

MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

COURSE OUTLINE

DEPT. RNEW

COURSE NUMBER: 1160

NUMBER OF CREDITS: 3

Lecture: 3 Lab: 0 OJT: 0

Course Title:
Instrumentation and Control

Catalog Description:
Instrumentation and Control builds on Mechanical Fundamentals and Process Dynamics. This course will cover the essential elements of a process control system. It will cover common types of electrical and pneumatic signals used for data collection while exploring devices used to measure flow rate, pressure, temperature, level and analytical control. This course will compare fundamental control concepts such as on/off and PID. It will explain how control concepts are used in various control loops of feedback, cascade, ratio and feedforward.

Prerequisites or Necessary Entry Skills/Knowledge:
None

FULFILLS MN TRANSFER CURRICULUM AREA(S) (*Leave blank if not applicable*)

- ☐ Goal 1: Communication: By meeting the following competencies:
- ☐ Goal 2: Critical Thinking: By meeting the following competencies:
- ☐ Goal 3: Natural Sciences: By meeting the following competencies:
- ☐ Goal 4: Mathematics/Logical Reasoning: By meeting the following competencies:
- ☐ Goal 5: History and the Social and Behavioral Sciences: By meeting the following competencies:
- ☐ Goal 6: The Humanities and Fine Arts: By meeting the following competencies:
- ☐ Goal 7: Human Diversity: By meeting the following competencies:
- ☐ Goal 8: Global Perspective: By meeting the following competencies:
- ☐ Goal 9: Ethical and Civic Responsibility: By meeting the following competencies:
- ☐ Goal 10: People and the Environment: By meeting the following competencies:

Topics to be Covered
Process variables such as pressure, temperature, level and flow
Analytical sensing or measuring instruments
Control loops
Symbology
Switches
Relays
Annunciators

Signal transmission and conversion
Controllers
Distributed controls Systems
PLC's
Instrumentation malfunctions

Student Learning Outcomes

Describe and evaluate sensors and signal processing and display elements commonly used with instrumentation in process plants.
Explain what is meant by open and closed-loop control systems.
State the general function of an instrument system and identify the basic instruments/devices and the function of each.
Describe the functions of the four basic elements of an automated process control system.
Explain how resistance, capacitance, dead time and lag time can affect a process control system.
Explain the relationship between temperature, pressure, level and flow in process plant operations.
Compare and contrast analog and digital control systems.
Identify and explain the different signal transmissions with regard to simple control loops.
Use typical symbols used in process flow diagrams.

Is this course part of a transfer pathway: Yes ☐ No ☒

**If yes, please list the competencies below*

Revised Date: 3/29/2022