

# Instrumentation

## Course Outcome Summary

### Chippewa Valley Technical College

#### *Information*

<b>Course Number</b>	620-150
<b>Credits</b>	2
<b>Contact Hours</b>	48

#### *Types of Instruction*

<i>Type of Instruction</i>	<i>Contact Hours</i>	<i>Outside Hours</i>	<i>Credits</i>
Classroom Presentation	16	16	1
On-Campus Lab	32	16	1
Totals	48		2

#### *Description*

This course is designed to give the student a basic understanding of instrumentation and process control. Through lecture and laboratory exercises, the student will learn how the basic physical properties of pressure, level, temperature, and flow are measured and used in industrial applications.

### *Exit Learning Outcomes Addressed In This Course*

#### *Course Level Learning Outcomes*

##### **Competencies**

##### **1. Interpret the components in a batch / continuous process.**

###### **Performance Standards**

*You will demonstrate your competence:*

- o by generating a block diagram of a continuous process used in the laboratory.
- o by answering questions on a written exam pertaining to the components used in a batch and / or continuous process.

*Your performance will be successful when:*

- o the block diagram contains the proper components of the process loop used in the laboratory.
- o you determine the proper components of the process loop based upon the information presented in class and in the course text book.
- o you determine the best possible answer to exam questions based on the information presented / aquired in lecture, the text book, and lab activities.

##### **1. Solve electrical problems using DC and AC electronic theory fundamentals**

###### **Performance Standards**

*You will demonstrate your competence:*

- o by solving electrical application problems in a written assignment.

*Your performance will be successful when:*

- o you have correctly solved the application assignment problems.
- o you use the current text as well as previous course techniques to solve the electrical application problems.

## **2. Perform accurate instrument calibration**

### ***Performance Standards***

*You will demonstrate your competence:*

- o by computing various accuracies of instruments based on their static characteristics.
- o by properly calibrating an instrument within a specified range in a laboratory setting.
- o by properly calibrating an instrument within a specified accuracy in a laboratory setting.
- o by verifying an instrument is within the manufacturers specified accuracy.

*Your performance will be successful when:*

- o you use the proper formula for the accuracy of an instrument based upon manufacturers specifications.
- o the correct property of accuracy (i.e. percentage , units, etc) is solved for correctly.
- o you used the calibration techniques outlined in class, lecture, or manufacturers specification.
- o an instrument is verified to be accurate against a given standard.

## **3. Distinguish signals and communications used for instrumentation**

### ***Performance Standards***

*You will demonstrate your competence:*

- o by correctly identifying the signal and / or communication technique used for a given instrument.
- o by using manufacturer data sheets / manuals to identify and apply instrument signals.

*Your performance will be successful when:*

- o you correctly identify the advantages and disadvantages of common instrumentation signals and communications networks.
- o you recognize the type of signal and / or communications type used on a device or on a written exam.
- o you use instrumentation signal types as a criteria for its selection in applications.

## **1.**

### **Apply the basic principles of pressure to instrumentation**

#### ***Performance Standards***

*You will demonstrate your competence:*

- o by using basic principles of pressure to solve application problems on tests, homework and lab application problems.

*Your performance will be successful when:*

- o you solve basic pressure application problems on a written test.
- o you solve basic pressure application problems in laboratory activities.
- o you use the basic principles of pressure as criteria for instrument selection for an application.

**2. Apply the basic principles of temperature to instrumentation**

**Performance Standards**

*You will demonstrate your competence:*

- o by using basic principles of temperature to solve application problems on tests, homework and lab application problems.

*Your performance will be successful when:*

- o you solve basic temperature application problems on a written test.
- o you use the basic principles of temperature as criteria for instrument selection for an application.
- o you solve basic temperature application problems in laboratory activities.

**3. Apply the basic principles of level to instrumentation.**

**Performance Standards**

*You will demonstrate your competence:*

- o by using basic principles of level to solve application problems on tests, homework and lab application problems.

*Your performance will be successful when:*

- o you solve basic level application problems on a written test.
- o you use the basic principles of level as criteria for instrument selection for an application.
- o you solve basic level application problems in laboratory activities.

**4. Apply the basic principles of flow to instrumentation.**

**Performance Standards**

*You will demonstrate your competence:*

- o by using basic principles of flow to solve application problems on tests, homework and lab application problems.

*Your performance will be successful when:*

- o you solve basic flow application problems in laboratory activities.
- o you use the basic principles of flow as criteria for instrument selection for an application.
- o you solve basic flow application problems on a written test.

**5.**

**Present oral technical presentation on an industrial instrument.**

**Performance Standards**

*You will demonstrate your competence:*

- o by presenting the researched criteria about the chosen industrial instrument according to the presentation criteria document.
- o by using the method guidelines as outlined in the presentation criteria document.

*Your performance will be successful when:*

- o you have presented the required information about your chosen industrial instrument as outlined in the presentation criteria document.
- o you has used the methods of presenting the required information about your chosen industrial instrument as outlined in the presentation criteria document.

**1. Analyze a continuous process control loop for proper operation****Performance Standards**

*You will demonstrate your competence:*

- o by interpreting Piping & Instrumentation Diagrams that use ANSI symbols.
- o by creating basic Piping & Instrumentation Diagrams that use ANSI symbols in a laboratory experiment.
- o by correctly identifying Piping & Instrumentation ANSI symbols.
- o by predicting the control results of a process control loop based on changes to its proportional action.
- o by predicting the control results of a process control loop based on changes to its integral action.
- o by predicting the control results of a process control loop based on changes to its derivative action.
- o by using the trial and error tuning method to tune a simulated control loop according to specified conditions.

*Your performance will be successful when:*

- o you create a Piping & Instrumentation Diagrams that use ANSI symbols.
- o you use the trial and error tuning method to tune a simulated control loop according to specified conditions.
- o you correctly predict the response of a process control loop based on changes to its proportional action.
- o you correctly predict the response of a process control loop based on changes to its integral action.
- o you correctly predict the response of a process control loop based on changes to its derivative action.