IT8 Electricity, Electronics and Wiring

ITEEA Standards:

Standard 1: Students will develop an understanding of the characteristics and scope of technology. Students in the middle-level grades will explore in greater detail the scope of technology. From personal and classroom experience, students will be familiar with specific ways in which technology is dynamic, and teachers should build on this experience by reinforcing the idea that technology is constantly changing.

- **F. New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.**
- **G. The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.**
- **H. Technology is closely linked to creativity, which has resulted in innovation.**
- **I. Corporations can often create demand for a product by bringing it onto the market and advertising it.**

Standard 2: Students will develop an understanding of the core concepts of technology. Technology has a number of core concepts that characterize it and set it apart from other fields of study. These concepts serve as cornerstones for the study of technology.

- **M. Technological systems include input, processes, output, and, at times, feedback.**
- **N. Systems thinking involves considering how every part relates to others.**
- **O. An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.**
- **P. Technological systems can be connected to one another.**
- **Q. Malfunctions of any part of a system may affect the function and quality of the system.**
- **R. Requirements are the parameters placed on the development of a product or system.**
- **T. Different technologies involve different sets of processes.**

Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study. The products of technology are used in every field of study. Technological progress often sparks advances and sometimes can even create a whole new field of study.

- **D. Technological systems often interact with one another.**
- **F. Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.**

Standard 8: Students will develop an understanding of the attributes of design. Design is the first step in the making of a product or system. Without design, the product or system cannot be made effectively.

- **E. Design is a creative planning process that leads to useful products and systems**.
- **F. There is no perfect design.**
- **G. Requirements for a design are made up of criteria and constraints.**

Standard 9: Students will develop an understanding of engineering design. The design process is fundamental to technology and to engineering. Also referred to as technological design, the engineering design process demands critical thinking, the application of technical knowledge, creativity, and an appreciation of the effects of a design on society and the environment.

- **F. Design involves a set of steps, which can be performed in different sequences and repeated as needed.**
- **G. Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.**
- **H. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.**

Standard 11: Students will develop abilities to apply the design process. Almost any technology that a student encounters is the result of a systematic problem-solving design process that transformed an idea into a final product or system. This design process involves an in-depth understanding of the problem and resources available, an exhaustive search for solutions, and an extensive evaluation and refinement procedure.

- **H. Apply a design process to solve problems in and beyond the laboratory-classroom.**
- **I. Specify criteria and constraints for the design.**
- **K. Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.**

Standard 12: Students will develop the abilities to use and maintain technological products and systems. Everyone uses technological products and systems — cars, televisions, computers, and household appliances — but not everyone uses them well, safely, or in the most efficient and effective manner.

- **H. Use information provided in manuals, protocols, or by experienced people to see and understand how things work.**
- **I. Use tools, materials, and machines safely to diagnose, adjust, and repair systems.**
- **K. Operate and maintain systems in order to achieve a given purpose.**

CTE Frameworks: This class addresses the Technology, Trades & Industry content area.

A. **Benchmarking against Standards:** Students will create products within given criteria and tolerance level.
B. **Assessing student achievement through demonstrated performance:** Students will be graded based on the quality of product produced, as well as their ability to demonstrate competency of the manufacturing process.

NGSS Standards: By the time students reach middle school they should have had numerous experiences in engineering design. The goal for middle school students is to define problems more precisely, to conduct a more thorough process of choosing the best solution, and to optimize the final design**.**

ETS1.A: Defining and Delimiting Engineering Problems

▪ The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

ETS1.B: Developing Possible Solutions

▪ A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)

▪ There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)

▪ Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.(MS-ETS1-3)

▪ Models of all kinds are important for testing solutions. (MS-ETS1-4)

Outline for Class

Week 1 Intro to Google Classroom and electricity basics

- Use a variety of technology to complete tasks and turn them into the google classroom
- Gain an overview of electricity
- Interact with Static Electricity
- Create a video of Static Electricity Examples using household items and a balloon.

Week 2 Atomic Structure of Electricity

- Introduction to the Atomic Structure of Electricity
- Students will learn about electron theory
- Learn about Static and Current Electricity
- Research and Develop an Electricity Experiment to demonstrate to the class
- Experiment Demonstrations

Week 3 Electrical Motors

- Develop an Electromagnetic Motor
- Recreate a DC Electric Motor
- Learn about Electricity and its use in everyday situations and life

Week 4-5 Exploring Circuits with Snap Circuits

- Learn different types of Electrical Circuits
- Learn about switches, diodes and LEDs
- Learn about resistance, capacitors and fuses

- Create circuits with the use of Snap Circuits

Week 6-8 - Residential Wiring
- Electrical Wiring Basics
- Residential Wiring safety
- 13 suggested electrical tools recommended for your home
- Residential wiring to code requirements
- Wiring a basic light switch
- Wiring a 2 way switch with outlet wiring
- Wiring outlet series with switch control
- Wiring a 3 way light switch
- 4 way light switch joint wiring project

Week 9 - Presenting Your Creations
- Powerpoint presentation for your Static Electricity Examples
- Powerpoint presentation for your Electricity Experiment
- Powerpoint presentation of Residential Wiring Projects
- Powerpoint presentation for your Electrical Career

Electricity, Electronics and Wiring: If you want to know how electricity, electronic components and wiring works, this class is for you. You will explore the area of electricity, design circuits, build electric motors, electro-magnets and use electronic components to control electricity. Students will also examine the behavior and parts of atoms as well as the impact of electricity on the world around them.