*Unit 1 The Engineering Design Process

Content Area: **Technology**
Course(s): **Capstone in Technology, Design & Engineering**
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Status: **Published**

Transfer Skills

The engineering design process is a series of steps that is used to effectively solve problems by following a systematic approach to develop, choose and execute a possible solution.

Enduring Understandings

Society can shape technology, and technology can shape society.

Engineering design is a creative and iterative process for identifying and solving problems in the face of various constraints.

There are often many possible solutions to a problem.

The design process is often called the “design loop” because there is no beginning middle or end but an iterative process of design, testing, and redesign.

Background research involves “skimming the surface” of an engineering design problem to get a basic understanding of the problem as a whole.

Engineering design can be used to develop sustainable solution to real world problems.

Essential Questions

What is technology?

How are science, technology and engineering interrelated?

How does society influence technology and vice versa?

Why is the design process used in engineering design?

Why does a technological product change over time?

What is sustainable design and why is it important in engineering?

Why is it so important to solve global problems and not just local ones?

Content

Design brief, Scientific method, Iteration, Mockup, Analysis, Technology, Design process, Proof of concept, Science, Engineering, Hypothesis, Innovation, Project map, Brainstorming, Experiment, Specifications, Possible solution, Prototype, Evaluation, Invention, Rapid Prototyping, 3D printer, Laser cutter

Skills

Discuss how science, technology and engineering are interrelated.

Describe the parts of the engineering design loop and their significance in the process as a whole.

Identify possible engineering design problems.

Conduct background research on an engineering design problem.

Create, present and defend a design brief for an engineering design problem.

Evaluate and critique project proposals.

Resources

Desktop computers

Research database access

Presentation device

Standards

TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.F.CS1	Identify and define authentic problems and significant questions for investigation.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.B.1	Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic or political need and publish for review.
TECH.8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
TECH.8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
TECH.8.2.12.C.CS2	The application of engineering design.
TECH.8.2.12.D.1	Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
TECH.8.2.12.D.2	Write a feasibility study of a product to include: economic, market, technical, financial, and management factors, and provide recommendations for implementation.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS2	Use and maintain technological products and systems.