# Power Technology 3: Automotive
# Grade: 11-12

**Units of Credit:** One Year (Elective)

**Prerequisites:** Power Technology 2 or Consent of Instructor

**Course Description:**
Automotive students learn how to maintain, diagnose and repair engines, automatic and manual transmissions/transaxles, suspensions, power steering systems, brakes, electrical systems, and heating and air conditioning systems. Engine performance testing is an integral part of their training. Training also includes the safe removal and recycling of hazardous materials. All areas of instruction in this program help prepare the students for the certification test sponsored by the National Institute for Automotive Service Excellence (ASE).

Students who meet eligibility requirements may have the opportunity to earn college credits for units of study within this career program. Students qualify to participate in the Automotive Youth Educational System (AYES) program that provides outstanding opportunities for high school students to get on the job training in the industry. Graduates of this program may obtain employment as general automotive technicians and automotive service repairers specializing in any one or more of the following areas: brakes, front ends, steering and suspension systems; engine repairs, tune up, and emission systems; electric and fuel systems; automotive heating and air conditioning systems; and automatic and manual transmissions/transaxles. This program will be certified by the National Automotive Technicians Education Foundation, Inc.

**Topics:**
- Tire and wheel service
- Brake service
- Steering and suspension service
- Lubrication and cooling systems
- Vehicle preparation and maintenance
- Fuel and exhaust systems
- Electrical systems
- Battery service
- Starting systems
- Charging systems Ignition systems
- Engine service
- Emission testing service
- Vehicle safety/emission inspection
- Alignment service
- Air conditioning service
- Power train service
- Internship

*NOTE: Throughout this document, learning target types are identified as knowledge ("K"), reasoning ("R"), skill ("S"), or product ("P").*

**STANDARD 1: Students experience various career opportunities and assess personal career pathways.**

**Benchmark 1:**

Explore and identify personal interests, aptitudes, and abilities and develop strategies to achieve tentative career goals.

**Learning Targets *(Type)*:**

1. I can use Montana Career Information Systems (MCIS) and/or other systems or web resources to investigate and evaluate my personal interests, aptitudes and abilities. *(S)*
2. I can formulate tentative career goals. *(R)*
3. I can evaluate approaches for meeting my goals. *(R)*
4. I can summarize the career opportunities for a person with automotive repair skills. *(K,S)*
5. I can write a report on an automotive occupation of choice. *(S,P)*

**Benchmark 2:**

Utilize local resources to research career plans.

**Learning Targets *(Type)*:**

1. I can identify local resources to develop career plans. *(K)*
2. I can contact my school career counselor or teacher to pursue career pathways. *(S)*
3. I can interview a person working in an automotive related job. *(R,S)*

**Benchmark 3:**

Recognize the interrelationships of family, community, career, and leisure roles.

**Learning Targets *(Type)*:**

1. I can compare and contrast the needs of career and leisure activities and how they relate to and/or affect family and community. *(R)*
2. I can describe the importance of balance between family and community in regards to career and leisure activities. *(R)*

**STANDARD 2: Students demonstrate an understanding and apply principles of Resource Management (i.e., financial, time, personal management).**

**Benchmark 1:**

Prepare a budget and keep financial records.

**Learning Targets (*Type*):**

1. I can research and report cost of materials and time. *(R,S)*
2. I can document financial inputs and outputs. *(S)*
3. I can identify the necessity to maintain accurate financial records. *(K)*
4. I can stay within a fixed budget. *(S,P)*
5. I can use or prepare work order pricing estimates, make forecasts, keep records, make adjustments to meet objectives, and evaluate actual cost of repair records. *(R,S,P)*

**Benchmark 2:**

Prioritize, allocate time, prepare and follow schedules to complete a project.

**Learning Targets (*Type*):**

1. I can estimate the required time to complete a project. *(R)*
2. I can prioritize resources, equipment and tasks. *(R)*
3. I can reflect upon completion. *(K)*

4. I can select goal-relevant activities, rank them, allocate time, and prepare and follow schedules. *(R,S)*
5. I can allocate and evaluate time, materials, facilities and resources to set and achieve goals. *(R,S)*

**Benchmark 3:**

Apply appropriate time to task.

**Learning Targets (*Type*):**

1. I can implement a time schedule for task completion. *(S)*

**Benchmark 4:**

Use physical resources wisely to accomplish a goal.

**Learning Targets (*Type*):**

1. I can identify the resources necessary to accomplish the task. *(K)*
2. I can maintain the tools of the trade. *(S)*
3. I can maximize the use of my resources. *(S)*

**STANDARD 3: Students acquire and utilize personal and leadership skills to become successful, productive citizens.**

**Benchmark 1:**

Demonstrate active leadership skills by participation in group activities and projects.

**Learning Targets (*Type*):**

1. I can investigate various leadership styles. *(R)*
2. I can apply leadership styles in group activities and projects. *(R)*
3. I can apply the skills of effective group participation and leadership related to citizenship and career preparation. *(R,S)*
4. I can distribute work accordingly; evaluate performance and provide feedback toward the accomplishment of personal and team goals. *(R,S)*
5. I can demonstrate and teach a learned skill including performance evaluation of self and others in this process. *(S)*

**Benchmark 2:**

Demonstrate positive personal and work ethics.

**Learning Targets (*Type*):**

1. I can arrive on time for class and work. *(S)*
2. I can develop personal and work related goals. *(K,P)*
3. I can describe ethical behavior in the workplace. *(K)*

**Benchmark 3:**

Demonstrate skills to be a productive citizen.

**Learning Targets (*Type*):**

1. I can develop professional relationships with community members. *(S)*
2. I can contribute to my community in a positive manner. *(S,P)*
3. I can practice and evaluate positive service skills (e.g., resolving misunderstanding, consumer complaints). *(R,S)*

**Benchmark 4:**

Apply self-esteem building practices.

**Learning Targets (*Type*):**

1. I can define and provide evidence of my strengths in my career interest areas. *(K,S)*
2. I can persevere through set backs and stay focused on my goals. *(S)*

**Benchmark 5:**
Demonstrate appreciation for diverse perspective needs and characteristics.
**Learning Targets (*Type*):**
1. I can develop a working relationship with diverse populations. *(K,S)*
2. I can demonstrate communication skills that contribute to positive relationships. *(S)*
3. I can work to understand diverse points of view. *(R)*
4. I can develop effective oral and written communication skills with individuals from varied cultures, including fellow workers, management, and customers. *(S)*
5. I can practice various roles required as a member of an effective team while recognizing individual differences and cultural diversity. *(R,S)*

**Benchmark 6:**
Practice several methods of effective communication.
**Learning Targets (*Type*):**
1. I can demonstrate good listening skills. *(S)*
2. I can effectively communicate verbally through collaborative projects. *(S,P)*
3. I can develop quality written professional communications. *(R)*
4. I can communicate ideas to justify position, persuade and convince others, and responsibly challenge existing procedures and policies. *(R,S)*

**STANDARD 4: Students acquire and demonstrate current technical skills leading to an occupation.**
**Benchmark 1:**
Practice technical skills and procedures required for an occupation.
**Learning Targets (*Type*):**
1. I can gather, compile and analyze data from a variety of sources, and evaluate relevance and accuracy in making informed decisions in the workplace. *(R,S)*
2. I can organize, process, analyze, and maintain written and computerized records and other forms of information using systematic methods. *(R,S)*
3. I can derive and use formulas for area, surface area, and volume of many types of figures. *(K)*
4. I can analyze how matter is affected by changes in temperature, pressure and volume. *(R,S)*
5. I can use mathematics to describe the work and power in a system. *(K,R,S)*
6. I can use mathematics to describe and predict electrical and magnetic activity (current, resistance, voltage). *(K,R,S)*
7. I can compare and contrast how conductors, semiconductors, and superconductors work and describe their present and potential uses. *(R,S)*
8. I can demonstrate an understanding that energy can be found in chemical bonds and can be used when it is released from those bonds. *(K)*

**Benchmark 2:**
Practice safe and appropriate use of technology.
**Learning Targets (*Type*):**
***NOT ADDRESSED IN THIS COURSE.***
**Benchmark 3:**
Select the appropriate tools, equipment, and procedures for the task.
**Learning Targets (*Type*):**

1. I can use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools. *(S)*

**Benchmark 4:**

Manage and maintain technological tools and follow troubleshooting protocol.

**Learning Targets (*Type*):**

***NOT ADDRESSED IN THIS COURSE.***

**Benchmark 5:**

Apply technical information to a variety of sources.

**Learning Targets (*Type*):**

1. I can select, analyze, and present information using a variety of methods (e.g., oral, written, graphic, pictorial, multimedia). *(R,S)*
2. I can acquire, organize, communicate, process, analyze and evaluate information from print and electronic sources. *(R,S)*

**STANDARD 5: Students know and demonstrate the requirements of the workplace through authentic application.**

**Benchmark 1:**

Practice and demonstrate academic and technical skills to a workplace setting.

**Learning Targets (*Type*):**

1. I can practice, and demonstrate my technical workplace skills in my school lab. *(S)*
2. I can research, write and present on the technical content utilizing academic skills found in workplace settings. *(R,S,P)*
3. I can identify the key components of an automotive system. *(K)*
4. I can compose a plan for proper automotive maintenance. *(R,S)*
5. I can assemble vehicle components from individual component parts. *(K)*
6. I can diagnose and remedy the problems in non-working automotive systems. *(R,S)*
7. I can evaluate quality and performance of a variety of systems (e.g. impact of change). *(R,S)*
8. I can practice and analyze principles of system management considering external factors and uncontrolled variables. *(R,S)*
9. I can manage and analyze existing systems including optimizing outputs and making in-process adjustments. *(R,S)*
10. I can design and evaluate a system composed of subsystems. *(R,S)*

**Benchmark 2:**

Apply the concepts of entrepreneurship.

**Learning Targets (*Type*):**

1. I can explain the concepts of entrepreneurship. *(K)*
2. I can demonstrate the concepts of entrepreneurship through a unique project. *(K,S)*
3. I can present my unique project to an authentic audience. *(S,R,P)*

**Benchmark 3:**

Identify possible outcomes and consequences of decisions.

**Learning Targets (*Type*):**

1. I can identify possible consequences of carelessness and horseplay. *(K)*
2. I can explain potential outcomes of not following directions, (i.e. safety, guidelines, rubrics). *(R)*
3. I can use various techniques to approximate solutions, determine the reasonableness of answers, and justify the results. *(S)*

**Benchmark 4:**

Use acceptable industry standard equipment in a school setting.

**Learning Targets (*Type*):**

1. I can successfully use acceptable industry standard equipment to produce an authentic product within budget constraints. *(S,R,P)*