STRANDS AND STANDARDS
POWER MOTOR SPORTS REPAIR

Learning that works for Utah
CTE®

Course Description

This course is designed to be a specialized course to follow Small Engine Repair. Students will specialize and focus on skills related to small motor sports associated with the outdoor recreational industry (UTV, dirt bikes, ATV, jet skis, snow mobiles, etc.). Entry level skills will include inspections, preventative maintenance, and light repair.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.09.00.00.091
Concurrent Enrollment Core Code	40.09.00.13.091
Prerequisite	Small Engine Repair or Automotive, Intro
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Automotive Service
Endorsement 2	Small Engine Technician

STRAND 1: SHOP SAFETY

Students will understand and demonstrate general shop safety.

Standard 1

Learn safe working habits and procedures. Pass relevant safety tests with 100 percent.

- Personal safety.
- Tool and equipment safety.
- Workplace safety.
- Personal protective equipment (PPE).

Standard 2

Comply with safety rules for working with automotive chemicals.

- Chemical manufacturers provide a Safety Data Sheets (SDS) for each chemical they produce.
- Identify the location of and navigate through the SDS for critical information.
- Store and dispose of chemicals in properly labeled containers.

Standard 3

Identify the gasses encountered in the automotive field and the hazards they present.

- Water, oxygen, nitrogen, carbon dioxide (CO2), hydrocarbons (HC), oxides of nitrogen (NOx), and carbon monoxide (CO).
- HC, NOx, and CO can pose health and environmental problems if they are not controlled.

Standard 4

Identify potential electrical safety hazards.

- Standard Electrical Battery
- Electrical Equipment
- Loss of Isolation

Standard 5

Identify potential hazards in workplace practices.

- Chain, bar, and sprockets
- Blades and cables
- Pinch/nip points
- Pulleys and belts
- Power takeoff (PTO)

Standard 6

Assess lifting equipment for safe and proper operation.

- Inspect & verify for safe operation.
- Safety devices (swing arms, locks, latches, etc.)
- Lift points (unibody and full frame)
- Jacks and jack stands, auxiliary lift supports

Performance Skills

- Pass relevant safety tests with 100 percent.
- Comply with safety rules and procedures for working with automotive chemicals.
- Use concepts and practices to solve, mitigate, and manage potential shop hazards & substances.
- Demonstrate safe and proper operation of lifting.
- Demonstrate safe and proper operation of shop equipment.
- Comply with safety procedures when working with electrical components and systems (lock out, tag out).
- Demonstrate proper use of appropriate PPE.

STRAND 2: TOOLS & EQUIPMENT

Students will be able to understand basic hand tools, fasteners, shop equipment, and procedures.

Standard 1

Identify, size, and measure metric and standard fasteners.

- Bolts, nuts, lock washers, keys, cotter pins, and snap rings
- Right-hand and left-hand threads, and course and fine threads

Standard 2

Correctly identify and use basic hand tools.

- Screwdrivers, wrench, sockets, drive handles, extensions, pliers, hammer, chisels, punches, files, hacksaw, pullers, vises, drill bits, grinding tools
- Pneumatic and electric power tools

Standard 3

Identify and demonstrate use of basic measuring tools.

- Spark Plug Gap Gauge
- Feeler Gauge
- Measuring Tape

Standard 4

Use reference manuals or information systems to find service procedures and specifications.

- Computer oriented
- Printed manuals
- Owner's manuals
- Repair orders (cause, concern, correction)

Performance Skills

- Measure metric and standard fasteners.
- Demonstrate use of basic measuring tools to manufacturers' specifications.
- Correctly identify, use, maintain, and organize basic hand tools, including torque wrench.
- Successfully complete a repair order.

STRAND 3: POWER SPORTS EQUIPMENT ID

Students will recognize various types of power sports equipment and applications within relevant laws and regulations.

Standard 1

Differentiate on-road and off-road vehicles and applications.

- Vehicle design
- Purpose (land, marine)

Standard 2

Categorize vehicle types and applications (UTV, dirt bikes, ATV, jet ski, snow mobile, etc.)

- Engine size
- Model design and usage

Standard 3

Investigate laws, regulations, registrations, and certifications for operation.

- Operator certification and licensing
- Equipment requirements
- Vehicle inspections

Performance Skills

- Location Vehicle Identification Number (VIN), serial number, and model number to interpret vehicles specifications.

STRAND 4: BRAKES

Students will inspect and service brakes and related systems on various power equipment.

Standard 1

Describe the operation of brakes and related systems.

- Master cylinder, caliper, and wheel cylinder
- Lines, cables, and levers
- Drum hardware and components
- Disc hardware and components
- Wheel bearings

Standard 2

Locate and assess all serviceable brake components and their specifications.

- Pads and shoes
- Cable adjusters
- Hydraulic components
- Wheel bearings

Standard 3

Assess and properly use tools and equipment to service brakes and related systems based on manufacturer recommendations.

- Torque wrench
- Micrometer
- Depth gauge and/or lining depth gauge
- Calipers

Performance Skills

- Inspect mechanical linkages and cables; adjust as necessary.
- Inspect hydraulic system components.
- Inspect hydraulic fluid level and condition.
- Inspect and repack wheel bearings.
- Inspect and service brake pads and shoes to manufacturer’s specifications.

STRAND 5: STEERING & SUSPENSION

Students will inspect and service steering, suspension, and related systems on various power equipment.

Standard 1

Describe the operation of steering and suspension systems and related components.

- Shocks, coils, and forks
- Control and swing arms, bushings, and joints
- Rack and pinion, direct steer, head tube, joints, and knuckles

Standard 2

Locate and assess all serviceable steering and suspension components.

- Steering (wheel, handlebars, column, gear box, etc.)
- Bushings, bearings, and joints
- Shocks, springs, forks, control arms

Standard 3

Interpret tire sidewall markings: size, inflation, and age.

- Tire type and application
- Tire sizes

Standard 4

Demonstrate wheel and tire service procedures.

- Removal and installation
- Dismount, inspect, remount
- True wheel
- Torque to specifications

Standard 5

Demonstrate tire and tube repair procedures.

- Inspect interior and exterior of the tire.
- Determine if the tire can be repaired.
- Repair the tire damage correctly.
- Verify tire repair.

Standard 6

Assess and properly use tools and equipment to service steering, suspension, and related systems based on manufacturer recommendations.

- Torque wrench
- Truing stand
- Tire spoons and machines
- Grease gun

Performance Skills

- Interpret tire sidewall markings.
- Dismount, inspect, and remount a tire on a wheel.
- Locate a leak and repair a tire/tube following manufacturer recommendations.
- Service all lubrication points on steering and suspension components following manufacturer recommendations.
- Tighten fasteners to manufacturer's torque specifications.
- (Optional) Use a truing stand to balance wheels.

STRAND 6: ELECTRICAL

Students will inspect and service the Base Electrical/Electronic System(s).

Standard 1

Demonstrate use of electrical tools and equipment to interpret Ohm's Law.

- Test light, Digital Multimeter (DMM), power probe, etc.
- Series, parallel, and series-parallel circuits
- Voltage drop (shorts, grounds, opens, excessive resistance)

Standard 2

Inspect and test circuit devices.

- Fuses
- Switches
- Bulbs/LED

Standard 3

Maintain and service a battery and related components.

- Fluid
- Charging (in/out of vehicle)
- Cleaning
- Remove/replace

Standard 4

Locate and inspect starting systems.

- Electrical start
- Pull start
- Kick start

Standard 5

Locate and inspect charging systems.

- Magnetos
- Alternators

Standard 6

Show effective diagnostic strategies.

- Diagnostic steps: verify failure, visual inspection, diagnose, repair, verify repair
- Interpret vehicle Diagnostic Test Codes (DTCs).

Performance Skills

- Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs).
- Retrieve a diagnostic trouble code (DTC).
- Demonstrate use of types of test lights; use appropriate test light to check operation of electrical circuits as directed per service information.
- Inspect and service a battery.
- Properly change a vehicle light.

STRAND 7: IGNITION SYSTEMS

Students will inspect and service ignition systems on various power equipment.

Standard 1

Describe the operation of ignition systems and related components.

- Magneto, armature, and coils
- Spark plug and wires
- Primary and secondary
- Capacitor Discharge Ignition (CDI)

Standard 2

Assess and properly use tools and equipment to test ignition components based on manufacturer recommendations.

- Spark plugs
- Ignition coils and wires
- Magneto gap
- CDI resistance test

Performance Skills

- Inspect, test, and replace spark plugs and related wires.
- Perform a primary and secondary ignition test.

STRAND 8: ENGINE

Students will inspect and service engines, transmissions, and related systems on various power equipment.

Standard 1

Based on the manufacturer's specifications, perform preventative engine maintenance inspections.

- Fluid levels
- Belts, chains, and sprockets
- Hoses
- Filters
- Mounts

Standard 2

Describe the operation of four-stroke and two-stroke.

- Intake, compression, power, exhaust
- Ports vs. valves

Standard 3

Understand lubrication maintenance intervals and oil types.

- Viscosity
- Additives
- Formulas

Standard 4

Locate and assess basic engine cooling system components and operations.

- Cooling types (liquid, air)
- Radiator
- Thermostat
- Hoses
- Pump
- Reservoir
- Fan

Standard 5

Describe proper top end removal and rebuild procedures.

- Feeler gauge, micrometers, measuring instruments, straight edge, etc.
- Inspection, removal, labeling, storage, and reinstallation.
- Valve adjustments (shim under bucket, tappet, rocker)

Standard 6

Based on the manufacturer's specifications, perform preventative drivetrain maintenance inspections.

- Belts, chains, and sprockets
- Shafts
- Gear box, continuously variable transmissions (CVT), clutches (wet, dry)
- Power takeoff, attachments
- Tooling (pullers and installers)

Performance Skills

- Successfully service air intake systems.
- Successfully complete cooling system inspection and service.
- Demonstrate use of basic measuring tools in setting a valve train to manufacturers' specifications.
- Perform a compression and leak down test.
- At the correct interval, perform lube, oil, and filter service. Use proper disposal methods for waste oil and filters.
- Adjust and set belt and/or chain tension.
- Inspect a CVT belt.
- Inspect, adjust, and/or change drivetrain fluids.
- (optional) Successfully complete a top-end rebuild based on manufacturer's specifications

STRAND 9: FUEL SYSTEMS

Students will inspect and service fuel systems on various power equipment.

Standard 1

Describe the operation of fuel systems and related components.

- Pumps
- Injectors/carburetor
- Tanks
- Petcock/shutoff valve
- Lines and hoses
- Filters

Standard 2

Differentiate the various fuel types and products.

- Mixtures/ratios
- Ethanol
- Octane levels / race fuels

Standard 3

Categorize carburetor types and components.

- Designs (downdraft, mechanical, constant velocity)
- Jetting
- Rebuild
- Tuning

Standard 4

Describe the operations of fuel injection systems.

- Port fuel injector
- Return system

Standard 5

Assess and properly use tools and hardware related to fuel systems based on manufacturer recommendations.

- Float levelers
- Multi tuner
- Cleaner solvents
- Jet files & cleaners
- Gaskets, o-rings, sealants

Performance Skills

- Successfully rebuild a carburetor.
- Complete a fuel tank flush following manufacturer recommendations.
- Replace lines and fuel filters according to manufacturer recommendations.

STRAND 10: SEASONAL STORAGE

Students will demonstrate long-term storage processes and procedures.

Standard 1

Distinguish various cleaning and protective processes for upholstery, tires, body panels, and accessories.

- Methods
- Chemicals
- Shrink wrap
- Repairs

Standard 2

Distinguish various fuel storage processes.

- Methods
- Additives

Standard 3

Distinguish various electrical and battery storage processes.

- Methods
- Additives
- Equipment

Performance Skills

- Demonstrate proper fuel preventative maintenance (seasonal storage).
- Demonstrate proper battery storage (long-term).
- Properly condition and protect upholstery, tires, body panels, and accessories.

STRAND 11: MECHANICAL MATH

Students will solve basic mathematical equations related to small engine repair tasks and concepts.

Standard 1

Solve whole and fractional/decimal problems (two- and three-digits).

- Addition
- Subtraction
- Multiplication
- Division

Standard 2

Solve conversion problems.

- Fraction-to-decimal
- Decimal-to-fraction
- Decimal-to-percent
- Percent-to-decimal

Standard 3

Identify basic ratios, proportions, and volumes.

- Fluids: gallon, liter, quart
- Units of measure: psi, kpa, foot, lbs, newton meters, inch

Standard 4

Solve basic linear-measurement problems.

- Measure using the Imperial system
- Measure using the Metric system

Performance Skills

- Solve whole number problems with two- and three-digits.
- Solve fraction problems.
- Solve decimal problems with two- and three-digits.
- Solve conversion problems.
- Solve basic ratio-to-proportion problems.
- Solve basic linear-measurement problems.
- Use basic ratios, proportions, and volumes when servicing a small engine.

STRAND 12: CTSOs & WORKPLACE SKILLS

Students will be encouraged to participate in a relevant CTSO through the demonstration of automotive repair workplace and career readiness skills. These standards will not appear on state skill certification exams, but should be taught throughout the duration of the course.

Standard 1

Students will display personal skills related to the essential values, personality traits, and personal characteristics for success in automotive repair and life.

- **Integrity** - demonstrate honesty and personal responsibility for actions in repairing and maintaining vehicles.
- **Work ethic** - demonstrate tenacity, hard work, excellence, punctuality, meet deadlines; and be self-directed when completing tasks in the automotive repair classroom or shop.
- **Professionalism** - demonstrate maturity, self-confidence; and a positive image when working with teammates or clients on automotive repair jobs/projects.
- **Responsibility** - demonstrate dependability, consistency, and personal well-being when safely completing automotive repair tasks.
- **Adaptability/Flexibility** - Foster creativity, new ideas, and resilience when working to solve problems in automotive repair tasks.
- **Self-motivated** - demonstrate a willingness to learn, independence, initiative, and a positive attitude when approaching new information

Standard 2

Students will display workplace skills related to the essential attitudes and abilities for success in the automotive repair industry.

- **Communication** – Demonstrates skills in listening and speaking; communicates professionally with teammates, supervisors, and customers in relation to automotive repair.
- **Decision making** – Analyzes key facts, data, and situations to employ reasoning skills for completing automotive repair tasks.
- **Teamwork** – Builds trusting relationships, works cooperatively with others and utilizes individual strengths of team members when completing automotive repair tasks.
- **Planning, organizing, and management** – Designs, prepares, and implements automotive repair tasks within a desired timeframe; Sets priorities and responds to changing priorities.
- **Leadership** – Builds positive relationships and mitigates conflict.

Standard 3

Students will display technical skills that are grounded in automotive repair that deliver essential knowledge and competencies for success in the industry.

- **Computer and technology literacy**
- **Job specific skills**
- **Safety and health**
- **Service orientation** – responds to internal and external customers; demonstrates focus and presence; attends to personal matters away from the classroom.
- **Professional development** – demonstrates openness to learn, grow, and change in the automotive repair industry.

Skill Certification Test Points by Strand