Common Course Numbering System

Searching Current Courses For Summer 2015

Course: PRO 131  
Title: Instrumentation II  
Long Title: Instrumentation II  
Description: Introduces the student to switches, relays and annunciator systems and moves on to discuss signal conversion and transmission. Controllers, control schemes and advanced control schemes are covered at a level appropriate for the process technician. The student then moves on to learn about digital control, programmable logic control and distributed control systems before ending the course with a discussion of instrumentation power supplies, emergency shutdown systems and instrumentation malfunctions.

Min Credit: 3  
Max Credit: 

Course Notes: Entered new course 5/16/06 s@  
Origin Notes: CNCC  

STANDARD COMPETENCIES:

I. Recall the types of instrumentation used in the petrochemical and refining industry to monitor and control the process  
II. Be able to identify various types of regulators, switches, relays and annunciator Systems  
III. Define the relevant terms associated with tuning in process control and controllers  
IV. Define, identify, and describe types of control schemes  
V. Match appropriate control schemes to a process  
VI. Define and list different applications of advanced control schemes  
VII. Explain the purpose of digital control  
VIII. Describe the difference between analog and digital controllers  
IX. Define terms associated with Programmable Logic Control (PLC)  
X. Describe the operation of a Digital Control System (DCS)  
XI. Explain the function of a multiplexer/demultiplexer  
XII. Explain advantages of a DCS over an analog control system  
XIII. Given a DCS diagram, identify the major components  
XIV. Define terms associated with instrumentation power supply  
XV. Explain the purpose of uninterruptible power supply (UPS) systems  
XVI. Given a diagram, identify components in a UPS system  
XVII. Define the terms associated with emergency shutdown systems, interlocks, and alarms
XVIII. Given a drawing, picture, or actual device, identify and describe basic shutdown devices

XIX. Given a PFD and/or P&ID and a legend, locate and identify emergency shutdown devices

XX. Compare and contrast ESD systems and interlocks

XXI. Explain methods for testing and resetting ESD systems

XXII. Discuss different safety policies regarding the bypassing of ESD instruments or devices

XXIII. Describe the failure modes of the following:

A. temperature elements
B. thermocouples
C. RTDs
D. level floats
E. flow elements
F. pressure elements
G. analytical elements

XXIV. Explain how a control loop will respond to typical malfunctions in the following:

A. primary sensing elements
B. transmitters
C. controllers
D. final control elements

TOPICAL OUTLINE:

I. Review of types of instrumentation used in the petrochemical and refining industry to monitor and control the process:

A. indicators
   1. transmitters/transducers
   2. controllers
   3. final control elements
   4. control loops.

II. Pressure regulators, switches, relays, and enunciator systems

III. Signal transmission and conversion

IV. Controllers- Part 1

V. Controllers- Part2

VI. Control schemes

VII. Advanced control schemes- Part 1

A. Cascaded/Remote Set Point (RSP) control scheme

B. Ratio (fractional) control scheme.
VIII. Advanced control schemes – Part 2

IX. Introduction to Digital Control

X Programmable Logic Control
   A. Definitions
   B. Purposes
   C. “Ladder logic” applications

XI. Distributed Control Systems (DCS)
   A. Multiplexer/demultiplexer.
   B. Advantages of a DCS over an analog control system

XII. Emergency Shutdown Systems (ESD), Interlocks, and Protective Devices – Part 1

XIII. Emergency Shutdown Systems (ESD), Interlocks, and Protective Devices – Part 2

RELEASE: 8.5.3

© 2015 Ellucian Company L.P. and its affiliates.