Course Learning Outcomes:
By the end of this course, a student should be able to:

- Complete exercises
- Explore alternate circuits for equivalent functions
- Differentiate between efficient and inefficient circuits
- Improve poor or existing circuit designs
- Improvise when not all of the circuit information is available
- Interpret various circuits
- Research manufactures information on component specifications and operating limits
- Read and identify circuits by name from a schematic
- Draw circuit schematics from verbal description

Course Outline

I. Basic Hydraulic Principles
   A. Energy of Work
   B. Law of Conservation
   C. Acceleration
   D. Flow
   E. Area, Velocity, and Flow Rate
   F. Sizing Lines
   G. Pressure Transmits Force
   H. Flow through an orifice
   I. Rotary Motion
   J. Suction
   K. Heat in Systems
   L. Heat of Horsepower
   M. Dissipating Heat
   N. Viscosity Index

II. Pressure Controls
   A. Overview of Basics
   B. Manipulating Pressure
   C. Modulating
   D. Relief Valves
   E. Direct Acting
   F. Differential Piston
   G. Pilot Operated
   H. Construction
   I. Remote Control and Venting
   J. Reducing Valves
   K. Heat
   L. Direct Operated
   M. Check Valve
   N. Multi-Function Valves
   O. Sequence Valve
   P. Counterbalancing
Q. Overcenter Valve
R. Unloading Valve
S. Hilo Valve

III. Directional Controls
A. Direct Operated
B. Pilot Operated

IV. Flow Controls
A. Non-Compensated
B. Pressure Compensated

V. Pumps
A. Gear
B. Vane, Fixed, and P.C. Comp.
C. P.C. Piston

VI. Cylinders
A. Overview
B. Sizing
C. Levers
D. Mounting Styles
E. Part Number Ordering
F. Materials/Coatings

VII. Motors
A. Horsepower and Torque
B. Formula Use
C. Torque and Radius
D. Speed
E. Flow
F. Pressure control and Flow Control

VIII. Hydrostatic
A. Internal Components
B. Hydrostatic vs. Open Loop
C. Flow
D. Load Sensing
E. Application
F. Controls

IX. Filters
A. Contamination
B. Particle Size
C. Media
D. Suction Filtration
E. Beta