south dakota DEPARTMENT OF EDUCATION
Learning. Leadership. Service.

Engineering Design and Development

Career Cluster	STEM
Course Code	21007
Prerequisite(s)	None
Credit	.5
Program of Study and Sequence	Engineering Pathway, Energy Pathway, and Robotics Pathway.
Student Organization	None
Coordinating Work-Based Learning	Interviewing industry professionals, guest speakers, tours, field trips
Industry Certifications	None
Dual Credit or Dual Enrollment	TBD
Teacher Certification	STEM Cluster Endorsement; Engineering & Robotics Pathway Endorsement; 9-12 Engineering Endorsement; 7-12 Technology Education
Resources	Community members, industry professionals

Course Description:

Engineering Design and Development is a pathway course in the STEM Engineering Pathway, STEM Energy Pathway, and STEM Robotics Pathway. Students are engaged in an instructional program that integrates academics, problem solving, communication, and technical preparation and focuses on career awareness. This course is designed to provide the student with an engaging opportunity to research, design, innovate and develop technological artifacts (products). This course will prepare students for direct entry into a career, advanced educational opportunities, and lifelong learning.

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 Engineering, Energy and Robotics.

Course Standards

Indicator # EDD 1 Identify a technologically related problem

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	EDD 1.1 Examine current state of a problem *Example:* • Investigate a needs assessment to determine relative importance of the problem • Formulate pros and cons of a current problem • Compare current problem to similar problems	
Three Strategic Thinking	EDD 1.2 Research solution options to solve problem *Example:* • Investigate possible solutions • Investigate other options via the Internet, library, interviews, etc. • Draw conclusions from research by interviewing industry professionals	Consider implications of human subjects research Professional ethics Soft skills Communication
Three Strategic Thinking	EDD 1.3 Propose new solutions to solve problem *Example:* • Develop a logical design plan, identify, and resolve logic errors • Formulate a course of action to solve the chosen problem	
Four Extended Thinking	EDD 1.4 Identify the best solution *Example:* • Analyze the pros and cons of each solution • Analyze potential solutions • Prove and defend the best solution • Propose solution ideas to team members	Soft skills: • Presentation • Teamwork

Notes:

Indicator # EDD 2 Construct a prototype of the solution to problem

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	EDD 2.1 Construct a prototype to model solution *Example:* • Sketch a prototype of the product • Show product specifications • Construct product according to specifications	
Four Extended Thinking	EDD 2.2 Test prototype for effectiveness *Example:* • Design a product for safety testing • Identify safety factors in a given product or process • Collect data on prototype tests • Analyze the data for prototype effectiveness	Ethics Lab safety and training

Notes:

Indicator # EDD 3 Analyze test data results for prototype performance

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	EDD 3.1 Analyze test results *Example:* • Analyze product performance data • Chart and graph data • Synthesize test results	
Three Strategic Thinking	EDD 3.2 Make decisions based on test result data *Example:* • Assess performance needs • Critique product improvements • Design concept models based on data results	
Four Extended Thinking	EDD 3.3 Redesign the product to meet performance needs *Example:* • Evaluate and sketch changes made to prototype • Judge findings of prototype performance • Apply changes to prototype	

Notes:

Indicator # EDD 4 Communicate solution(s) and the prototype for others

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	EDD 4.1 Communicate solutions for product *Example:* • Create a presentation of the final product for potential clients • Compose a report for potential clients • Design final product options to meet client demand based on needs and responses	Soft skills • Communication • Customer Service • Teamwork • Time management • Organization • Listening

Notes: