POWER TECHNOLOGY

Grade Level:	10-11-12
Prerequisite:	None
Length:	1 Semester
Period(s) Per Day:	1
Credit:	1/2
Credit Requirement Fulfilled:	Vocational/Elective

Course Description:

This course is an introduction to electricity/electronics. Students will solve problems and build skills in constructing and analyzing circuits. Students will learn basic electrical theory and principles. Students will be able to identify electrical components and build working circuits. Students will learn circuit board soldering techniques and the operation of diagnostic equipment and instruments. Students will learn about common residential wiring and build related circuits. Electrical power generation will also be studied.

Course Objectives and Expectations:

1. Perform operations of tools and equipment in the shop safely and efficiently.
2. Explain how electricity is generated and the resources used to generate it.
3. Describe the basic principles of DC and AC electricity.
4. Perform circuit building and meter measurements on active circuits.
5. Identify all the parts of a circuit and explain how each part operates or affects the circuit. Draw and label electrical component representations.
6. Read electrical schematics and use them to construct circuits and test them.
7. Learn how to solder wiring and construct circuit boards.
8. Learn how simple house wiring circuits are constructed and how to wire them correctly.

Student Objectives:

1. Students will learn to work safely on electrical components.
2. Students will learn to use tools and equipment common to electrical service and repair.
3. Students will learn about different renewable and non-renewable resources used to generate electrical power.
4. Students will learn about ohm's law and the basic relationship of voltage, amperage, and resistance.

5. Students will learn to identify electrical components and understand their function in a circuit.

6. Students will build electrical circuits by reading electrical schematics.

7. Students will learn to diagnose circuits using electrical testing equipment.

8. Students will learn how to solder wires and components together.

9. Students will learn to construct circuit boards.

10. Students will learn about circuits common to residential household wiring.

11. Students will build circuits common to residential household wiring.

Pacing	**Montana Common Core Standard**
Quarter 1 & 2	
Unit 1 – Electrical Safety	1.II.1, 4.II.2, 5.II.3
Unit 2 – Forms of Energy	1.II.1, 2.II.3, 3.II.1, 3.II.2,
Unit 3 – Basic Electricity	1.II.1, 4.II.1
Unit 4 – Electrical Testing Equipment	1.II.1, 2.II.3, 4.II.1, 4.II.2, 4.II.3, 4.II.4, 5.II.1, 5.II.4
Unit 5 – Breadboard Circuit Construction	1.II.1, 2.II.2, 2.II.3, 3.II.1, 3.II.2, 3.II.3, 4.II.1
Unit 6 – Circuit Board Construction	1.II.1, 2.II.2, 2.II.3, 3.II.1, 3.II.2, 3.II.3, 4.II.1, 4.II.2, 4.II.3, 4.II.4, 5.II.1, 5.II.3, 5.II.4
Unit 7 – Residential Wiring Construction	1.II.1, 2.II.2, 2.II.3, 2.II.4, 3.II.1, 3.II.2, 3.II.3, 4.II.1, 4.II.2, 4.II.3, 4.II.4, 5.II.1, 5.II.3, 5.II.4
Unit 8 – Electrical Power Generation	1.II.1, 5.II.3

1st Quarter

Electrical Safety

A. Shop safety
B. Keep work area clean
C. Use tools properly
D. Respect electricity

Forms of Energy

A. Light
B. Heat
C. Kinetic
D. Electrical
E. Chemical

Basic Electricity
- A. Atomic structure
- B. Volts, Amps, Ohms
- C. Ohm's Law
- D. Series circuits
- E. Parallel circuits

Electrical Testing Equipment
- A. Test light
- B. Digital Volt Ohm Meter (DVOM)
- C. Labscope

Breadboard Circuit Construction
- A. Component functions
- B. Electrical schematic reading
- C. Assembly
- D. Operation

Circuit Board Construction
- A. Component functions
- B. Electrical schematic reading
- C. Soldering methods
- D. Assembly
- E. Operation

2nd Quarter

Residential Wiring Construction
- A. Components
- B. Types of wire
- C. Circuit functions
- D. Electrical schematic drawing
- E. Electrical schematic reading
- F. Building circuits
- G. Testing and operation

Electrical Power Generation
- A. Resources used
- B. Renewable or Non-renewable
- C. Means of power generation
- D. Distribution

Timeline:

Unit 1 -	Electrical Safety	(1 week to cover)
Unit 2 -	Forms of Energy	(1 week to cover)
Unit 3 -	Basic Electricity	(2 weeks to cover)
Unit 4 -	Electrical Testing Equipment	(1 week to cover)
Unit 5 -	Breadboard Circuit Construction	(3 week to cover)
Unit 6 -	Circuit Board Construction	(3 week to cover)
Unit 7 -	Residential Wiring Construction	(7 week to cover)
Unit 8 -	Electrical Power Generation	(2 week to cover)
Total =		(20 weeks to cover)

Montana Content Standards/RST

Content Standard 1: Students experience various career opportunities and assess personal career pathways.
Benchmark II. 1. Explore and identify personal interests, aptitudes, and abilities and develop strategies to achieve tentative career goals.

Content Standard 2: Students demonstrate an understanding and apply principles of Resource Management (i.e. financial, time, personal management).
Benchmark II.2. Prioritize, allocate time, prepare and follow schedules to complete a project.
Benchmark II.3. Apply appropriate time to task.
Benchmark II.4. Use physical resources wisely to accomplish a goal.

Content Standard 3: Students experience various career opportunities and assess personal career pathways.
Benchmark II.1. Demonstrate active leadership skills by participation in group activities and projects.
Benchmark II. 2. Demonstrate positive personal and work ethics.
Benchmark II. 3. Demonstrate skills to be a productive citizen.

Content Standard 4: Students acquire and demonstrate current technical skills leading to an occupation.
Benchmark II.1. Practice technical skills and procedures required for an occupation.
Benchmark II.2. Practice safe and appropriate use of technology.
Benchmark II.3. Select the appropriate tools, equipment, and procedures for the task.
Benchmark II.4. Manage and maintain technological tools and follow troubleshooting protocol.

Content Standard 5: Students know and demonstrate the requirements of the workplace through authentic application.
Benchmark II.1. Practice and demonstrate academic and technical skills to a workplace setting.

Benchmark II.3. Identify the possible outcomes and consequences of decisions.
Benchmark II.4. Use acceptable industry standard equipment in a school setting.

Resources:

http://opi.mt.gov/Portals/182/Page%20Files/Career%20%26%20Technical%20Education/Docs/Standards%20and%20Guidelines/ContStds-CareerTech.pdf