

## VALLEY ROP COURSE OUTLINE

**COURSE TITLE:** Auto Mechanics 3

**VALLEY ROP #:** TR-5664-Auto3  
**CDE #:** 2495

**CBEDS TITLE:** Automotive Mechanics  
**CBEDS #:** 5664

**CTE SECTOR:** Transportation  
**CTE PATHWAY:** Vehicle Maintenance, Service & Repair

**JOB TITLES:** Automotive Master Mechanics 49-3023.01

### **COURSE DESCRIPTION:**

This course introduces students to automotive service and repair, shop safety, and shop operation, as well as tool safety, use and identification. The course will also cover automotive engines and basic systems: emissions, brakes, steering and suspension, front-end alignment, manual transmission, rear ends/differentials, and fuel injections. With completion of the course the student will be prepared for an entry-level position in today's automotive service industry.

### **DATE APPROVED:**

**REVISED DATE:** October 30, 2002; January 30, 2006; March 2009/ Nov 2009

**HOURS:** 180

**CREDITS:** 10

**PREREQUISITES:** Auto Mechanics 2

**GRADE LEVEL:** 11-12

**ARTICULATION(S):** None

**TEXTBOOKS:** Automotive Encyclopedia 2000 edition, by William Tolboldt, Larry Johnson, W. Scott Gauthier.

## **COURSE COMPETENCIES:**

Upon completion of this course, the student will:

- Learn about careers and how to find a job through resume and job interview classroom practice. Students will learn the basic elements of a resume and will produce a professional resume for them to keep. In addition, students will go through a job interview with the instructor or a business advisor.
- Acquire skills and knowledge in records and information management by storing and protecting records, organizing records, and retrieving them quickly when needed, tracking the movement of records to account for their location at all times, and disposing of records no longer needed.
- Acquire and improve keyboarding speed and accuracy using specialized software and a personal computer.
- Learn basic concepts and procedures of Microsoft Word-word processing software. Be able to create, edit, save, retrieve, and print documents by producing assignments.
- Learn and practice business communication formats by producing interoffice memorandums, letters, reports, and outlines.

## **INSTRUCTIONAL METHODS:**

- Portfolio
- Student projects
- Guest Speakers
- Oral Presentations
- Demonstrations
- Hands-On

## **EVALUATION METHODS:**

Assessment opportunities, which allow continuous evaluation of students' progress, will be embedded throughout the course and should be a learning experience. All students will be expected to achieve mastery of all topics; often, demonstrations of mastery will occur in a public forum. The following strategies, which include both formal and informal assessment techniques will include, but are not limited to:

- Competency based skill sheets
- Performance demonstrated projects
- Unit tests and applications
- Portfolio

## **COURSE OUTLINE:**

### **Unit of Instruction**

### **Estimated Hours**

#### **Safety**

**10**

#### **Emission Systems**

**22**

Explores emission problems with the internal combustion engine. Includes early and late emission systems, their disadvantage and advantage of each. Discusses need for emission systems on vehicles, pollutants that are created by the internal combustion engine, and different ways we can control them. Explores different vehicles that use alternative fuels, their advantages and disadvantages.

##### **Competencies:**

Use smog machine to diagnose engine problems.

Tune vehicles properly to reduce engine pollutants.

Identify emission system parts and know how they work.

Test and diagnose individual emission controls.

Learn how the computer works and use both the sensors and actuators to control emissions.

Use advanced scan tools and meters to test sensors and actuators and all computer units.

#### **Brake Systems**

**22**

Discusses the basic hydraulic systems, how they work and how to trouble shoot them. Explores braking systems on vehicles from early to late models. Provides training on trouble shooting brake problems and demonstrates proper repair of brakes.

##### **Competencies:**

Understand how hydraulic systems work.

Identify different parts.

Diagnose brake problems.

Disassemble and assemble brake parts.

Use a disc and drum brake lathe.

Bleed brake hydraulic systems.

Adjust emergency brakes.

Understand how anti lock brake systems work.

#### **Steering and Suspension Systems**

**22**

Discusses different steering systems from manual to power steering, gear boxes or rack and pinion units. Discusses different suspension systems for both front wheel drive vehicles and rear wheel drive vehicles. Explores different tires manufactured for vehicles, from high performance to truck application.

##### **Competencies:**

Understand why suspension systems are needed.

Learn how suspension systems work and the different modifications on them.

Identify the parts of a steering system and how they work.

Understand how power steering and hydraulic steering works.

Modify suspension systems.

Identify suspension parts and diagnosis.

Identify tire labels.

Diagnose tire problems.

**Front End Alignment****22**

Discusses the different angles for steering alignment, how to diagnose worn suspension parts, and how to correct alignment. Introduction to the different types of alignment machines and their purposes.

**Competencies:**

Identify the different alignment angles and what they are for.

Diagnose worn parts in front end.

Identify all front end parts.

Use modern day equipment to do a proper alignment.

**Manual Transmission****22**

Discusses theory of the manual transmission. Demonstrates calculation of different gear ratios.

Explores need for transmissions. Discusses theory of the clutch and how it works.

**Competencies:**

Calculate the gear ratio of the manual transmission.

Inspect and diagnose trouble in the transmission.

Identify all transmission parts.

Disassemble and assemble a manual transmission.

Show how a clutch works and explain its purpose.

Identify parts of the clutch.

**Rear Ends, Differentials****22**

Explores theory of differentials in vehicles, what they are for, how they work, and how to work on them and service them.

**Competencies:**

Identify the parts of a differential, both front and rear wheel drive.

Calculate the different gear ratios of rear ends.

Recite the different ratios.

Demonstrate the assemble and disassemble of a rear end.

**Fuel Injection Systems****22**

Introduces the different types of fuel injection systems, from early styles to modern day electronic fuel injection systems. Learn to service and repair systems using modern day equipment for diagnosing fuel injector problems.

**Competencies:**

Explain the basic way all fuel injectors work.

Identify advantages and disadvantages of fuel injection over carburetion.

Identify basic parts of different injection systems.

Diagnose and repair systems.

Use scan tools and meters to diagnose problems.

**Employability/Career Skills****16****Total****180 Total Hours**

## **Standards Integrated**

### **Automotive Electrical Systems**

PS-C1.5, C1.1, C1.2, C1.4, C2.2 thru C2.7, C3.4 thru C3.7, C4.1, C6.1, C6.3, C6.4, C7.1 thru C7.7  
LS1.1, LS1.3, LS 1.7, LS 1.8, LS1.7, LS 2.1, LS 2.5, LS 2.6 NS1.2, NS1.6, NS1.7, NS2.2, NS2.3  
AF1.2, 4.2, MG1.1, MG1.3, MG2.1, MG2.3, MR1.2, MR2.1, MR3.1, MR3.3

### **Automotive Fuel Systems**

C1.1 thru C1.5, C2.2, C2.5C3.1, C3.6, C4.1, C4.3, C4.4, C6.1, C6.3, C6.4, C6.7, C7.1  
LS1.1, LS1.3, LS1.7, LS1.8, LS2.1, LS2.5, LS2.6, NS1.2,NS1.6, NS1.7, NS2.2, NS2.3, AF1.2, AF4.2,  
MG1.1, MG1.3, MG2.1, MG2.3, MR1.2, MR2.1, MR3.1, MR3.3 R1.1, R1.2, R2.3, R2.4, R2.7, R2.8,  
W1.2, W1.3, W1.5, W2.1, W2.5

### **Automotive Drive Train**

PS-C1.5, C1.1, C1.2, C1.4, C2.1, C2.3, C2.4, C2.5, C2.6, C2.7, C8.1, C8.4, LS1.1, LS1.3, LS1.7,  
LS1.8, LS2.1, LS2.5, LS2.6, MG1.1, MG1.3, MG2.1, MG2.3, MR1.2, MR2.1, MR3.1, MR3.3, NS1.2,  
NS1.6, NS1.7, NS2.2, NS2.3, AF1.2, AF4.2, R1.1, R1.2, R2.3, R2.4, R2.7, R2.8,  
W1.2,W1.3,W1.5,W2.1, W2.5

### **Brake Systems**

PS-C1.5, C1.1, C1.2, C1.4, C2.1, C2.3, C2.4, C2.5, C2.6, C2.7, C4.2, C4.4, C5.3, C6.1  
C8.1, C8.4, LS1.1, LS1.3, LS1.7, LS1.8, LS2.1, LS2.5, LS2.6, MG1.1, MG1.3, MG2.1, MG2.3, MR1.2,  
MR2.1, MR3.1, MR3.3, NS1.2, NS1.6, NS1.7, NS2.2, NS2.3, AF1.2, AF4.2, R1.1, R1.2, R2.3, R2.4,  
R2.7, R2.8, W1.2,W1.3,W1.5,W2.1, W2.5

### **Suspension and Steering**

PS-C1.1,1.2,1.4,C1.5, CC5.3,C3.6,C3.7,C8.3,C8.5,C8.6  
LS1.1,LA1.3,LS1.7,LS1.8,LS2.5,LS2.6,NS1.2,NS1.6,NS1.7,NS2.2,NS2.3,AF1.2,AF4.2,MG1.1,MG1.3  
MG2.1,MG2.3,MR1.2,MR2.1,MR3.3 R1.1,R1.2,R2.1,R2.4,R2.7,R2.8,W1.2,W1.3,W1.5,W2.1,W2.5

### **Career Preparation Standards**

PS-C1.1, C1.2, C1.4, C1.5, LS1.1, LS1.3, LS1.7, LS1.8, LS2.1, LS2.5, LS2.6,  
R1.1, R1.2, R2.1, R2.3, R2.7, R2.8, W1.2, W1.3, W1.5, W2.1, W2.5

## **CAREER PREPARATION STANDARDS**

**PERSONAL SKILLS** - Students will understand how personal skill development affects their employability. This skill includes positive attitudes, self-confidence, honesty, responsibility, initiative, self-discipline, personal hygiene, time management, and the capacity for lifelong learning.

1. Demonstrate an understanding of classroom policies and procedures.
2. Discuss importance of the following personal skills in the business environment:
  - a. Positive attitude
  - b. Self-confidence
  - c. Honesty
  - d. Perseverance
  - e. Self-management/work ethic
  - f. Pride in product/work
  - g. Dependability
3. Identify acceptable work attire.
4. Establish goals for self-improvement and further education/training.
5. Prioritize tasks and meet deadlines.
6. Understand the importance of initiative and leadership.
7. Understand the importance of lifelong learning in a world of constantly changing technology.

**INTERPERSONAL SKILLS** - Students will understand key concepts on group dynamics, conflict resolution, and negotiation. This skill includes the ability to work cooperatively, accept supervision, assume leadership roles, and show respect for others. This standard includes an understanding of sexual harassment laws and an appreciation of cultural diversity in the workplace.

1. Identify and discuss behaviors of an effective team.
2. Explain the central importance of mutual respect in the workplace relations.
3. Discuss and demonstrate strategies for conflict resolution and negotiation, and explain their importance within the business environment.
4. Understand laws that apply to sexual harassment in the workplace, and identify tactics for handling harassment situations.
5. Work cooperatively, share responsibilities, accept supervision and assume leadership roles.
6. Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups.

**THINKING AND PROBLEM-SOLVING SKILLS** - Students will exhibit critical and creative thinking skills, logical reasoning, and problem solving. These skills include applying basic skills in order to calculate, estimate, measure; identify, locate, and organize information/data; interpret and follow directions from manuals, labels, and other sources; analyze and evaluate information and solutions.

1. Recognize the importance of good academic skills and implement a plan for self-improvement as needed.
2. Read, write, and give directions.
3. Exhibit critical and creative thinking skills and logical reasoning skills, and employ these skills for problem solving.
  - a. Work as a team member in solving problems.
  - b. Diagnose the problem, its urgency, and its causes.
  - c. Identify alternatives and their consequences.
  - d. Explore possible solutions.
  - e. Compare/contrast the advantages and disadvantages of alternatives.
  - f. Determine appropriate action(s).
  - g. Implement action(s).
  - h. Evaluate results of action(s) taken.

**COMMUNICATION SKILLS** - Students will understand principles of effective communication. This standard includes effective oral and written communication, listening skills, following and giving directions, requesting and giving information, asking questions.

1. Use communication concepts in application of skills, techniques, and operations.

- Prepare written material.
  - Analyze written material.
2. Understand and implement written instructions, from technical manuals, written communications, and reference books.
  3. Present a positive image through verbal and nonverbal communication, and understand the power of body language in communication.
  4. Demonstrate active listening through oral and written feedback.
  5. Give and receive feedback.
  6. Demonstrate assertive communications (both oral and written).
  7. Demonstrate proper etiquette in workplace communications, including an awareness of requisites for international communications (languages, customs, time zones, currency and exchange rates).
  8. Demonstrate writing/editing skills as follows:
    - Write, proofread, and edit work.
    - Use correct grammar, punctuation, capitalization, vocabulary, and spelling.
    - Select and use appropriate forms of technology for communication.
  9. Exhibit a proficiency in the use of reference books.
  10. Research, compose, and orally present information for a variety of business situations utilizing appropriate technology.

**OCCUPATIONAL SAFETY** - Students will understand occupational safety issues, including the avoidance of physical hazards in the work environment. This includes the safe operation of equipment, proper handling of hazardous materials, appropriate attire and safety accessories, avoidance of physical injuries, interpretation of warning and hazard signs and terminology, and following and understanding safety-related directions.

1. Discuss and implement good safety practices, including the following (if applicable to course):
  - a. Personal
  - b. Lab
  - c. Fire
  - d. Electrical
  - e. Equipment
  - f. Tools
  - g. Interpretation of Material Safety Data Sheets (MSDSs)
  - h. Environmental Protection Agency (EPA)
  - i. Occupational Safety and Health Administration (OSHA)
  - j. American Red Cross Standards (ARC)
  - k. Networking Safety Standards
2. Apply sound ergonomic principles in organizing one's workspace.

**EMPLOYMENT LITERACY** - Students will understand career paths and strategies for obtaining employment within their chosen field. This includes traditional job preparation skills, such as resumes, application forms, cover letters, sources of employment information, and interviewing skills, but also includes an overview of the industry and an understanding of labor market trends.

1. Explore career opportunities and projected trends; investigate required education, training and experience; and develop an individual education plan.
2. Identify steps for setting goals and writing personal goals and objectives.
3. Examine aptitudes related to career options; relate personal characteristics and interests to educational and occupational opportunities.
4. Develop a career portfolio, including the following documents:
  - Job application
  - Resume(s)
  - Appropriate cover and follow-up correspondence
5. Identify and demonstrate effective interviewing techniques.

**TECHNOLOGY LITERACY** - Students will understand and adapt to changing technology by identifying, learning, and applying new skills to improve job performance. Students should understand the role of technology in their chosen field and should be able to use all appropriate technology. Students should also feel confident in their ability to learn new technology by generalizing from what they know, adapting skills to new situations, and identifying and using sources of information and of further learning.

1. Demonstrate the ability to use personal computers for loading and retrieving data, information gathering, measurements, and writing.
2. Identify the characteristics and explain the importance of adapting to changes, being flexible and evaluating goals when working in the industry.
3. Understand the importance of lifelong learning in adapting to changing technology.

**IMPORTANCE OF ETHICS** – Students will understand proper ethics in the workplace.

1. Discuss social and ethical responsibilities in the industry.
2. Demonstrate ethical choices in workplace situations.