south dakota DEPARTMENT OF EDUCATION
Learning. Leadership. Service.

Introduction to Energy/Power

Career Cluster	STEM
Course Code	20101
Prerequisite(s)	None
Credit	.5
Program of Study and Sequence	Foundation courses – cluster course – Introduction to Energy/Power – specialized pathway course – capstone experience
Student Organization	None
Coordinating Work-Based Learning	Community/industry speakers
Industry Certifications	None
Dual Credit or Dual Enrollment	TBD
Teacher Certification	Technology Education
Resources	O*Net - http://www.onetonline.org Occupational Safety and Health Administration (OSHA)-www.osha.gov

Course Description:

The Introduction to Energy and Power course is designed to provide a basic understanding of the various types of energy, how energy is obtained and the relationships among work, energy, and power. Students will also study the history and effects of energy on society, alternative power, safety and ethics.

Program of Study Application

This is a pathway course in the STEM cluster Energy pathway. It is recommended that the course be preceded by a series of foundation courses and a cluster course in STEM, and followed by a more specialized pathway course such as Alternative Energy Systems and Electronics.

Course Standards

Indicator # EP 1 Analyze the history of energy/power sources

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Content	EP 1.1 Examine the historical development of energy/power production *Example:* • Construct a timeline depicting the development of engines • Collect and summarize data orally or on paper about a famous inventor • Organize an oral report on the development of a power system	Soft skills • Presentation • Organization • Time management • Communication
One Recall	EP 1.2 Assess the impact of energy/power on the way people live and work *Example:* • List various energy sources and machines used prior to the 21st century • Name an invention and write a short paper describing its impact on society, both positive and negative • Define how the past use of energy and machines has negatively impacted the planet Earth	Internet ethics History/Social Studies Trends

Notes:

Indicator #EP 2 Examine the relationships among work, energy, and power

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	EP 2.1 Define work, power, and energy *Example:* • Define work, power, and energy • Recall the mathematics formula that calculates power	
Two Skill/Concept	EP 2.2 Examine the relationship between power and energy sources *Example:* • Compare difference between weight, mass, and force • Apply equations to find missing information pertaining to work, energy and power • Estimate the efficiency of a machine	

Notes:

Indicator # EP 3 Understand the transmission of energy and power

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	EP 3.1 Understand how a mechanical system operates *Example:* • Classify power trains as being either direct or indirect • List the various parts of a power train • Identify the parts of a power train	
Two Skill/Concept	EP 3.2 Understand the types of simple machines *Example:* • Sketch an example of a simple machine • Classify the mechanical advantage of various simple machines • Summarize the mechanical advantage of various simple machines	
Two Skills/Concepts	EP 3.3 Understand both liquid and gas forms of power transmission *Example:* • List the various forms of fluid power • Compare results from actions applied on liquids and gases • Interpret the laws that govern fluids	
One Recall	EP 3.4 Understand the laws that govern electricity *Example:* • State Ohm's Law • Match energy terms and symbols to units of measure • Define electrical quantities	

Notes:

Indicator # EP 4 Understand alternative energy

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	EP 4.1 Understand the sources of alternative energy *Example:* • Compare and contrast the types of alternative energy sources • Organize and prepare a presentation on synthetic fuels • Classify possible alternative energy sources	Trends
Three Strategic Thinking	EP 4.2 Analyze the sources of alternative energy *Example:* • Develop a logical argument on the environmental pros and cons for any one of the alternative energy sources • Investigate one or more of the alternative energy sources • Draw a model of an alternative energy apparatus	

Notes:

Indicator # EP 5 Implement safety with power technology

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	EP 5.1 Examine safety issues relating to mechanical systems *Example:* • Relate and follow safety rules pertaining to moving mechanical systems • Show the proper method of lifting • Apply lab safety rules	Lab safety OSHA
Two Skill/Concept	EP 5.2 Employ safety practices with fluids *Example:* • Apply safety rules relating to high-pressure lines • Show the proper cleanup method for fluids • Apply proper storage methods for flammable/toxic liquids	
One Recall	EP 5.3 Identify fire classification and extinguishers *Example:* • Identify the types of fires • List which extinguisher will fight which type of fire • Identify the locations of fire extinguishers in the lab	Fire department
Two Skill/Concept	EP 5.4 Employ safety practices with electricity *Example:* • Show how to use proper personal protective equipment • Apply safety rules based on *Occupational Safety and Health Administration (OSHA)* standards • Organize policies for the lab based on various emergency situations	Lab Safety OSHA

Notes:

Indicator # EP 6 Understand scientific concepts for energy and power technology

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	EP 6.1 Understand how energy converts from one form to another *Example:* • Recall the concept of the Law of Conservation of Energy • Compare between potential and kinetic energy • Identify the sources of energy	Physical Science
Two Skill/Concept	EP 6.2 Understand the categories of energy *Example:* • Classify the sources of energy • Summarize various methods of transferring energy • Identify uses of sources of energy	Ethics of Efficiencies Physical Science
Three Strategic Thinking	EP 6.3 Understand that an engine performing work exhausts thermal energy that cannot be retrieved to the surroundings *Example:* • Compare efficiency of various types of light bulbs • Compare efficiency for multiple energy sources • Investigate and define the Law of Thermodynamics	
Three Strategic Thinking	EP 6.4 Understand which energy sources can be renewable and non-renewable *Examples:* • Investigate examples of renewable energy sources • Investigate examples of nonrenewable energy sources • Compare methods that are being used to conserve energy	

Notes:

Indicator # EP 7 Explore energy and power career options

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	EP7.1 Research career opportunities in energy and power fields *Examples:* • Investigate and research career opportunities in the energy and power fields using career exploration software • Investigate the career exploration software to research educational requirements for chosen career path • Formulate a report about career opportunities in the energy and power fields • Revise and update student portfolio	Internet ethics Job Services High school counselors Community/ Industry SDMyLife BLS.gov Robotics, engineering, and electronics Career Development

Notes: