

Equipment & Technology Institute

Course Outline

Secondary Vocational-Technical Education Program

Vehicle & Mobile Equipment Mechanics
And Repairers (Technicians) Cluster
47.0600

Occupations:

- Heavy equipment service technician
- Small engine repair technician
- Industrial equipment service technician
- Equipment mechanic
- Field service technician
- Preventive maintenance technician
- Parts specialist
- Warranty claims writer
- Service shop supervisor
- Service shop manager

Course Sequence:	<u>Credit upon completion</u>
Orientation to Production (10)	.5
Basic electricity (10)	.5
Introduction to hydraulics (11)	.5
Electronics (11)	.5
Small engines/repair (12)	.5
Communications drafting (12) <u>or</u>	.5
General Business Skills (12) <u>or</u>	.5
Program Logic Control (12)	.5
Job shadowing*	* Non-credit
components	
Paid internships*	of the program.
Community College Technology Courses*	

Orientation To Production

10th grade 1 semester .5 credit

Description of this course and areas of study to be submitted by Gage Park High School.

Basic Electricity

10th grade 1 semester .5 credit

An introduction to the basic concepts of electricity, with emphasis on hands-on experience leading to an understanding of electricity as it applies to mobile equipment, heavy and industrial machinery used in construction and related industries.

Units of instruction in this Basic Electricity course include:

- 1a. Perform mathematical computations dealing with electricity.
- 1b. Know the basic concepts of electricity.
- 1c. Comprehend and describe electrical quantities and units.
- 1d. Demonstrate an understanding of magnetism and electromagnetism.
- 1e. Know and use the vocabulary pertaining to electricity.
- 2a. Analyze and compare basic circuits, laws and measurements.
- 2b. Understand capacitance, inductance, AC & DC voltages.
- 2c. Trace and describe multiple-load and complex circuits.
- 2d. Discuss the basic theory related to the operation of a battery.
- 3a. Demonstrate safe work practices in an electrical work area, including proper use of tools, equipment, solvents, personal safety apparatus, environmental and fire prevention/suppression.
- 3b. Follow a technical manual to analyze and repair a circuit operations problem, including removal, replacement and/or rebuilding of malfunctioning components.

Introduction To Hydraulics

11th grade 1 semester .5 credit

An introduction to the principles of hydraulics, including theories, operation and maintenance of hydraulic components, with a focus on how hydraulic systems are applied and used in mobile, heavy and industrial equipment.

Units of instruction in the Introduction To Hydraulics include:

- 1a. Discuss the history and key discoveries in the development of hydraulics.
- 1b. Know and describe the concepts of hydraulic design and operation.
- 1c. Understand open and closed center systems.
- 1d. Identify hydraulic schematics and their symbols in relation to components.
- 1e. Know and use the vocabulary pertaining to hydraulics.
- 2a. Demonstrate understanding of hydraulic fluids, filtering and pumping systems.
- 2b. Understand and identify types and uses of pipe fittings, tubing, hoses and seals.
- 2c. Describe basic functions, operations and uses of accumulators, cylinders, motors, pumps and valves.
- 3a. Perform basic maintenance checks, including flushing systems, leak prevention and protection against overheating.
- 3b. Demonstrate safe work practices in the work area, including proper use of tools, equipment, solvents, personal safety apparatus, environmental and fire prevention/suppression.
- 3c. Follow a technical manual to analyze and repair a hydraulic operations problem, including removal, replacement and/or rebuilding of malfunctioning components.

Electronics

11th grade 1 semester .5 credit

Using the knowledge gained from the basic electricity course, this advanced course relates to the workings of complete electronic systems, particularly as they apply to mobile, heavy and industrial equipment. (Knowledge also applies to most other mobile equipment and vehicles.)

Units of instruction in this Electronics course include:

- 1a. Learn and describe the history and development of electronics.
- 1b. Perform mathematical computations relating to basic electronic systems.
- 1c. Demonstrate knowledge of basic electronic concepts.
- 1d. Know and utilize key concepts and principles of electronic design.
- 1e. Know the vocabulary pertaining to basic electronics.
- 2a. Understand the workings and uses of semiconductors, junction diodes and transistors.
- 2b. Understand the concepts and workings of small signal, large signal and operational amplifiers

- 3a. Demonstrate safe work habits in working with electronics, including proper use of tools, equipment, solvents, personal safety apparatus, environmental and fire protection/suppression.
- 3b. Follow a technical manual to analyze and repair a malfunctioning electronic system, including removal, replacement and/or rebuilding components using electronic instruments.

Small Engines/Repair

12th grade 1 semester .5 credit

The understanding of all internal combustion engines begins with knowledge of how the small ending works. This course covers the operations of small engines/fuel systems, from basic terminology and componentry to testing and adjustment, while emphasizing that that the largest gasoline, diesel and other sources of engine power operate on the same concepts and principles.

Units of instruction in the Small Engines/Repair course include:

- 1a. Discuss the history and development of internal combustion engines.
- 1b. Perform mathematical measurements and computations pertaining to engines.
- 1c. Know and describe the basic concepts, functions and operations.
- 1d. Know and demonstrate engine design concepts, plus the principles and processes of engine components.
- 1e. Know and use the vocabulary pertaining to small engines.
- 2a. Identify the different types of small engines.
- 2b. Understand and describe cooling and lubrication systems.
- 2c. Understand and describe engine blocks and cylinders.
- 2d. Discuss concepts relating to fuel systems and intake/exhaust systems.
- 2e. Understand and discuss crankshafts and bearings.
- 2f. Describe the functions of an engine's electrical system.
- 3a. Show the correct techniques for using hand, power and precision tools.
- 3b. Demonstrate safe work practices in the work area, including proper use of tools, equipment, solvents, personal safety apparatus, environmental and fire protection/suppression.
- 3c. Follow a technical manual to analyze and repair an engine operational problem, including removal, replacement and/or rebuilding of malfunctioning components.

Special Note:

Gage Park students in the Equipment & Technology Institute will take one of the following three courses in their final (12th grade) semester. Or, depending on scheduling and availability, they may have an option to choose from among the following:

Communications Drafting

12th grade 1 semester .5 credit

This course is presented to the students as critical background for a comprehensive knowledge of modern technology, as it focuses on technical drawing, the use of drafting tools, computerization in the drafting profession and the fundamentals necessary to specific drafting skills.

Units of instruction in Communications Drafting include:

- 1a. Perform mathematical computations basic to the drafting art.
- 1b. Know basic concepts of communications and architectural drafting.
- 1c. Comprehend and utilize architectural drafting scales.
- 1d. Demonstrate an ability to transform a concept into its best technical design representation.
- 1e. Know and use the vocabulary pertaining to basic drafting.
- 2a. Create a freehand sketch of an idea using correct techniques.
- 2b. Understand the fundamentals of layout and drawing of one, two or three view orthographic drawings, utilizing sectional views as necessary.
- 2c. Layout and draw isometric, cabinet, oblique or perspective pictorial drawings.
- 2d. Understand standard dimensions along with tolerances to the extent needed for each application.
- 3a. Know how to select appropriate tools (triangle, protractor, compass, etc.) to prepare drawings.
- 3b. Demonstrate how to measure and draw the alphabet of lines.
- 3c. Boot-up/log-on a computer to create a technical drawing.
- 3d. Draw lines, arcs and circles using a computer.
- 3e. Edit lines, arcs and circles using a computer mouse.
- 3f. Demonstrate safe work practices in the communications drafting labs

General Business Skills (availability to be determined)

12th grade 1 semester .5 credit

A potential option for 12th grade students who would learn the basic of organizational management, teamwork and leadership concepts, financial and operational goals, etc. The AED Foundation will work with Gage Park High School, the Chicago Public Schools and within its own industry to find a teacher with the proper credentials to provide instruction.

Units of instruction would include:

- Comprehend the basic academic skills required on the job (English, math., science, social studies at minimum performance levels).
- Recognize types of communications equipment and options used in a business organization.
- Discuss the importance of knowing a company's goals and objectives.
- Define the importance of customer service, budgeting and forecasting, expense control, personal goals, accuracy in paperwork and computer programs, etc.
- Explain departmental operations and how departments fit into the corporate structure.
- Describe the various attitudes people have towards their employers, and how employers deal with them.
- Demonstrate a knowledge of business vocabulary.
- Discuss the importance of clean workplaces and the roles of safety, environmental protection and respect for co-workers.

Program Logic Control (availability to be determined)

12th grade 1 semester .5 credit

A potential option for 12 graders in their final semester, this course would be taught at Daley College. It focuses on understanding sophisticated electronic control systems used in plant, industrial and construction machinery. A summary of units of instruction will be available at a later date if the Gage park program's Steering Committee wants to recommend it as an option.