SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Electricity/Electronics	**Length of Course:** 15 cycles
Grade Level(s): 9-12	**Periods Per Cycle:** 3 periods
Units of Credit: .25	**Length of Period:** 43 minutes
Classification: Elective	**Total Instructional Time:** 32.25 hours

Course Description

This course will provide an overview of electricity and electronics within our society. Basic electrical and electronic concepts, typical applications, safe practices, and related consumer information are included. Practice applications include bread boarding, use of test equipment, and assembly of printed circuit boards and electronic projects. Emphasis will be placed on electronic components and their functions, operations, specifications, and circuit applications. The students will pay a lab fee for this course.

Instructional Strategies, Learning Practices, Activities, and Experiences

Bell Ringers
Teacher/Student Discussion
Demonstrations
Working with Test Equipment
Posted Objectives and Agenda
Problem Solving Activities
Student Project Based Activities
Guided Individual Practice

Assessments

Group Laboratory Experiments
Computer-Based Training
Troubleshooting Activities
Constructive Response
Independent Projects
Final Exam
Ability to Measure Voltage, Current, and Resistance in a Lab
Ability to Follow a Schematic Lab

Materials/Resources

Electronics Lab
Web-Based Research
Testing Equipment
Tech Ed Resource Library
Computer Tutorials
Basic Hand Tools

Adopted: 9/16/92
Revised: 8/18/08; 5/21/18; 12/9/20

Basic Electrical Concepts and Safety Requirements	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Equipment Safety B. Energy Concepts and Electrons C. Measuring Voltage, Current and Resistance	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, an productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Ohm's Law Calculations	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. AC and DC Voltage B. Resistance and Current C. Types of Wire and Insulators <u>Related Vocabulary:</u> voltage current resistance polarity multi-meter circuit	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Magnetism and Motors	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Magnetic Force B. Coils	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Speakers and Voice Coils	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Sound Waves B. Frequency C. Cycles Per Second <u>Related Vocabulary:</u> amplitude hertz wavelength amplifier polarity	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Wire Types and Connectors	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Wire Gage B. Outlets and Switches C. Safety Procedures <u>Related Vocabulary:</u> voltage current resistance polarity multi-meter circuit	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Electronic Safety	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Static Electricity B. Heat Sink C. Working With Soldering Irons	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Identify and Place Components in a Circuit	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Resistor Color Code B. Series and Parallel Circuits C. Digital Logic Circuits <u>Related Vocabulary:</u> heat sink de-solder	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Schematic and Soldering Components	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Reading and Following Schematics Drawings B. Safe Soldering Procedures C. Component Care and Handling	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Principles of Electronic Troubleshooting	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
A. Safety When Trouble Shooting B. Test Equipment C. Problem Solving Sequences <u>Related Vocabulary:</u> resistor capacitor transistor diode	**3.4.12.A2** ~ Describe how management is the process of planning, organizing, and controlling work. **3.4.12.A3** ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM). **3.4.10.C1** ~ Apply the components of the technological design process. **3.4.10.C2** ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments. **3.4.12.C2** ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly. **3.4.12.C3** ~ Apply the concept that many technological problems require a multi-disciplinary approach. **3.4.10.D1** ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product. **3.4.10.D2** ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it. **3.4.12.E6** ~ Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.