

Electronic & Electrical Systems

Subject Code: 010215

Course & Unit Descriptions

Course Description:

In the *Electronic and Electrical Systems* course, students will diagnose problems, test and repair electronic and electrical components. Students will learn physical principles of electricity and apply such to the proper maintenance, diagnosis and repair of electrical circuits. Students will learn the physical and mathematical principles of electronics, controllers and sensors and will learn the operation of onboard computers and programmable controllers.

Unit: Safety

Students will demonstrate their knowledge of safety rules and regulations along with identifying safety signs and signals. Students will describe health and safety practices, demonstrate appropriate responses for major types of hazardous materials disasters and how identify potential hazards and their prevention.

Benchmark: 4.1 Safety Procedures

Level 2: Follow safety procedures in specific situations with specialized tools and equipment, evaluate situation and take corrective action.

Indicators

4.1.02 Interpret safety signs and symbols

4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Unit: Basic Electrical Theory

Students learn the nature of electricity, Ohm's Law, and how to wire the three types of electrical circuits. Students will demonstrate the role of magnetism, electromagnetism, and induction in electrical circuits along with the functions of electrical components.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems

Indicators

4.7.08 Apply principles of electricity to electrical systems and motors

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Tools

Students learn to identify the tools and instruments (e.g. hydrometers, digital multi-meters, ignition analyzers, generator-alternator-regulator tester) needed for electrical systems.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems.

Indicators

- 4.7.03 Analyze, diagnose, calibrate and test instrumentation and data acquisition systems (e.g., guidance systems [laser, GPS], spraying, planting, harvesting monitors)
- 4.7.04 Utilize electrical testing equipment

Academic Standards

- English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
- Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
- Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Diagnose and Repair Electrical Systems Components

Students test and diagnose electrical systems by using tools and instruments (e.g. hydrometers, digital multi-meters, ignition analyzers, generator-alternator-regulator tester).

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems

Indicators

- 4.7.02 Analyze, diagnose and test electrical systems and components (e.g., charging, starting, lighting, accessories, ignition systems)
- 4.7.08 Apply principles of electricity to electrical systems and motors
- 4.7.10 Identify, analyze, diagnose and test electronic control systems, sensors, and actuators

Academic Standards

- English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)
- Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
- Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Schematics and Diagrams

Students will read schematics to understand a machine's electrical system, learn the differences between schematics and diagrams and how to use schematics and diagrams to troubleshoot equipment problems.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems.

Indicators

4.7.01 Interpret symbols and wiring diagrams

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Diagnose and Repair Electrical Systems Troubleshooting

Students learn how to follow and when to use a systematic troubleshooting procedure.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems

Indicators

4.7.02 Analyze, diagnose and test electrical systems and components (e.g., charging, starting, lighting, accessories, ignition systems)

4.7.03 Analyze, diagnose, calibrate and test instrumentation and data acquisition systems (e.g., guidance systems [laser, GPS], spraying, planting, harvesting monitors)

4.7.05 Analyze, diagnose and test electric drive components (e.g., man lifts and portable generators)

4.7.10 Identify, analyze, diagnose and test electronic control systems, sensors, and actuators

4.7.11 Utilize an onboard diagnostic system

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Skill Sets

Students will test and diagnose different types of electrical systems by using tools and instruments.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems.

Indicators

4.7.02 Analyze, diagnose and test electrical systems and components (e.g., charging, starting, lighting, accessories, ignition systems)

4.7.04 Utilize electrical testing equipment

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)

Unit: Diagnose and Repair Electrical Systems Computer and Controls

Students will test and diagnose electrical systems by using tools and instruments.

Benchmark: 4.7 Electrical and Electronic Systems

Level 2: Diagnose and repair electrical systems

Indicators

4.7.11 Utilize an onboard diagnostic system

Academic Standards

English: Use multiple resources to enhance comprehension of vocabulary. (Vocabulary F, 8-10; Vocabulary E, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Apply principles of forces and motion to mathematically analyze, describe and predict the net effects on objects or systems. (Physical Sciences D, 11-12)