

VALLEY ROP COURSE OUTLINE

COURSE TITLE: Small Gas Engines and Outdoor Power Equipment—(Two- & Four-Stroke Gasoline Engines Certification)

VALLEY ROP #: TR-5661-SmGsENge
CDE #: 1290

CBEDS TITLE: Small Engine Repair
CBEDS #: 5661

CTE SECTOR: Transportation
CTE PATHWAY:

JOB TITLES: Outdoor Power Equipment and
Other Small Engine Mechanics 49-3053.00

COURSE DESCRIPTION:

This course is designed to train students for entry-level jobs in the fast growing industry of small engine repair. Students will demonstrate ability to repair small engines such as lawn, garden, and small engines used in agriculture. Emphasis is placed on overhaul, repair, adjustment, troubleshooting, and small shop operation. This course prepares students for the Outdoor Power Equipment (OPE) Category 1 Two-and Four-Stroke Gasoline Engine Technician Certification—a industry-recognized certification through the Outdoor Power Equipment & Engine Service Association (OPEESA) an approved certification through the Equipment & Engine Training Council (EETC).

COURSE APPROVED: October 2003
REVISED DATE: May 2009 /Nov 2009

HOURS: 180 hours
CREDITS PER YEAR: 10

PREREQUISITES: Auto Mech 1 or permission of instructor

GRADE LEVEL: 11-12

TEXTBOOKS: Roth, Alfred. *Small Gas Engines*. The Goodheart-Wilcox Company, Inc. – Tinley Park, IL publisher.

RESOURCES: Radcliff, R. Bruce. *Small Engines*. American Technical Publishers, Inc., Homewood, IL
OR
Schuster, William A. *Small Engine Technology*, 2nd Edition. Delmar Publishers, Albany, NY.

COURSE COMPETENCIES:

Upon successful completion of the course, students will:

- Acquire knowledge of appropriate Theory in the areas of Two-Stroke and Four-Stroke Cycle Gasoline Engines.
- Demonstrate use of proper Safety with tool and material handling within a shop environment.
- Complete appropriate Service Paperwork
- Use Technical Publications in performing services.
- Identify, demonstrate proper use of, and clean Hand Tools
- Identify and demonstrate proper use of Precision Measuring Tools
- Demonstrate procedure for Troubleshooting.
- Identify Engine numbers.
- Explain Two- and Four-Stroke Cycle Engine operating theories.
- Describe engine components, theories, and functions.
- Describe Lubrication Fundamentals.
- Describe functions of Engine Maintenance.
- Perform Engine Maintenance.
- Test a Two-Stroke cycle Gasoline Engine
- Conduct a Two-Stroke Cycle Gasoline Engine Overhaul
- Conduct Four-Stroke Cycle Gasoline Engine Diagnosis
- Service a Four-Stroke Cycle Gasoline Engine
- Perform Failure Analysis
- Identify Career Opportunities and Conduct Job Search

INSTRUCTIONAL METHODS:

1. Lecture
2. Study Guides
3. Hands-on Performance
4. Labs with Assignment Sheets

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:

1. Pre and Post Written Tests
2. Written Unit Tests
3. Performance Tests
4. Job Search Portfolio

COURSE OUTLINE:

Unit of Instruction	Estimated Hours
Shop Safety	10
<ul style="list-style-type: none">• Work Habits• Personal Safety• Emergency Awareness• Regulations	
Shop Practices	5
Technical Publications	5
Tools & Equipment	5
<ul style="list-style-type: none">• Service Tools & Equipment• Hand Tools• Precision Measuring Tools	
Troubleshooting	5
<ul style="list-style-type: none">• Methods• Information Gathering	
Small Engine Fundamentals	10
<ul style="list-style-type: none">• Engine Identification• Two-Stroke Cycle Engine• Four-Stroke Cycle Engine• Engine Components	
Compression-Valves-Pistons	15
<ul style="list-style-type: none">• Valve Service	
Fuel System	15
Governor	10
Maintenance	25
<ul style="list-style-type: none">• Lubrication Fundamentals• Lubrication – Engine Maintenance	
Two-Stroke Cycle Gasoline Engine	10
<ul style="list-style-type: none">• Test a Two-Stroke• Overhaul	
Electrical	25
<ul style="list-style-type: none">• Batteries• Starting Systems• Charging Systems• Lighting• Auxiliary Generators• Electrical Wiring and Schematics• Electrical Troubleshooting	

Four-Stroke Cycle Gasoline Engine Diagnosis	10
Four-Stroke Cycle Gasoline Engine Service	10
Failure Analysis	10
Career Preparations	10

Total	180 Total Hours
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*10 hours on portfolio; topics addressed throughout course

CAREER PREPARATION STANDARDS:

- A. **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.
- B. **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.
- C. **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.

- D. **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.
 - a. Prepare written material.
 - b. 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:
 - a. Write, proofread, and edit work.
 - b. Use correct grammar, punctuation, capitalization, vocabulary, and spelling.
 - c. 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.
- E. **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 work space.
- F. **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:

- a. job application
 - b. resume(s)
 - c. appropriate cover and follow-up correspondence
5. Identify and demonstrate effective interviewing techniques.
- G. **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.
- H. **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.