

**Course Objectives/Course Outline**  
**Spokane Community College**

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**Course Title:** Proportional Valves

**Prefix and Course Number:** FLPT 279

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**Course Learning Outcomes:**

**By the end of this course, a student should be able to:**

- Differentiate between valve types
- Describe the function of a variety of valves
- Identify the basic design types: spool, nozzle, poppet, direct operated, and pilot operated.
- Identify circuits of hydraulic cylinder controls, hydraulic pump control, and hydraulic motor controls.

**Course Outline**

- I. Basics of Proportional Valves
  - A. Compare to standard directional valves
  - B. Compare to servo valves
  - C. Meter-in meter-out principles
  - D. Infinite spool position
  - E. Electronic spool position
  - F. Terminology
- II. Basic Types of Proportional Valves
  - A. Pressure control
    1. Relief valve
    2. Pressure reducing valve
  - B. Flow control
  - C. Directional control
- III. Construction (basic design)
  - A. Spool type
  - B. Nozzle type
  - C. Poppet type
  - D. Direct Operated
  - E. Pilot Operated
- IV. Electronic Control
  - A. Force Solenoids
  - B. LVDT spool position sensor
  - C. Valve amplifier
- V. Applications
  - A. Linear
  - B. Rotary
- VI. Sizing
  - A. Spring constant
  - B. Natural Frequency
  - C. Bulk Modulus
  - D. Acceleration/deceleration
  - E. Mass moment of inertia
- VII. Circuit Examples
  - A. Hydraulic cylinder control
  - B. Hydraulic pump control
  - C. Hydraulic motor control