Technological Design
At-A-Glance

Intended Audience: Grades 10-12   **Course Length: 36 weeks**

In *Technological Design*, engineering scope, content, and professional practices are presented through practical applications. Students in engineering teams apply STEM concepts and skills to solve engineering design problems and innovate designs. Students research, develop, test, and analyze engineering designs using criteria such as design effectiveness, public safety, human factors, and ethics. The educator is offered the choice to use Onshape, or CAD for Unit 1/1a when teaching the courseware.

Unit 1: Engineering Graphics: Enhanceing students' understanding of engineering graphics and modeling towards certification.

- Learning Cycles Cover History of Computer- Aided Design and Drafting System - CADD Milestone Research (1), Orthographic Sketching and Drawing - Mobile Phone Drawings (2), Isometric Drawing - Mobile Phone Isometric (3), Drawing to Scale - Classroom Drawing (4), Classroom Design - Classroom Design (preliminary Challenge), and Product Design Drawings - Mobile Phone Case Design (Primary Challenge)

Unit 1a: Onshape Certification byDesign: Assemblies and Engineering Drawings (Unit 1a) creates assemblies of 3-dimensional models for design problems leading towards certification. Students may be readily prepared to take the Industry exam proceeding this unit.

- Learning Cycles cover Inserting and Standard Content (1), Mates (2), Reading Engineering Drawings (3), Engineering Drawing Basics (4), Advanced Engineering Drawings (5), Mounting Block and Cap (Preliminary Challege), and Double V Belt Pulley (primary Challenge)

Unit 2: Design Fundamentals-Construction: Students use researching skills to investigate concepts of construction and material properties, and experiment with materials to understand their strengths and weaknesses to allow them to select appropriate materials for future products.

- Learning Cycle 1: Structure Design - Paper Tower Challenge
- Learning Cycle 2: Structure Design - Bridge Construction
- Learning Cycle 3: Material Properties - Material Properties Research
- Learning Cycle 4: Material Properties - Material Properties Testing
- Preliminary Challenge: Material Properties and Design - Safety Barrier Design
- Primary Challenge: Material Properties and Design - Concrete Beam

Unit 3: Technological Skills - Electronics / Robotics: Students will design, build, and code robotic solutions for real-world problems. This unit can be taught using hands-on robotics kits, online simulation, or any combination of these education modes.

- Learning Cycle 1: Electronics Fundamentals - Basic Circuit Introduction
- Learning Cycle 2: Microcontroller Fundamentals - Arduino Introduction
- Learning Cycle 3: Automation Fundamentals - Automation with Arduino
- Learning Cycle 4: Autonomy - Autonomous Robots
- Preliminary Challenge: Ultrasonic Tape Measure
- Primary Challenge: Coin Sorting Machine

Unit 4: Technology and Society: Students will assess the effects that technology has on people, society, and the environment. Students will research issues affecting their community and the world to develop technological solutions to these issues.

- Learning Cycle 1: Ecological Problem - Ecological Problem Poster Design
- Learning Cycle 2: Technological Advancement - Technological Advancement Presentation
- Learning Cycle 3: Ocean Pollution - Analyze the Effects of Ocean Pollution
- Learning Cycle 4: Ocean Pollution - Public Service Announcement
- Preliminary Challenge: Ocean Trash Removal
- Primary Challenge: Sustainable Furniture

Emerging Technologies: Students will analyze, explore, and experiment with emerging technologies. Students will investigate the impacts of virtual/augmented reality and wearable technologies. Students will also create their own wearable technology using the skills they learned in Unit 3 and create virtual and augmented reality experiences.

- Learning Cycle 1: VR Technology - Analyze Virtual Reality Technology
- Learning Cycle 2: 360° Photography
- Learning Cycle 3: Augmented Reality
- Learning Cycle 4: Wearable Technology - Analyze the Impacts of a Wearable Technology
- Preliminary Challenge: Wearable Technology - Develop a Wearable Technology
- Primary Challenge: Virtual Reality - Create a Virtual Reality Experience

For More Information

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