

**Course Title:** Energy and Power Engineering

**Board Approval Date:** 02/16/2016

**Credit / Hours:** .5 credit

**Course Description:**

Energy and Power Engineering will focus on problem solving activities and projects dealing with energy and power. Various forms of energy, power and power transmission will be investigated. Students will utilize various 3D CAD software packages to aid them in their project designs.

\*\*\*This course helps to fulfill the scope and sequence of Central Columbia courses in the PDE Approved Career and Technical Education program: Engineering Technologies/Technicians, Other.

**Learning Activities / Modes of Assessment:**

Large group / Individual instruction

Worksheets

Participation & Clean Up

Individual / Group Work

Computer Aided Design

Computer Numeric Controlled Equipment

Electrical, Hydraulic, Pnuematic and Mechanization Trainers

Tests and Quizzes

Checklists / Teacher Observation

Projects w/ Rubrics

**Instructional Resources:**

[www.discoveryeducation.com](http://www.discoveryeducation.com)

Technology Student Association

Learning Focused Schools

Online Tutorials

2D and 3D Architectural Software Programs

Preparatory Electricity and Electronics (PEET) 2.0: Complete

MecLab Mechatronics Training System

Hydraulic and Pneumatic Systems Trainer

## Course Pacing Guide Course Pacing Guide

Course: **Energy and Power Engineering**

<b>Course Unit (Topic)</b>	<b>Length of Instruction (Days/Periods)</b>
1. 1C Using SolidWorks to Design Products for the Energy/Power Industries	4 days
2. 1E Wind Turbine Project	10 days
3. 2C Total Quality Control	4 days
4. 2E Bio-Fuel Project	8 days
5. 3C Alternative Energy Engine Design and Build	15 days
6. 3E Solar Energy Project	10 days
7. Basic Electricity and Electronics	13 days
8. Fluid Power Systems	13 days
9. Machine Controls and Automated Systems	<u>13 days</u>
Total Days	90 days

Topic: 1C - Using SolidWorks to Design Products For the Energy and Power Industries

Subject(s): Technology

Grade(s):

Know:

Understand:

Do:

3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.

3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.

3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

3.4.12.E4. -- Compact INFORMATION AND COMMUNICATION TECHNOLOGIES - Synthesize the effects of information and communication systems and subsystems as an integral part of the development of the Information Age.

3.4.12.E7. -- Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.

SolidWorks allows engineers to draw and design products for the energy and power industries.

3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.

3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.

3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

3.4.12.E7. -- Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.

3.4.12.E6. -- Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.

Draw the energy and power themed practical drawings.

3.4.12.E4. - INFORMATION AND COMMUNICATION TECHNOLOGIES: Synthesize the effects of information and communication systems and subsystems as an integral part of the development of the Information Age.

Topic: 1C - Using SolidWorks to Design Products For the Energy and Power Industries

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

3.4.12.E6. – Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.

Reference Geometry

Patterns

Mirror

Swept Boss/Cut

Lofted Boss/Cut

Structural Member

Classification of Instructional Program (CIP) 15.9999 Task Numbers:

601, 602, 607, 608, 1402, 1403, 1903

Topic: 1E Wind Turbine Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.A2. – Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. – Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.C2. – Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p>	<p>The use of green technologies will be an important job for Engineers of the future.</p>	<p>3.4.12.A2. – Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. – Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.A1. – Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.B1. – Essential EFFECTS OF TECHNOLOGY - Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.</p> <p>3.4.12.C2. – Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.C3. – Essential RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION/PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E2. – Essential AGRICULTURAL AND RELATED BIOTECHNOLOGIES - Compare and contrast the technologies of biotechnology, conservation, bio-fuels, and ecosystems as they relate to managing Earth's resources effectively.</p>

Topic: 1E Wind Turbine Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.C3. – Essential RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION / PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E7. – Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.</p> <p>How to use the technological problem solving method when given a problem.</p> <p>How green technologies are used.</p> <p>How to design an efficient wind turbine to generate the maximum</p>		<p>3.4.12.E3. – Essential ENERGY AND POWER TECHNOLOGIES - Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.</p> <p>3.4.12.E7. – Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.</p> <p>Work with partners to brainstorm, design, construct, and test a wind powered turbine.</p> <p>Brainstorm ideas for the design of the solution.</p> <p>Create sketches of the solution.</p> <p>Decide which solution is going to be chosen.</p> <p>Build the device using the sketches.</p> <p>Test the device against other groups in the class.</p> <p>3.4.12.B2. - TECHNOLOGY AND ENVIRONMENT - Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.</p>

Topic: 1E Wind Turbine Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

<p>voltage. 3.4.12.A2. - CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work. 3.4.12.B1. - EFFECTS OF TECHNOLOGY - Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies. 3.4.12.B2. - TECHNOLOGY AND ENVIRONMENT - Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.</p>		
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Topic: 2C – Total Quality Control

Days: 4

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know	Understand	Do
3.4.12.A2. - Describe how management is the process of planning, organizing, and controlling work.	Total Quality Control is a method used in manufacturing where workers and management work together to increase both production and quality.	3.4.12.A2. - Describe how management is the process of planning, organizing, and controlling work.
3.4.12.B1. - Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.		3.4.12.B1. - Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.		Classification of Instructional Program (CIP) 15.9999 Task Numbers: 2101, 2102, 2103, 2104, 2105, 2106, 2107
3.4.12.D2. - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		
13.1.D - Explain the relationship of career training programs to employment opportunities.		



Topic: 2E Bio-fuel Project

Days: 8

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

3.4.12.A2. – Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.

3.4.12.A3. – Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

3.4.12.C2. – Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

- E

Chemical and Industrial Engineers of the future should have a working knowledge of bio-fuels.

3.4.12.A2. – Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.

3.4.12.A3. – Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

3.4.12.C2. – Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.12.C3. – Essential RESEARCH & DEVELOPMENT, INVENTION & INNOVATION, EXPERIMENTATION/PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.

3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.12.E3. – Essential ENERGY AND POWER TECHNOLOGIES - Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

3.4.12.E5. – Important TRANSPORTATION TECHNOLOGIES - Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques.

Topic: 2E Bio-fuel Project

Days: 8

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E5. – Important TRANSPORTATION TECHNOLOGIES - Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques.</p> <p>The basics of bio-diesel technology.</p> <p>How bio-fuels are increasingly being used in the United States.</p> <p>How to develop a small batch of bio-diesel fuel.</p> <p>3.4.12.A2. - CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p>		<p>3.4.12.E2. – Essential AGRICULTURAL AND RELATED BIOTECHNOLOGIES - Compare and contrast the technologies of biotechnology, conservation, bio-fuels, and ecosystems as they relate to managing Earth's resources effectively.</p> <p>Work with partners to develop a working batch of bio-diesel.</p> <p>Follow the directions to make the fuel.</p> <p>Compete against other students in the class by a visual and chemical testing of the fuel.</p>

## Topic: 3C - Alternative Energy Engine Design and Build

Days: 15

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.C2. -- Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p>	<p>SolidWorks can create a set of plans that can be followed to build an alternative energy engine.</p>	<p>3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.C2. -- Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.C3. -- Essential RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION/PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.12.D2. -- Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E5. -- Important TRANSPORTATION TECHNOLOGIES - Explain how the design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques.</p> <p>3.4.12.E6. -- Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.</p>

Topic: 3C - Alternative Energy Engine Design and Build

Days: 20

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.C3. – Essential RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION/ PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E5. – Important TRANSPORTATION TECHNOLOGIES - Explain how the design of intelligent and non-intelligent transportation systems depend on many processes and innovative techniques.</p> <p>3.4.12.E6. – Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.</p>		<p>Draw and assemble the parts of a working model engine.</p> <p>Use SolidWorks to aid in the making of all the parts.</p> <p>Assemble the parts and test run the alternative energy engine</p> <p style="text-align: center;"><b>Classification of Instructional Program (CIP) 15.9999 Task Numbers:</b></p> <p style="text-align: center;">102, 103, 104, 106, 107, 108, 501, 502, 503, 504, 505, 702, 802, 902, 903, 907, 908, 1103, 1205, 1401, 1501</p>

Topic: 3C - Alternative Energy Engine Design and Build

Days: 20

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

Computer Aided Machining (CAM)  Computer Numerical Controlled (CNC)  G-Code		
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Topic: 3E Solar Energy Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:	Understand:	Do:
<p>3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.C2. -- Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p>	<p>There are many aspects of solar technology from fuction to production that must be engineered.</p>	<p>3.4.12.A1. -- Important CHARACTERISTICS OF TECHNOLOGY - Compare and contrast the rate of technological development over time.</p> <p>3.4.12.A2. -- Essential CORE CONCEPTS OF TECHNOLOGY - Describe how management is the process of planning, organizing, and controlling work.</p> <p>3.4.12.A3. -- Essential TECHNOLOGY CONNECTIONS - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).</p> <p>3.4.12.B1. -- Essential EFFECTS OF TECHNOLOGY - Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.</p> <p>3.4.12.C2. -- Essential ENGINEERING DESIGN - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.C3. -- Essential RESEARCH &amp; DEVELOPMENT, INVENTION &amp; INNOVATION, EXPERIMENTATION/PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.</p> <p>3.4.12.D2. -- Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p>3.4.12.E2. -- Essential AGRICULTURAL AND RELATED BIOTECHNOLOGIES - Compare and contrast the technologies of biotechnology, conservation, bio-fuels, and ecosystems as they relate to managing Earth's resources effectively.</p>

## Topic: 3E Solar Energy Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

3.4.12.C3. – Essential RESEARCH & DEVELOPMENT, INVENTION & INNOVATION, EXPERIMENTATION / PROBLEM SOLVING AND TROUBLESHOOTING - Apply the concept that many technological problems require a multi-disciplinary approach.

3.4.12.D2. – Important USING AND MAINTAINING TECHNOLOGICAL SYSTEMS - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.12.E7. – Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.

3.4.12.E6. – Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.

3.4.12.E3. – Essential ENERGY AND POWER TECHNOLOGIES - Compare and contrast energy and power systems as they relate to pollution, renewable and non-renewable resources, and conservation.

3.4.12.E7. – Important CONSTRUCTION TECHNOLOGIES - Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.

3.4.12.E6. – Essential MANUFACTURING TECHNOLOGIES - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.

Work with partners to brainstorm, design, construct, and test a solar powered cooker.

Brainstorm ideas for the design of the solution.

Create sketches of the solution.

Decide which solution is going to be chosen.

Build the device using the sketches.

Test the device against other groups in the class.

3.4.12.B2. - TECHNOLOGY AND ENVIRONMENT - Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.

Topic: 3E Solar Energy Project

Days: 10

Subject(s): Technology

Grade(s): 9th, 10th, 11th, 12th

Know:

Understand:

Do:

The technological design loop.

Basics of solar technology.

All necessary items needed to develop a solar powered appliance.

3.4.12.A2. - CORE CONCEPTS OF TECHNOLOGY -

Describe how management is the process of planning, organizing, and controlling work.

3.4.12.B1. - EFFECTS OF TECHNOLOGY -

Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.

3.4.12.B2. - TECHNOLOGY AND ENVIRONMENT -

Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.



Topic: Basic Electricity and Electronics

Days: 13

Know	Understand	Do
3.4.12.A3. - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).	Electronics is developing circuits that control electricity to complete a specific task.	3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.
3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.		CIP 15.9999 Task Numbers: 611,2301,2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 23,19, 2320, 2321, 2322, 2323, 2324, 2325
3.4.12.D2. - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		
3.4.12.E6. - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.		

Topic: Fluid Power Systems

Days: 13

Know	Understand	Do
3.4.12.A3. - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).	Fluid Power is the use of pressurized liquid or gas to control and transmit power.	3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.
3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.		CIP 15.9999 Task Numbers: 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1401, 1402, 1403, 1404, 1405, 1406
3.4.12.D2. - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		
3.4.12.E6. - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.		

Topic: Machine Controls and Automated Systems

Days: 13

Know	Understand	Do
3.4.12.A3. - Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).	The use of machine controls and automated systems has caused manufacturing companies to become more efficient in their quality production.	3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.12.C2. - Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.
3.4.12.C3. - Apply the concept that many technological problems require a multi-disciplinary approach.		CIP 15.9999 Task Numbers: 906, 1304, 1308, 1401, 1402, 1406, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615
3.4.12.D2. - Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.		
3.4.12.E6. - Compare and contrast the importance of science, technology, engineering and math (STEM) as it pertains to the manufactured world.		