



## MASTER COURSE OUTLINE

Prepared By: John Martin

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## COURSE TITLE

Hydraulic Systems

## GENERAL COURSE INFORMATION

Dept.: AUT

Course Num: 132

(Formerly: )

CIP Code: 47.0604

Intent Code: 21

Program Code: 712

Credits: 3

Total Contact Hrs Per Qtr.: 44

Lecture Hrs: 22

Lab Hrs: 22

Other Hrs:

Distribution Designation:

## COURSE DESCRIPTION (as it will appear in the catalog)

This course provides a student with the skills and knowledge necessary to maintain and service various hydraulic power transmission systems. Topics covered include hydraulic fundamentals, system operation, pump, valve and actuator service, as well as seals, lines and hydraulic system components.

## PREREQUISITES

AUT 115 Automotive Shop Safety and Environmental Issues

AUT 190 Automotive Lab (Co-Requisite)

## TEXTBOOK GUIDELINES

None

## COURSE LEARNING OUTCOMES

*Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:*

1. Describe hydraulic system operating principles
2. Explain the operation of various types of hydraulic systems and components
3. Diagnose and locate various hydraulic system faults
4. Perform hydraulic system maintenance and repair
5. Select the proper hydraulic fluid for any hydraulic system.

## INSTITUTIONAL OUTCOMES

IO3 **Human Relations/Workplace Skills:** Students will be able to demonstrate teamwork, ethics, appropriate safety awareness and/or workplace specific skills

## COURSE CONTENT OUTLINE

### UNIT 1: HYDRAULIC FUNDAMENTALS

Basic Principles of Hydraulics

Hydraulic System Types and Operation

Automotive Application of Hydraulics

### UNIT 2: HYDRAULIC PUMPS

Gear Pumps

- Vane Pumps
- Piston Pumps
- Hydraulic Pump Ratings
- Diagnosis and Repair of Hydraulic Pump Malfunctions
- UNIT 3: HYDRAULIC VALVES
  - Pressure Control Valves
  - Directional Control Valves
  - Volume Control Valves
  - Other Valves
  - Diagnosis and Repair of Hydraulic Valve Malfunctions
- UNIT 4: HYDRAULIC CYLINDERS
  - Single Acting Cylinders
  - Double Acting Cylinders
  - Vane Type Cylinders
  - Diagnosis and Repair of Hydraulic Pump Malfunctions
- UNIT 5: HYDRAULIC MOTORS
  - Comparing Pump and Motor Design
  - Gear Motors
  - Vane Motors
  - Piston Motors
  - Hydraulic Motor Application & Efficiency
  - Diagnosis and Repair of Hydraulic Motor Malfunctions
- UNIT 6: HYDRAULIC ACCUMULATORS
  - Operation of Accumulators
  - Pneumatic Accumulators
  - Weight Loaded Accumulators
  - Spring Loaded Accumulators
- UNIT 7: HYDRAULIC FILTERS
  - Why and How Filters Are Used
  - Types of Filters
  - Degrees of Filtration
  - Contamination
  - Maintenance of Filters
- UNIT 8: RESERVOIRS, OIL COOLERS, HOSE, PIPES, TUBES AND COUPLERS
  - Reservoirs
  - Oil Coolers
  - Flexible Hoses
  - Pipes and Tubes
  - Pipe Couplers
- UNIT 9: HYDRAULIC SEALS
  - Use of Seals
  - Types of Seals
  - Seal Failures and Remedies
- UNIT 10: HYDRAULIC FLUIDS
  - What Hydraulic Fluids Do
  - Properties of Hydraulic Fluids
  - Maintaining Hydraulic Fluid
- UNIT 11: GENERAL MAINTENANCE
  - Hydraulic System and Component Maintenance
  - Importance of Oil and Filter Changes
  - Preventing Leaks
- UNIT 13: FLUID POWER DIAGRAMS
  - Fluid Diagram Symbols
  - Reading Fluid Diagrams

**DEPARTMENTAL GUIDELINES** *(optional)*

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**DIVISION CHAIR APPROVAL**

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**DATE**