	Materials/Resources (examples)	Assessments (examples)
<ul style="list-style-type: none"> ● Class discussion ● Lab activity- mouse trap drag car ● Reading Assignments- Internet Articles ● Textbook- Powering the Future 	<ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Student activity on creating a mouse trap drag car.

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Alternative Energy Engineering 1

Unit 5

Hydro Energy: Past, current and future development of hydro energies.

Narrative.....Hydro energy is one of the world's oldest forms of energy that humans have harnessed to use to complete a job or task. From the very first water wheels used to grind up grains to the massive hydro electric dams that are used today to power some of the world's greatest cities. In this unit we will explore the past, current and future developments in hydro energies and their various uses. Students will explore how much power water can give to society and the different ways of harnessing this power. We will explore future techniques of harnessing tides and using ocean swells to generate the power society needs. Using hands on experiments students will be able to determine what kind of power a body of water can deliver as well as ways to increase this power.

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Grade: 10-11	Subject: Technology Education- Alternative Energy 1 Hydrodynamic Energy
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>Pre-Engineering Technology</i></p> <p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>

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<p>Enduring Understanding</p>	<ul style="list-style-type: none"> • Hydro energy is one of humankind's oldest forms of harnessed alternative energies. • Hydro energy is still a developing technology in new and better forms. • Hydro energy is only going to expand and develop further in aiding society in its energy needs. • Designs are processes that take time with no definite end. • Research and investigating different options for a problems solution is key to success. • Working as a team to solve a problem is important in today's workforce. • Every role in a design team is as important as the next. • Unknown problems will develop with new designs. • Problem solving is important to development of new technologies..
<p>Essential Questions</p>	<ul style="list-style-type: none"> • How is hydro energy created and harnessed? • What are the benefits of hydro energy? • What are the downfalls to hydro energy? • How can we develop new forms of hydro energy?
<p>Content Standard:</p>	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> • <i>Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.</i> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p>

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- *Select and use appropriate methods for computing to solve problem in a variety of contexts*
- *Solve problems involving scientific notation and absolute value*
- *Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.*

READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

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Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.
6. Describe the process for researching known, relevant information, constraints and limitations.
7. Analyze and research between alternate solutions.
8. Develop details of a solution.
9. Build a prototype from plans.
10. Test a prototype.
11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.
21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).

G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.

27. Solve problems using vectoring, predict resultant forces.

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	<ol style="list-style-type: none"> 28. Describe and use Ohm's and Watt's laws. 29. Describe and differentiate among series, parallel, and combination circuits. 30. Explain AC and DC systems. 31. Identify the causes of resistance in a fluid system. 32. Describe components of hydraulic and pneumatic systems. 33. Identify three ways in which heat is transferred. 34. Explain the difference between Celsius and Fahrenheit scales. 35. Describe heat conductors and insulators. 36. Identify the six simple machines and their applications. 37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems. 38. Draw a circuit diagram and lay out the circuit. 39. Identify direction of heat flow given differences in temperature. 40. Describe the use of insulation to minimize heat flow. 41. Explain force in electrical, mechanical, fluid and thermal systems. 42. Describe work in electrical, mechanical, fluid and thermal systems. 43. Explain rate in electrical, mechanical, fluid and thermal systems. 44. Describe resistance in electrical, mechanical, fluid and thermal systems.
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to explain how hydro power has had a major impact on the history of human society.</p> <p>Students will be able to construct a working water wheel in scale to use in a stream.</p> <p>Students will be able to understand the impacts of hydro energy on the environment and society.</p> <p>Students will be able to read how much power a local water source contains.</p> <p>Students will be able to explain in detail the benefits and downfalls to hydroelectric power.</p>

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	Students will be able to use their knowledge of hydro electric power to develop more efficient ways of harnessing waters power.	
Strategies/Modes	Materials/Resources (examples)	Assessments (examples)
<ul style="list-style-type: none"> ● Class discussion ● Lab activity- creating water wheels. ● Reading Assignments- Textbook- Powering the Future ● Pages- Chapter. 4 and 8 	<ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Student activity on creating water wheels with generators. ● Hydro energy quiz.

Seymour Public Schools Curriculum

Alternative Energy 1

Unit 6

Heat Energy: Geothermal Heating and Thermal Heat.

Narrative.....Heat energy has been used for as long as humans have needed sources of warmth, comfort and light. There have been developments in heat energy directly from one of the biggest energy sources on earth, its core. Harnessing the power and heat of the inner core of the earth to transport warmth into our homes is an amazing technology. Having the ability to induct hot air in vents that is created by the warmth below our feet is a great source of energy that is almost an infant in its development. There are great strides being made and in this unit students will explore and experience different ways heat energy is used to help us better our lives. We will explore how heat energy was one of the earliest forms of fuels for transportation and entertainment by using hot air balloons.

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Grade: 10-11	Subject: Technology Education- Alternative Energy 1 Geothermal Energy Thermal Energy
CSDE Standard	<i>MATHEMATICS STANDARDS</i> <i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i> <i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i> <i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i> <i>READING STANDARDS</i> <i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i> <i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i> <i>Pre-Engineering Technology</i>

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	<p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>
<p>Enduring Understanding</p>	<ul style="list-style-type: none"> ● Heat energy is one of the most abundant forms of energy in the earth today ● Heat energy is the oldest form of transportation fuel used by humans. ● How geothermal heating is extremely effective for home and small building heating. ● Designs are processes that take time with no definite end. ● Research and investigating different options for a problems solution is key to success. ● Working as a team to solve a problem is important in today’s workforce. ● Every role in a design team is as important as the next. ●
<p>Essential Questions</p>	<ul style="list-style-type: none"> ● How is geothermal heating harnessed and used? ● What are the benefits of geothermal heating? ● What are the downfalls to geothermal heating? ● How do humans use thermal energy for transportation?
<p>Content Standard:</p>	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> ● <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> ● <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent,</i>

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exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.

2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES

- *Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.*

3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.

- *Select and use appropriate methods for computing to solve problem in a variety of contexts*
- *Solve problems involving scientific notation and absolute value*
- *Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.*

READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

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8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.
6. Describe the process for researching known, relevant information, constraints and limitations.
7. Analyze and research between alternate solutions.
8. Develop details of a solution.
9. Build a prototype from plans.
10. Test a prototype.
11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.

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	<p>21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).</p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p> <p>27. Solve problems using vectoring, predict resultant forces.</p> <p>28. Describe and use Ohm's and Watt's laws.</p> <p>29. Describe and differentiate among series, parallel, and combination circuits.</p> <p>30. Explain AC and DC systems.</p> <p>31. Identify the causes of resistance in a fluid system.</p> <p>32. Describe components of hydraulic and pneumatic systems.</p> <p>33. Identify three ways in which heat is transferred.</p> <p>34. Explain the difference between Celsius and Fahrenheit scales.</p> <p>35. Describe heat conductors and insulators.</p> <p>36. Identify the six simple machines and their applications.</p> <p>37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems.</p> <p>38. Draw a circuit diagram and lay out the circuit.</p> <p>39. Identify direction of heat flow given differences in temperature.</p> <p>40. Describe the use of insulation to minimize heat flow.</p> <p>41. Explain force in electrical, mechanical, fluid and thermal systems.</p> <p>42. Describe work in electrical, mechanical, fluid and thermal systems.</p> <p>43. Explain rate in electrical, mechanical, fluid and thermal systems.</p> <p>44. Describe resistance in electrical, mechanical, fluid and thermal systems.</p>
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to explain how geothermal energy is a viable and useful resource for heating of homes and businesses.</p> <p>Students will be able to explain how a geothermal energy source is harnessed in the heating of buildings.</p>

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	<p>Students will be able to analyze and describe how thermal energy can be used in transportation.</p> <p>Students will be able to construct, analyze and test a working hot air balloon model to demonstrate the characteristics of thermal energy.</p>	
<p>Strategies/Modes</p> <ul style="list-style-type: none"> ● Class discussion ● Lab activity- creating thermal energy powered balloon. ● Reading Assignments- Textbook- Powering the Future ● Pages- Chapter 12 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<p>Assessments (examples)</p> <ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Student activity on creating a thermal energy powered balloon. ● Geothermal energy quiz.

ALTERNATIVE ENERGY ENGINEERING 2

Alternative Energy Engineering 2

Unit 7

Seymour Public Schools Curriculum

Alternative Energy Engineering Careers, Goals Expectations

Narrative.....In the world of alternative energy there is a high demand for competent, skilled and driven engineers. The entire alternative energy industry is driven and ran by these engineers. One of the fastest growing job markets for engineers is in the energy trades. Oil companies are recognizing the facts that they need new ways to make money through energy sources. These new crop of engineers they are hiring are focused on the alternative energy sector of the market. There are so many different types of alternative energy technologies being developed that the future engineers of the world are able to pick and choose their specialties to focus their energy on. The students will be able to explore the different types of engineering jobs that are available. The students will be exploring the expectations of these engineers and goals to meet those expectations.

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Grade: 10-11	<p style="text-align: center;">Subject: Technology Education- Alternative Energy Engineering 2 Current Engineering Jobs Future Engineering Jobs Expectations of Engineers</p>
CTE Standard	<p><i>Pre-Engineering Technology</i> <i>C. Career Awareness: Identify and describe various careers in the engineering field including educational requirements and ethical expectations.</i></p> <p><i>READING STANDARDS</i> <i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</p>
Enduring Understanding	<ul style="list-style-type: none"> ● Alternative energy technologies have many opportunities for engineering careers ● Engineers are an important factor in today's energy market. ● Engineers must work under strict guidelines and regulations. ● Engineers work as a team to solve multiple problems in today's workforce. ● Problem solving skills is important to development as an engineer.
Essential Questions	<ul style="list-style-type: none"> ● What can an individual do to prepare for the type of engineering job they desire? ● Which engineering career is the best for my interests? ● What types of alternative energy engineering careers are available? ● How do the different types of engineering jobs differ from one another? ● What are the expectations of an engineer? ●

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Content Standard:	<p><i>Pre-Engineering Technology</i></p> <p><i>A. Career Awareness: Identify and describe various careers in the engineering field including educational requirements and ethical expectations.</i></p> <ol style="list-style-type: none">1. Describe major engineering fields.2. Identify functions of an engineer.3. Identify educational requirements for an engineer.4. Describe ethics related to engineering situations (e.g., environmental, sustainable engineering, medical, and corrupt practices.) <p><i>READING STANDARDS</i></p> <p>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</p> <ul style="list-style-type: none">• Students recognize and appreciate that contemporary and classical literature has shaped human thought• Students interpret, analyze and evaluate text in order to extend understanding and appreciation• Students communicate with others to create interpretations of written, oral and visual texts• Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text• Students use appropriate strategies before, during and after reading in order to construct meaning <p>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</p> <ul style="list-style-type: none">• Students interpret, analyze and evaluate text in order to extend understanding and appreciation• Students communicate with others to create interpretations of written, oral and visual texts• Students use appropriate strategies before, during and after reading in order to construct meaning
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<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to use vocabulary related directly to engineering:</p> <ul style="list-style-type: none"> ● Analysis ● Systems ● Communications ● Design ● Constraints ● Ethics ● Environmental Impact <p>Students will be able to discuss the differences in the types of the following engineering jobs:</p> <ul style="list-style-type: none"> ● Hydrogen ● Solar ● Wind ● Product Development 		
<p>Strategies/Modes</p> <ul style="list-style-type: none"> ● Class discussion to assess prior knowledge engineers and their jobs. ● Reading Assignments- news article handouts ● 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> ● Supplementary materials- news articles, handouts. 	<p>Assessments (examples)</p> <ul style="list-style-type: none"> ● Design Brief - Career selection and educational demands ● Student Presentation ● Unit Quiz 	

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Alternative Energy Engineering 2

Unit 8

Hydrogen Fuels

Narrative.....In today's world hydrogen energy is the most abundant form of energy. It is the main chemical make up in all other forms of energy. It is a very important part of society and needs to be looked at from a different perspective on how these forms of energy can be altered or developed into being more efficient forms of energy for us to use. Students will examine the current ways this energy source is used in order to develop on a further scale. There are many situations in which hybrid forms of these sources are being used today. This unit will give students a better chance to understand hydrogen energy and its great potential.

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Grade: 10-11	Subject: Technology Education- Alternative Energy Engineering 2 Hydrogen Fuels
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>Pre-Engineering Technology</i></p> <p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>

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Enduring Understanding	<ul style="list-style-type: none"> • Hydrogen energy is the world's' most abundant resource. • Hydrogen energy can be as effective as other forms of current energy. • Energy stored in the bonds between atoms and molecules is what makes up hydrogen energies.
Essential Questions	<ul style="list-style-type: none"> • What are the different types of hydrogen energy? • In what ways can hydrogen energy be used in a more efficient manner for transportation? • How can we collectively increase the use of hydrogen energy in our society? • What would be the best application for hydrogen energy?
Content Standard:	<p><i>MATHEMATICS STANDARDS</i></p> <p>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</p> <ul style="list-style-type: none"> • Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools • Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales. <p>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</p> <ul style="list-style-type: none"> • Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information. <p>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</p> <ul style="list-style-type: none"> • Select and use appropriate methods for computing to solve problem in a variety of contexts • Solve problems involving scientific notation and absolute value • Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.

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READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.

6. Describe the process for researching known, relevant information, constraints and limitations.

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7. Analyze and research between alternate solutions.

8. Develop details of a solution.

9. Build a prototype from plans.

10. Test a prototype.

11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.

21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).

G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.

27. Solve problems using vectoring, predict resultant forces.

28. Describe and use Ohm's and Watt's laws.

29. Describe and differentiate among series, parallel, and combination circuits.

30. Explain AC and DC systems.

31. Identify the causes of resistance in a fluid system.

32. Describe components of hydraulic and pneumatic systems.

33. Identify three ways in which heat is transferred.

34. Explain the difference between Celsius and Fahrenheit scales.

35. Describe heat conductors and insulators.

36. Identify the six simple machines and their applications.

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	<p>37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems.</p> <p>38. Draw a circuit diagram and lay out the circuit.</p> <p>39. Identify direction of heat flow given differences in temperature.</p> <p>40. Describe the use of insulation to minimize heat flow.</p> <p>41. Explain furl in electrical, mechanical, fluid and thermal systems.</p> <p>42. Describe work in electrical, mechanical, fluid and thermal systems.</p> <p>43. Explain rate in electrical, mechanical, fluid and thermal systems.</p> <p>44. Describe resistance in electrical, mechanical, fluid and thermal systems.</p>	
<p>Performance Expectations (Student outcomes)</p>	<p>Students will be able to explain how hydrogen energy creates usable energy.</p> <p>Students will be able to develop and analyze models demonstrating a hydrogen energy usage.</p> <p>Students will be able to understand vocabulary pertaining to hydrogen energies.</p> <p>Students will understand how technologies can influence the decisions made by vehicle manufacturers.</p>	
<p>Strategies/Modes</p> <ul style="list-style-type: none"> ● Class discussion ● Lab activity- hydrogen powered boats ● Reading Assignments- Textbook- Powering the Future ● Pages- Chapter 11 page 211 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<p>Assessments (examples)</p> <ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Engineering development of hydrogen powered boats, cars etc ● Design brief of developmental process. ● Unit Quiz

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Alternative Energy Engineering 2

Seymour Public Schools Curriculum

Unit 9

Solar Energy

Narrative.....Solar energy is one of the most widely known forms of alternative energy; it can be extremely efficient when using it in the proper settings and has a large impact on construction and design of architecture today. Solar energy is already being widely used around the world to power houses, factories, and everyday items we use in life. This unit is designed to allow the student to break down the processes of using solar power as an energy source for homes, vehicles and other necessities of modern life. Students will have the opportunity to design and build their own solar powered household. This will allow for a more hands on approach at learning about one of the more well known forms of alternative energy.

Seymour Public Schools Curriculum

Grade: 10-11	Subject: Technology Education- Alternative Energy Engineering 2 Solar Energy
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>

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<p>Enduring Understanding</p>	<ul style="list-style-type: none"> • Designs are processes that take time with no definite end. • Research and investigating different options for a problems solution is key to success. • Working as a team to solve a problem is important in today’s workforce. • Every role in a design team is as important as the next. • Solar power is a never ending source of energy.
<p>Essential Questions</p>	<ul style="list-style-type: none"> • What is the best application to use solar power? • How can solar power be used in everyday life? • In what ways is solar power being used in society today? • What is photovoltaic energy?
<p>Content Standard:</p>	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> • <i>Use technological tools such as spreadsheets, probes, computer algebra systems and</i>

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graphing utilities to organize and analyze large amounts of numerical information.
3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.

- *Select and use appropriate methods for computing to solve problem in a variety of contexts*
- *Solve problems involving scientific notation and absolute value*
- *Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.*

READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to*

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construct meaning

Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.

6. Describe the process for researching known, relevant information, constraints and limitations.

7. Analyze and research between alternate solutions.

8. Develop details of a solution.

9. Build a prototype from plans.

10. Test a prototype.

11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.

21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).

G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.

27. Solve problems using vectoring, predict resultant forces.

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	<ol style="list-style-type: none"> 28. Describe and use Ohm's and Watt's laws. 29. Describe and differentiate among series, parallel, and combination circuits. 30. Explain AC and DC systems. 31. Identify the causes of resistance in a fluid system. 32. Describe components of hydraulic and pneumatic systems. 33. Identify three ways in which heat is transferred. 34. Explain the difference between Celsius and Fahrenheit scales. 35. Describe heat conductors and insulators. 36. Identify the six simple machines and their applications. 37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems. 38. Draw a circuit diagram and lay out the circuit. 39. Identify direction of heat flow given differences in temperature. 40. Describe the use of insulation to minimize heat flow. 41. Explain furl in electrical, mechanical, fluid and thermal systems. 42. Describe work in electrical, mechanical, fluid and thermal systems. 43. Explain rate in electrical, mechanical, fluid and thermal systems. 44. Describe resistance in electrical, mechanical, fluid and thermal systems.
<p>Performance Expectations (Student outcomes)</p>	<ul style="list-style-type: none"> ● Students will understand how solar energy is converted into usable electricity. ● Students will be able to describe in detail how solar energy is used by industrial companies. ● Students will understand how solar panels can be used to heat water in a home. ● Students will have the ability to design their own home solar energy system. ● Students will describe and analyze the effectiveness of solar power as an energy source.

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Strategies/Modes	Materials/Resources (examples)	Assessments (examples)
<ul style="list-style-type: none"> ● Class discussion ● Lab activity- solar energy house. ● Reading Assignments- Internet articles ● Textbook- Powering the future ● Pages- Chapter 7 page 141. 	<ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Student activity in creating solar energy model house. ● Design brief of home build. ● Unit Quiz

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Alternative Energy Engineering 2

Unit 10

Wind Energy

Narrative.....Wind energy is one of the world's oldest forms of green energy. Wind energy has been used by humans to pump water and grind up grains as early as 200 B.C. Wind power much like hydro power is a never ending source of energy that is completely green. In this unit students will have the chance to explore how wind energy is used to produce electricity. Students will learn about the benefits and downfalls to using wind energy as a source of energy. In this unit students will experiment with different types of wind turbine props and learn how shapes and sizes of props can affect how effective a wind turbine can be.

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<p>Grade: 10-11</p>	<p style="text-align: center;">Subject: Technology Education- Alternative Energy Engineering 2 Wind Energy</p>
<p>CTE Standard</p>	<p><i>MATHEMATICS STANDARDS</i> <i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i> <i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p>

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<p>Enduring Understanding</p>	<ul style="list-style-type: none"> • Designs are processes that take time with no definite end. • Research and investigating different options for a problems solution is key to success. • Working as a team to solve a problem is important in today’s workforce. • Every role in a design team is as important as the next. • Unknown problems will always rise up with new designs.
<p>Essential Questions</p>	<ul style="list-style-type: none"> • How do wind turbines create usable electricity? • What are the different types of wind turbines? • How can wind turbines be good or bad for the environment? • How can wind energy be used in everyday life? • In what ways does blade shape affect how well a wind turbine works?
<p>Content Standard:</p>	<p><i>MATHEMATICS STANDARDS</i> <i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> </p>

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2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES

- *Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.*

3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.

- *Select and use appropriate methods for computing to solve problem in a variety of contexts*
- *Solve problems involving scientific notation and absolute value*
- *Develop and use a variety of strategies to estimate values of formulas, functions and roots; to recognize the limitations of estimation; and to judge the implications of the results.*

READING STANDARDS

6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE

- *Students recognize and appreciate that contemporary and classical literature has shaped human thought*
- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students select and apply strategies to facilitate word recognition and develop vocabulary in order to comprehend text*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A

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CONCLUSION

- *Students interpret, analyze and evaluate text in order to extend understanding and appreciation*
- *Students communicate with others to create interpretations of written, oral and visual texts*
- *Students use appropriate strategies before, during and after reading in order to construct meaning*

Pre-Engineering Technology

B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.

5. Identify principles of a problem.
6. Describe the process for researching known, relevant information, constraints and limitations.
7. Analyze and research between alternate solutions.
8. Develop details of a solution.
9. Build a prototype from plans.
10. Test a prototype.
11. Describe the steps of the design process (e.g, create, evaluate, synthesis, final solution, findings, and present.)

E. Teamwork: Explain the characteristics of an effective design team and the process.

20. Contribute to a team project.

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	<p>21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).</p> <p><i>G. Engineering Systems: Identify and describe the various systems that are part of the engineering field including electrical, electronics, hydraulic, pneumatics, mechanical, fluid and thermal systems.</i></p> <p>27. Solve problems using vectoring, predict resultant forces.</p> <p>28. Describe and use Ohm's and Watt's laws.</p> <p>29. Describe and differentiate among series, parallel, and combination circuits.</p> <p>30. Explain AC and DC systems.</p> <p>31. Identify the causes of resistance in a fluid system.</p> <p>32. Describe components of hydraulic and pneumatic systems.</p> <p>33. Identify three ways in which heat is transferred.</p> <p>34. Explain the difference between Celsius and Fahrenheit scales.</p> <p>35. Describe heat conductors and insulators.</p> <p>36. Identify the six simple machines and their applications.</p> <p>37. Use appropriate electrical, mechanical, fluid and thermal units to solve problems.</p> <p>38. Draw a circuit diagram and lay out the circuit.</p> <p>39. Identify direction of heat flow given differences in temperature.</p> <p>40. Describe the use of insulation to minimize heat flow.</p> <p>41. Explain force in electrical, mechanical, fluid and thermal systems.</p> <p>42. Describe work in electrical, mechanical, fluid and thermal systems.</p> <p>43. Explain rate in electrical, mechanical, fluid and thermal systems.</p> <p>44. Describe resistance in electrical, mechanical, fluid and thermal systems.</p>
<p>Performance Expectations (Student outcomes)</p>	<ul style="list-style-type: none"> ● Students will be able to describe how wind energy is converted into usable electricity. ● Students will be able to describe how wind turbines affect the environment in positive and negative ways. ● Students will have the ability to design, build and test their own wind turbine to determine the amount of power released by them.

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	<ul style="list-style-type: none"> • Students will understand how blade design influences how much power can be harnessed using a wind turbine. • Students will be able to recognize the different forms of wind turbines. 	
<p>Strategies/Modes</p> <ul style="list-style-type: none"> • Class discussion • Lab activity- Wind Turbine Lesson. • Reading Assignments- Internet articles • Textbook- Powering the Future • Pages- Chapter 6 page 119. 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> • Textbook- Powering the Future by Daniel B. Botkin • Supplementary materials. 	<p>Assessments (examples)</p> <ul style="list-style-type: none"> • Observations and conversations with students throughout the lessons • Student activity in creating wind turbine blades. • Unit Quiz

Alternative Energy Engineering 2

Unit 11

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Energy Design Brief- Final project

Narrative.....Throughout the year students will become familiar with how alternative energies are used in the world today. Students will have developed an understanding of energy sources in both its benefits and downsides. This unit is designed to allow students to solve an energy challenge that will be presented to the class. This unit is part of the final project and grade of the class. The students will have opportunity to research further into alternative energy sources that will allow them develop a unique and alternative way to use green energy sources to further the positive impact green energies can have on society today.

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Grade: 10-11	Subject: Technology Education- Alternative Energy Engineering 2 Product Development
CTE Standard	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <p><i>READING STANDARDS</i></p> <p><i>6) MAKE CONNECTIONS BETWEEN THE TEXT AND OUTSIDE EXPERIENCES AND KNOWLEDGE</i></p> <p><i>8) USE EVIDENCE FROM THE TEXT TO DRAW AND/OR SUPPORT A CONCLUSION</i></p> <p><i>B. Design Process: Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.</i></p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p>
Enduring Understanding	<ul style="list-style-type: none"> ● Designs are processes that take time with no definite end. ● Research and investigating different options for a problems solution is key to success. ● Working as a team to solve a problem is important in today’s workforce.

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	<ul style="list-style-type: none"> ● Every role in a design team is as important as the next. ● Unknown problems will develop with new designs. ● Problem solving is important to development.
Essential Questions	<ul style="list-style-type: none"> ● How can this design problem be solved? ● What do I already know about alternative energy that can be used? ● Which type of alternative energy would best fit this problem? ● Have I looked at all the possibilities? ● When designing do I take the proper steps of a design brief?
Content Standard:	<p><i>MATHEMATICS STANDARDS</i></p> <p><i>1) EXTEND THE UNDERSTANDING OF NUMBER TO INCLUDE INTEGERS, RATIONAL NUMBERS AND REAL NUMBERS</i></p> <ul style="list-style-type: none"> • <i>Compare, locate, label and order real numbers on number lines, scales, coordinate grids and measurement tools</i> • <i>Select and use an appropriate form of number (integer, fraction, decimal, ratio, percent, exponential, scientific notation, irrational) to solve practical problems involving order, magnitude, measures, labels, locations and scales.</i> <p><i>2) INTERPRET AND REPRESENT LARGE SETS OF NUMBERS WITH THE AID OF TECHNOLOGIES</i></p> <ul style="list-style-type: none"> • <i>Use technological tools such as spreadsheets, probes, computer algebra systems and graphing utilities to organize and analyze large amounts of numerical information.</i> <p><i>3) DEVELOP STRATEGIES FOR COMPUTATION AND ESTIMATION USING PROPERTIES OF NUMBER SYSTEMS TO SOLVE PROBLEMS.</i></p> <ul style="list-style-type: none"> • <i>Select and use appropriate methods for computing to solve problem in a variety of contexts</i> • <i>Solve problems involving scientific notation and absolute value</i> • <i>Develop and use a variety of strategies to estimate values of formulas, functions and</i>

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Pre-Engineering Technology

B. Design Process: *Describe the design process including identifying the problem, determining constraints and limitations, analyzing potential solutions as well as the creation of a prototype for testing.*

5. Identify principles of a problem.

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	<p>6. Describe the process for researching known, relevant information, constraints and limitations.</p> <p>7. Analyze and research between alternate solutions.</p> <p>8. Develop details of a solution.</p> <p>9. Build a prototype from plans.</p> <p>10. Test a prototype.</p> <p>11. Describe the steps of the design process (e.g. create, evaluate, synthesis, final solution, findings, and present.)</p> <p><i>E. Teamwork: Explain the characteristics of an effective design team and the process.</i></p> <p>20. Contribute to a team project.</p> <p>21. Identify characteristics of an effective design team (e.g., leadership, responsibility, respect, rapport and time management).</p>
<p>Performance Expectations (Student outcomes)</p>	<ul style="list-style-type: none"> ● Students will understand how a design brief is used to problem solve. ● Students will complete a design brief to solve an alternative energy problem. ● Students will have the ability to design, build and test prototypes of their own alternative energy design briefs. ● Students will be able to develop new and different ways to solve our energy crisis in the world today.

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<p>Strategies/Modes</p> <ul style="list-style-type: none"> ● Class discussion on design brief problems. ● Class discussion ● Internet Articles 	<p>Materials/Resources (examples)</p> <ul style="list-style-type: none"> ● Textbook- Powering the Future by Daniel B. Botkin ● Supplementary materials. 	<p>Assessments (examples)</p> <ul style="list-style-type: none"> ● Observations and conversations with students throughout the lessons ● Student activity in alternative energy design brief. ● Presentation