Unit 01: Safety

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **2 Weeks**
Status: **Published**

Summary

Introduction: Engineering,, a technical problem solving discipline is explored. Students will use the engineering design loop to solve problems. Students will develop practices to ensure safety in the classroom and beyond.

Revision Date: July 2022

Standards

CS.9-12.8.2.12.ED.5	Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
CS.9-12.ED	Engineering Design
LA.RST.9-10	Reading Science and Technical Subjects
LA.RST.9-10.2	Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LA.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
SCI.9-12.SEP.3	Planning and Carrying Out Investigations
SCI.9-12.SEP.3.c	Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.
	Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints.
	Craft and Structure
	Integration of Knowledge and Ideas

Essential Questions/Enduring Understandings

Essential Questions:

What do engineers do?

How do engineers solve problems?

What are safety concerns and procedures when working with electricity and tools?

Essential Understandings:

Engineers develop apply scientific principles to solve problems

The engineering design loop is used to produce a solution to problems where multiple solutions exist.

The engineering design loop is an interactive process composed of a series of steps.

Identifying, and addressing safety concerns is the highest priority.

Objectives

Students will know key terms: electric engineer, computer engineer, design loop, iterative, scientific method, design log, alternate solutions, brainstorming, design brief, evaluation, and safety.

Students will know engineers are responsible for the design of communications networks, telecommunication systems, controls systems, computers, power systems, and radio frequency/microwave and fiber optic systems.

Students will know the steps of the design loop.

Students will know how to apply the design loop to a problem.

Students will know how to methodically document work in a design log.

Students will be skilled at identifying safety and fire concerns when using electronics.

Students will be skilled at applying strategies and rules for maintaining a safe environment.

Students will be skilled at using unit vocabulary.

Learning Plan

Preview the essential questions and connect them to learning throughout the unit.

Conduct formative assessments throughout the process using class discussion, student writing, and practice quizzes.

Assess to determine the students' background knowledge in the design loop and electrical engineering.

Provide guidance and rubrics for the development of a digital portfolio.

Provide lectures and lessons to develop students' understanding of the design loop.

Provide guidance and rubrics for the development of a digital portfolio.

Complete summative assessments throughout to evaluate skills acquisition.

Possible activities: students to make a poster for drill press safety, electronics lab safety, soldering safety, scroll saw safety, etc.

Conduct formative assessments throughout the design process.

Complete unit summative assessments.

Assessment

Formative:

Participate in a guided question and answer sessions, and group and individual discussions, and show an understanding of the purpose of the unit lesson(s), and their key terms and concepts.

Participate in classroom activities such as class discussion, question and answer sessions, cooperative group projects, and presentation of research.

Develop a digital portfolio that logs student activities throughout the year. The portfolio will be graded using a rubric.

demonstrate the ability to utilize the design loop as a problem-solving tool.

Demonstrate the ability to document work in a design log that is assessed with a rubric.

Summative:

Demonstrate the ability to document work in a design log that is assessed with a rubric.

Demonstrate understanding through written quizzes and tests about subject materials.

Meaningfully address the essential and guiding questions of this unit of study.

Pass tests on safety.

Benchmark:

Develop a digital portfolio that logs student activities throughout the year. The portfolio will be graded using a rubric.

Final exam

Alternative:

Oral exam

Project review

Materials

Textbook: Raymond B. Landis, Studying Engineering: A Road Map to a Rewarding Career (4th ed.). Discovery Press (ISBN-10: 0879348749, ISBN-13: 978-0979348747)

Robotics Lab, including soldering irons, electric and manual drills/drill press, scroll saw, hand-powered saws,

3-D printer and curing machine, safety glasses, hand-operated tools like tin snips, wire cutters, electronic multimeters, power supplies, and electronic components.

Computer Lab: Windows-based computers with Autocad software, Arduino software, LEGO NXT software, CREO software, and INTERNET connectivity.

Consumable materials: materials for 3d Printer, paper, wire, and electronics components (speakers, transistors, capacitors, resistors, etc).

White Board/LCD Screen

Online references from NJIT