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Curriculum

Overview

Understanding the Design Process

The first *Design and Discovery* sessions help you to begin to look at the world from a designed perspective.

The design process is introduced and is used throughout the curriculum.



Session 1: Jump Into Design

Re-think and re-engineer everyday objects to practice design and engineering processes. Practice a 10-step design process in hands-on activities.

Session 2: The Designed World

Design opportunities are everywhere! Build your ability to analyze existing objects for improvements and identify good problems to solve with design and engineering.

Engineering Fundamentals

These sessions provide background in materials, electrical, and mechanical engineering principles that you may need to incorporate in your design.

Session 3: Materials for Design

From spaceships to beverage containers, materials make the difference in successful performance of a product. Test materials' properties, determine the best materials for certain applications, and consider cost and environmental impact when choosing materials.

Session 4: Getting a Charge From Electricity

Circuits are the building blocks of all electrical appliances. In this session, explore simple, series, and parallel circuitry with bulbs, batteries, wires, and breadboards. Then build on these concepts by learning about short circuits, fuses, and then wiring an LED number display to light up your favorite numbers.

Session 5: Making Machines

Explore the mechanics of simple machines, and then apply what you learn to make a mechanical toy of your own design.

Session 6: One Problem, Many Solutions

Wake up your observation skills by analyzing the form and function of a digital clock radio. Then compare clock radios to see how the functions are implemented in different designs.

Thinking Creatively

In these sessions, you will identify interesting problems and develop ideas for solutions.

Session 7: The 3 R's Of Problem Identification

It's time for the 3R's of Problem Identification: Revisit, Refine, and Research. Using a variety of techniques, narrow down your list of design opportunities.

Session 8: A Brief Focus on Your Design Problem

Prepare a design brief to help you focus your understanding about a problem and propose a solution.

Session 9: A Solution Taking Shape

Dig deeper into your proposed design solution as you research patents for similar ideas and consider the necessary parts to get from “think” to “thing.”

Making, Modeling, and Materializing

Turn your thinking into things and begin several cycles of building models and testing your ideas.

Session 10: Bicycle Breakdown: Systems, Components, and Parts

Some ideas have complex solutions that need to be divided into manageable parts. Using bicycles, think about systems and components in a product you might design and engineer.

Session 11: Design Requirements and Drawings

Design requirements help designers focus on the user and fine-tune design details. Learn how to use drawings to help you plan your project details and move from “think” to “thing.”

Session 12: Planning for Models and Tests

It's time to make your project ideas tangible- to go from what's in your mind to things in your hand. Reflect on changes to your ideas and then plan what to construct—a model of systems, components, or the product itself.

Session 13: Making It! Models, Trials, and Tests

Let the construction begin! Tinker with pieces, parts, and connections to make models of a system, a component, or the product itself.

Prototyping

In these sessions, you will refine your project into a working prototype.

Session 14: Prototype Practicalities

Projects are taken to the next level as you plan how to develop your working prototype. Consider the product specifications, materials, and budget.

Session 15: Develop It!

This is a work session for you to construct your prototype. Like all other stages in the design process, you may need to make several prototypes as you conduct trials and tests of the product.

Session 16: Test It!

Conducting user testing allows you to try out your product, get feedback, evaluate the feedback, and plan your revisions.

Final Presentations

In the final sessions, you will plan or participate in an event to showcase your project and get feedback.

Session 17: Fairly There

Start preparing for a culminating celebratory event to share your project and your engineering and design expertise—either a showcase or a mini-engineering fair.

Session 18: Dress Rehearsal

Get ready for the big event! Practice your presentation and receive feedback from your peers. Following the event, take some time to reflect on your *Design and Discovery* experience.