Gateway Community College
Small Engine Repair & Technology
COURSE OUTLINE

COURSE TITLE: Small Engine Repair & Technology

TOTAL CLASS HOURS: 96 (14 weeks)

DESCRIPTION: Classroom and hands-on training to learn to inspect, service and repair motorized power equipment. Jobs in this field may include working as a small engine mechanic or technician on generators, snow blowers, lawn mowers, personal watercraft, marine engines, garden tractors or other small engines.

Course content includes safety, tools, fuel, chemicals, starting and charging the equipment training in inspection, disassembly, reconditioning, preventive maintenance and troubleshooting; and hands-on familiarity with a variety of equipment. Students are encouraged to seek out independent internship and employment opportunities in this field.

Curriculum aligns with subject matter competencies under the Equipment and Engine Training Council (EETC) Certification(s) in 2-Stroke, 4-Stroke and Electrical. Gateway is an approved EETC testing site.

COURSE OUTLINE:

Small engine Technology 1 – Basics

Safety

a. Shop safety
b. Keep work area clean
c. Handle hazardous material properly
d. Wear proper clothing
e. Maintain adequate ventilation
f. Use hand tools properly
g. Use power tools properly
h. Use compressed air carefully
i. Lift properly
j. Protect he knees
k. Use proper electrical wiring/grounding procedures
l. Operate engine safely
m. Be prepared for emergencies
n. Follow OSHA requirements

Measuring

a. Measuring instruments
b. Micrometer
c. Cleaning and calibrating a micrometer
d. Using a micrometer
e. Reading the standard micrometer
f. Reading a vernier micrometer
g. Telescoping gauge
h. Small hole gauge
i. Thickness gauge
j. Valve spring tension tester
k. Combination square
l. Dial indicator
m. Screw pitch gauge

Tools

a. Wrenches
b. Pliers
c. Retaining ring pliers
d. Screwdrivers
e. Hammer
f. Punches
g. Cold chisels
h. Gear pullers
i. Probe and pick up tools
j. Vise
k. Cleaning tank

Electrical

Starting and Charging

Fuel

Fasteners, sealants, and gaskets

a. Thread fastener
b. Set screws
c. Self-tapping Screws
d. Bolts
e. Nuts
f. Lock Nuts
g. Bolt and Nut Terminology
h. Bolt grades
i. Thread Types
j. Thread Fit
k. Thread Designation
l. Tightening and Loosening Threaded Fasteners
m. Tightening to Specific Torque Settings
n. Chasing Threads

o. Tapping New Threads
p. Rule for Hand Tapping
q. Threading with a Die
r. Washers
s. Pins
t. Cotter Pins
u. Clevis Pins
v. Dowel Pins
w. Straight Pins
x. Grooved Pins
y. Taper Pin
z. Retaining Rings
aa. Keys
bb. Threaded Adhesives
cc. Sealants
dd. Anti-seizure Compounds
ee. Gaskets

Bearings
Chemicals
Career Opportunities

Small Engine Technology 2 – Engines

Principles of Operation

a. Gasoline engines
b. Simple Engine in Operation
c. Gasoline
d. Gasoline Must Burn Quickly
e. Fuel Is Atomized
f. Explosion Must be Contained
g. Further Improvement
h. Basis for an Engine
i. Cylinder Block
j. Crankshaft and Crankcase
k. Pistons
l. Connecting Piston to Crankshaft
m. Intake and Exhaust Ports
n. Poppet Valves
o. Valve Spring Assembly
p. Valve Lift or Tappet
q. Camshaft
r. Valve Train Configuration
s. Flywheel
t. Basic Terminology
u. Engine Bore and Stroke

v. Engine Displacement
w. Compression Ratio
x. Force
y. Work
z. Power
aa. Energy
bb. Horsepower
cc. Horsepower Formula
dd. Kinds of Horsepower
ee. Brake Horsepower
ff. Indicated Horsepower
gg. Frictional Horsepower
hh. Rated Horsepower
ii. Corrected Horsepower
jj. Torque
kk. Torque Is Not Constant
ll. Torque and Horsepower
mm. Volumetric Efficiency
nn. Practical Efficiency
oo. Mechanical Efficiency
pp. Thermal Efficiency

2-stroke gas/4-stroke gas

a. Small Engine Identification
b. Four-Stroke Cycle Engine
c. Intake Stroke
d. Compression Stroke
e. Power Stroke
f. Exhaust Stroke
g. Valve Timing
h. Lubrication
i. Two-Stroke Cycle Engine
j. Variation in Design
k. Principle of Operation
l. Intake into Crankcase
m. Ignition Power
n. Exhaust
o. Fuel Transfer
p. Scavenging and Tuning
q. Rotary Disc Valve Engine
r. Reed Valve Engine
s. Four-Cycle Engine vs. Two-Cycle Engine

Diesel

Fuel/Emissions

a. Engine Fuels
b. Gasoline
c. Fuel Stabilizers
d. Liquefied Petroleum Gas or Natural Gas
e. Combustion of LPG
f. Advantages of LPG
g. Disadvantages of LPG
h. Kerosene and Diesel Fuels
i. Two-Cycle Fuel Mixtures
j. Tanks, Lines, and Fittings
k. Fuel Filters
l. Fuel Pumps
m. Impulse Diaphragm Fuel Pumps
n. Pressurized Fuel System
o. Vapor Return Fuel Systems
p. Emission Control Regulations
q. Impact of EPA Regulations on the Service Technician
r. Role of the Consumer Principle of Carburetion
s. Air-Fuel Mixture
t. Carburetor Pressure Difference
u. Vacuum
v. Atmospheric Pressure
w. Venturi Principle
x. Types of carburetors
y. Float-Type Carburetors
z. Float Bowl Ventilation
aa. Choke System
bb. Throttle System
cc. Load Adjustment
dd. Acceleration System
ee. Acceleration Well
ff. Economizer Circuit
gg. Idling Circuit
hh. Part-Throttle, Full-Throttle Sequence
ii. Primer
jj. Diaphragm-Type Carburetors
kk. Diaphragm carburetor Operation
ll. Manual Throttle Control
mm. Governor Throttle Controls
nn. Type of Governors
oo. Governor Features
pp. Air Cleaners and Air Filters

qq. Oil-Wetted Air Cleaner
rr. Dry-Type Air Cleaner
ss. Dual Element Air Cleaners

Ignition

a. Basic Ignition System Operation
b. Fundamentals of Electrical Principles
c. The Electron Theory
d. Electrical Unit of Measurement
e. Ohm's Law
f. Magnetism
g. Magnets and Electricity
h. Ignition Coil
i. Spark Plugs
j. Spark Plug Heat Transfer
k. Measuring Spark Plug Temperature
l. Types of Electrodes
m. Switching Devices
n. Breaker Points
o. Electronics witching Devices
p. The MBI Magneto System
q. The Stop Switch
r. Ignition Advance Systems
s. Dwell and Cam Angle
t. Electronic Ignition
u. Operation of Capacitive Discharge Ignition (CDI) System
v. Operation of Transistor Controlled Ignition (TCI) System
w. Magneto Ignition Systems Compared
x. Battery Ignition Systems
y. High Voltage Secondary Current
z. Auto-Transformer Type Ignition Coil
aa. The Lead-Acid Battery

Lubrication

a. Principle of Lubrication
b. Friction
c. Preventing Wear Due to Friction
d. Lubricating Oil
e. Permitting Easy Starting
f. Lubricates and Prevents Wear
g. Protects against Rust and Corrosion
h. Keeps Engine Parts Clean
i. Cools Engine Parts
j. Seals Combustion Pressures
k. Preventing Foaming
l. Aids Fuel Economy

m. Oil Selection
n. SAE Viscosity Grade
o. API Engine Oil Service Classification
p. Engine Lubrication
q. Two-Cycle Engine Lubrication Systems
r. Four-Cycle Engine Lubrication Systems
s. Splash Lubrication System
t. Constant Level Splash System
u. Ejection and Barrel Pumps
v. Positive Displacement Oil Pumps
w. Full-Pressure Lubrication Systems
x. Oil Filter Systems
y. Bypass Systems
z. Shunt Filter Systems
aa. Full-Flow Filter Systems

Cooling
Preventive maintenance and Troubleshooting
Inspection, disassembly, & reconditioning

Small Engines Technology 3 – Equipment
Operation, maintenance and repair of Lawn equipment
Tractors
Snow throwers
Personal watercraft
Generator
Transmissions/Drive systems
Tires