

YOSEMITE REGIONAL OCCUPATIONAL PROGRAM

SMALL ENGINE/MOTORCYCLE REPAIR 3-4

CBEDS Codes: 5661

JOB TITLES

Small Engine Mechanic

Motorcycle Mechanic

DOT NO.

625.281-034

620.281-054

Course Description:

This course is designed to offer advanced training in the field of small engine and motorcycle repair. It is recommended that Small Engine/Motorcycle Repair 1-2 (ROP) course be taken prior to this course. This advanced program provides the students with indepth advanced study and troubleshooting in the small engine/motorcycle field.

Recommended Prerequisites: Small Engine/Motorcycle Repair 1-2

DURATION: up to 350 total hours

CREDIT: 5-10 Units/Semester

RECOMMENDED GRADE LEVEL: 11-12, Adult

MEETS GRADUATION REQUIREMENTS IN: Practical Arts

MEETS UNIVERSITY OF CALIFORNIA ENTRANCE REQUIREMENTS: No

MEETS CALIFORNIA STATE UNIVERSITY REQUIREMENTS: No

Instructional Materials

Basic Text(s):

Small Engines, Jay Webster, American Technical, Latest Edition

Supplementary Text(s):

Motorcycle Handbook, Paul Depsey, Bob Clampett, Fawcett, 1987

Motorcycle Operations, Johns/Edmonson, Goodheart, 1987

Small Gas Engines, Alfred Roth, Ronald Baird, Goodheart-Willcox, 1985

The Complete Guide to Motorcycle Mechanics, Motorcycle Mechanics Institute Staff, Prentice Hall, 1984

Technical Manuals for Small Engine and Motorcycles

Practical Problems in Mathematics for Automotive Technicians, Delmar Publishers, Inc., 1990

Mathematics Through Auto Mechanics, Garold "Gary" Ellyson, Kenneth E. Clouse (KECCO), 1990

Instructional Content

Instruction will include:

Student Outcomes

At the end of instruction, the student will be able to:

Hours

CL=Classroom
CC=Comm. Class.

1. Career Opportunities/Leadership/ Gender Equity	Goal: The student will be able to demonstrate competency in lifelong career planning skills, develop leadership abilities, and develop an awareness of programs offered in higher education without regard to race, sex, national origin, or handicap as they relate to small engine/motorcycle repair.	Anchor/ CR	CTE	CL	CC
<ol style="list-style-type: none"> 1. Review desirable personal traits. 2. Review skills needed for employment in field. 3. Review possible careers in field. 4. Review opportunities offered through VICA (Vocational Industrial Clubs of America) 5. Demonstrate that opportunities in field are available without regard to race, sex, national origin or handicap. 6. Correct way to fill out a job application. 7. Resume' development 8. Employment outlook within the automotive field. 9. Visit a local automotive firm and observe employees at work. 10. Explore areas or levels of education in which opportunities are available in automotive technology. 11. Review "Help Wanted" columns in the daily newspaper for a week. 12. Review the role of small engine mechanic in industry. 13. Demonstrate written and oral communication skills. 	<ol style="list-style-type: none"> A. Using reading materials, visual media, attendance at trade meetings, or by visiting automotive repair facilities. Complete a report about choosing a career within the field of automotive repair. B. Develop leadership abilities in educational, vocational, civic, recreational and social activities through involvement in student organizations such as Vocational Industrial Clubs of America (VICA). C. Identify personal traits (strengths, values and weaknesses). D. Listen to guest speaker on trade and technical education after high school. E. Identify at least three possible career choices in the small engine/motorcycle repair field. F. Perform the responsibilities of supervisor in charge of clean up assignments on a rotating basis. G. Perform as a lead person to assist students with less experience. H. Demonstrate that opportunities in the small engine/motorcycle repair field are available without regard to race, sex, national origin or handicap. I. Demonstrate an understanding of the role of a small engine mechanic in industry. J. Develop a resume and complete a job application K. Correctly fill out and use repair order forms. L. Write a career report on opportunities in the small engine field by reading materials or listening to speakers from trade schools or visiting repair facilities. 	2.0-2.6 3.0 1.0 11.0	<u>Trans</u> A1.0- A1.5		
		CR 1-12			

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<p>2. Attitudes, behaviors and personal characteristics valued by employers.</p> <ol style="list-style-type: none"> Positive attitudes and work ethics Interpersonal skills Ability to work in a team. Personal traits that impact work performance. 	<p>Goal: The student will demonstrate attitudes, behaviors, and personal characteristics valued by employers.</p> <ol style="list-style-type: none"> Responsibility Dependability Promptness Willingness to learn new skills Attentiveness during instruction Getting along with others Respect for others Honest and integrity Pride in work Flexibility Not being defensive when corrected Working up to capacity Being pleasant and cheerful Showing strong motivation to succeed Good personal appearance Organized Constructively assisting others 	<p>Anchor/CR</p> <p>9.1 9.3 9.6</p> <p>CR 1-12</p>	<p>CTE</p> <p>A1.1- A1.6</p>	<p>CL</p>	<p>CC</p>
<p>3. Safety and shop practices</p> <ol style="list-style-type: none"> Review district's safety program Administer shop safety tests and explain shop safety. Parental acknowledgement of safety requirements and conduct expectations. Appropriate site maintenance practices, and appropriate storing and stacking of materials. Instruct proper completion of customer service paperwork. 	<p>Goal: The student will demonstrate safe personal skills and the safe operation of equipment avoiding injury and financial loss.</p> <ol style="list-style-type: none"> Satisfactorily complete the district's safety program. Passes shop safety tests and demonstrate shop safety. Obtain parental acknowledgement of safety requirements and conduct expectations Follow cleanup and storage procedures Correctly fill out and use repair order forms. 	<p>1.0 6.0</p> <p>CR 6 and 7</p>	<p>A1.0- A6.0 B1.0 B2.0 B2.2</p>		
<p>4. Tools</p> <ol style="list-style-type: none"> Demonstrate proper tool use according to manufacture specifications. 	<p>Goal: The student will identify and select the proper tool for a specific application. The student will correctly use tools and equipment to perform a job to manufactures specification.</p> <ol style="list-style-type: none"> Identify hand and power tools by their proper names and explain their proper use. Properly use service manuals/parts books to look up parts and specifications. 	<p>6.3 6.4-6.7</p> <p>CR 1</p>	<p>A2.0 B2.2</p>		
<p>5. Measuring and shop math.</p> <ol style="list-style-type: none"> Demonstrate proper use of measuring instruments. Instruct conversion of fractions to decimals. 	<p>Goal: The student will understand the metric system and demonstrate its use in conjunction with performing specific measurements with precision measuring instruments used in the motorcycle industry.</p> <ol style="list-style-type: none"> Measure engine parts using a micrometer and a caliper. 	<p>11.1</p> <p>CR 1</p>	<p>B3.1 B3.2 B3.4</p>		

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Measuring and shop math. (Continued)	B. Measure using a ruler in inches and in metric. C. Perform shop math covering fractions to decimals. D. Demonstrate metric wrench sizes to SAE sizes in daily use.	Anchor/ CR	CTE	CL	CC
<p>6. Identify and Diagnose</p> <ol style="list-style-type: none"> 1. Define engines by construction and design. 2. Identify engine component parts. 3. Discuss two and four stroke cycle engines. 4. Demonstrate upper end service 5. Discuss valve reconditioning 6. Demonstrate valve grinding 7. Demonstrate removal and replacement of pistons and rings. 8. Demonstrate service on lower end of engine 9. Instruct proper use of measurement tools. 10. Transmission theory 11. Compute gear ratios. 12. Theory of clutch workings and parts. 13. Demonstrate in-depth procedures on engine or motorcycles. 	<p>Goal: The student will understand the operation of each component of the power train and be able to perform diagnosis and repair functions to meet industry standards.</p> <ol style="list-style-type: none"> A. Identify different types of engines according to design and construction on a test. B. Identify the component parts of an engine on a test. C. Explain the two and four stroke cycle theory and describe the sequence of combustion on a test. D. Service upper end and valve train and measure spring pressure and stem clearance. E. Explain valve reconditioning and grinding. F. Grind a valve and seat. G. Remove and replace pistons and rings and measure ring end gap H. Service lower end of engine (bearings and crankshaft). I. Perform engine measurements on cylinders, crankshafts, pistons, and other component parts. J. Explain basic transmission theory. K. Compute gear ratios. L. Identify the parts of a transmission gearbox. M. Explain theory of clutch workings. N. Identify the parts of the clutch system. O. Explain procedures for splitting cases and engine rebuilding. P. Perform the following in-depth procedures on engine or motorcycle: machine work, boring, valve work, high performance work, trouble-shooting, clutch repair, transmission repair, assembly of top end, and necessary adjustments. 	<p>10.1-10.3 11.1 11.2 6.0 1.0 CR 1,2,4,5, and 9</p>	<p>C3.5 C6.3 C6.4 C7.1- C7.3 B2.2 B1.4</p>		

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7. Power Train	Goal: The student will understand the operation of each component of the power train and be able to perform diagnosis and repair functions to meet industry standards.	Anchor/CR	CTE	CL	CC
<ol style="list-style-type: none"> 1. Discuss types of transmissions and clutches. 2. Compute gear ratios. 3. Discuss power flow as it relates to transmissions. 4. Demonstrate assembly of a transmission. 5. Demonstrate proper adjustments of a clutch system. 	<ol style="list-style-type: none"> A. Explain or identify types of transmissions and clutches. B. Compute gear ratios. C. Explain how power flows through the transmission. D. Disassemble and reassemble a transmission. E. Service a clutch system and make proper adjustments. 	10.1 10.3 1.0 CR 1 and 2	C8.2 B1.4		
<ol style="list-style-type: none"> 1. Demonstrate carburetor overhaul. 2. Discuss fuel pump theory and types of fuel tanks. 3. Demonstrate service of fuel and air filters. 4. Define carburetors 5. Define and demonstrate troubleshooting fuel pumps and carburetors. 6. Perform fuel system diagnosis and repair. 	<ol style="list-style-type: none"> A. Explain the carburetor theory and circuits. B. Overhaul a basic carburetor and name the parts. C. Explain fuel pump theory and be able to rebuild/overhaul a fuel pump. D. Explain different types of fuel tank systems and perform proper service on the systems. E. Properly service fuel and air filters and pumps. F. Identify different types of carburetors. G. Troubleshoot and rebuild a fuel pump on an engine or motorcycle. H. Troubleshoot and rebuild a carburetor on an engine or motorcycle. I. Perform a fuel system diagnosis and repair. 	10.1- 10.3 11.1 11.2 6.0 1.0 CR 1,2, 4 and 5	C8.6 B8.1		
<ol style="list-style-type: none"> 1. Use of a test light 2. Rewiring a motorcycle 3. Diagnosis, repair and how to rebuild a starter. 4. Troubleshooting an alternator and generator; rebuilding if necessary. 5. Use of a volt-ohm meter. 6. Discussion the starting and charging systems. 7. Charging a battery 8. Service and repair on generators and alternators in various systems. 9. Types of starting systems 10. Service and repair of starting systems. 	<ol style="list-style-type: none"> A. Troubleshoot the wiring with a test light. B. Rewire the motorcycle. C. Diagnose, repair, and troubleshoot starter problems. D. Rebuild a starter. E. Troubleshoot the generator and rebuild as needed. F. Troubleshoot the alternator and rebuild as needed. G. Use the volt-ohm meter. H. Explain and/or identify the starting and charging systems. 	10.1- 10.3 11.1 11.2 6.0 1.0 CR 1,2, 4, 5 and 9	C7.1 C6.3 C6.4 B2.2	5-10	0

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<i>Electrical System (Continued)</i>	I. Charge a battery and check it for charge. J. Service and repair and replace generators and alternators in the various systems. K. Identify the different types of starting systems. L. Service and replace or repair the various types of starting systems.	Anchor/ CR	CTE	CL	CC
<p>10. Ignition Systems</p> <ol style="list-style-type: none"> 1. Theory of basic magneto. 2. Magneto system overhaul 3. How to overhaul a distributor. 4. Capacitate discharge ignition system 5. Internal and external fly wheel system. 6. Spark plug 7. Demonstrate procedure on an engine or motorcycle. 	<p>Goal: The student will understand the basic principles of magneto, battery, electronic ignition systems, and be able to perform repair to industry standards.</p> <ol style="list-style-type: none"> A. Explain the theory of basic magneto. B. Overhaul a magneto system and perform a tune-up. C. Explain the workings of a distributor and overhaul it. D. Explain the capacitive discharge ignition system and service it. E. Explain and perform service and tune-up on internal and external flywheel type ignition systems. F. Service a spark plug (clean and gap test). G. Perform the following procedures on an engine or motorcycle; troubleshoot, tune-up, general repair, rebuilding of the system, and necessary adjustments. 	<p>10.1-10.3 11.1-11.2 6.0 1.0</p> <p>CR 1,2, and 5</p>	<p>C3.5 C7.1 C7.2 C7.3</p>		
<p>11. Lubrication</p> <ol style="list-style-type: none"> 1. Discuss and define lubrication systems and identify oil types and their classifications. 	<p>Goal: The student will understand lubrication systems used on motorcycles.</p> <ol style="list-style-type: none"> A. Explain the lubrication system B. Identify the different types of systems (pump, splash, etc.) C. Explain how a two-cycle lubrication system operates. D. Explain or identify oil types and classifications. 	<p>10.1-10.3 1.0</p> <p>CR 1,2, and 5</p>	<p>C6.2</p>		
<p>12. Smog systems</p> <ol style="list-style-type: none"> 1. Review basic smog systems, its purpose and how to service. 	<p>Goal: The student will understand smog systems.</p> <ol style="list-style-type: none"> A. Explain basic smog control systems. B. Explain purpose of smog systems. C. Service smog systems. 	<p>10.1-10.3 11.1-11.2 6.0 1.0</p> <p>CR 1,2, 4, 5 And 9</p>	<p>C1.3</p>		
<p>13. Troubleshoot and Tune-up</p> <ol style="list-style-type: none"> 1. Review tune-up procedures. 2. Demonstrate tune-up (carburetion and ignition) 3. Troubleshoot an engine in the areas of carburetion, ignition, compression and starting system. 	<p>Goal: The student will demonstrate how to troubleshoot and tune-up an engine to industry standards.</p> <ol style="list-style-type: none"> A. Explain tune-up and trouble shooting procedures. B. Perform a complete tune-up on an engine (carburetion and ignition). C. Troubleshoot an engine in the areas of carburetion, ignition, compression and starting system. 				

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<p>14. Brakes</p> <ol style="list-style-type: none"> 1. Brake systems. 2. Rebuilding drum brake system 3. Changing brake shoes 4. Service of mechanical and hydraulic brake system. 5. Rebuilding disc brake system 6. Changing pads 7. Troubleshooting brake system 	<p>Goal: The student will demonstrate an understanding of brake principles operation to include state and federal regulations as they apply to brake repair. The student will perform maintenance and repair operations on brakes in a competent manner meeting legal requirements.</p> <ol style="list-style-type: none"> A. Explain brakes and their related systems. B. Rebuild a drum brake system and change brake shoes. C. Service the mechanical and hydraulic components of the brake system. D. Rebuild a disc brake system and change pads. E. Troubleshoot the brake system and the related sub-systems 	<p>Anchor/CR</p> <p>10.1-10.3 11.1 11.2 6.0 1.0</p> <p>CR 1,2, and 5</p>	<p>CTE</p> <p>C8.3 C6.0</p>	<p>CL</p>	<p>CC</p>
<p>15. Frame Tire Suspension</p> <ol style="list-style-type: none"> 1. Frame maintenance 2. Welding 3. Body work on frame 4. Painting 5. Rebuilding front forks 6. Replacement, repacking or repairing wheel bearings and steering neck. 7. Shocks 8. Various suspension systems. 	<p>Goal: The student will learn the operation, maintenance, and repair of motorcycle frames, wheels, tires, and suspension. The student will become familiar with advantages of specific systems and components and be able to make recommendations relating to them.</p> <ol style="list-style-type: none"> A. Perform frame maintenance. B. Weld (ar and oxy/acetylene). C. Perform bodywork on frame and body parts. D. Paint frame and body parts. E. Rebuild front forks on a motorcycle. F. Repack and replace wheel bearings. G. Repair and replace front steering neck bearing and assembly on motorcycle. H. Remove and replace shocks. I. Identify various suspension systems. 	<p>10.1-10.3 11.1 11.2 6.0 1.0</p> <p>CR 1,2, 4 and 5</p>	<p>C8.1 C8.4 C8.5 C8.6 B8.0 B7.0</p>		
<p>16. Engine Overhaul</p> <ol style="list-style-type: none"> 1. Use of industry manual for parts and specifications. 2. Use of measuring instruments to compute various readings of parts. 3. Diagnosis and repair of an engine using proper parts and specifications from a repair manual. 	<p>Goal: The student will demonstrate an understanding of engine overhaul and diagnosis to rebuild an engine to specifications.</p> <ol style="list-style-type: none"> A. Explain how to use the manual to look up part and specification and disassembly and reassembly procedures. B. Explain the use of the micrometer in measurement. C. Measure and compute readings of various parts of the engine using the micrometers, ruler, and other measuring devices. D. Disassemble an engine and diagnose the problem, repair and rebuild the engine, using a repair manual and proper specifications and parts. E. Rebuild ignition system to specifications Make all necessary adjustments to motor to make it run correctly. 				

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17. Computer Usage 1. Computer usage as it pertains to the industry.	Goal: The student will understand computer usage in the field. A. Demonstrate computer applications in industry as they pertain to parts, service and inventory.	Anchor/CR 3.8 2.4 11.1 11.2 1.0 CR 1,2, and 5	CTE A2.2 A2.3 A2.8	CL	CC
18. Individual Projects 1. Completion of individual student projects.	Goal: The student will complete individual projects in addition to assigned class curriculum. A. Satisfactorily complete pre-approved individual projects.	10.1- 10.3 11.1 11.2 6.0 1.0 CR 1,2,4,5, and 9	C3.5 C6.3 C6.4 C7.1- C7.3 B2.2 B1.4		