

## NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY INS 230 – INSTRUMENTATION I (3 CR.)

### Course Description

Presents the fundamental scientific principles of process control including temperature, pressure, level, and flow measurements. Topics include transducers, thermometers, and gauges are introduced along with calibration. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

### General Course Purpose

Instrumentation I is a course of study designed to acquaint the student with basic knowledge and understanding of the industrial instrumentation field, with special emphasis on accident prevention and industrial safety procedures in the shop and plant.

### Course Prerequisites/Corequisites

None

### Course Objectives

Upon completing the course, the student will be able to:

- a) Demonstrate industrial safety practices and procedures in plant and shop.
- b) Distinguish the general behavior of materials as well as weight, mass, viscosity, specific gravity, and other relevant properties.
- c) Integrate principles of force and energy and heat transfer principles.
- d) Use basic electrical/electronic principles and other electrical concepts pertinent to industrial instrumentation.
- e) Identify types of tubing and demonstrate how, when, and where to use the tubing.
- f) Operate various pressure measuring devices.
- g) Use various electrical and mechanical transducers to measure pressure.
- h) Adjust and maintain flow meters.
- i) Apply principles and concepts important to the understanding of industrial instrumentation and control.
- j) Interpret thermocouples and PH response.
- k) Use appropriate verbal and non-verbal responses in interpersonal relations, discussion, and group projects.
- l) Use listening skills for interpretation of tasks given
- m) Determine the nature and extent of the information needed so that control can be accomplished.
- n) Access needed information effectively and efficiently so that projects can be accomplished in a timely manner.
- o) Use information effectively, individually or as a member of a group, to accomplish a specific purpose, such as the process control projects.
- p) Use logical and mathematical reasoning within the context of various disciplines to control the level in a tank.
- q) Interpret and use mathematical formulas to calculate the tank level and other critical calculations.
- r) Use graphical, symbolic, and numerical methods to analyze, organize, and interpret data, such as P & IDs.
- s) Generate an empirically evidenced and logical argument from observations of systems in the lab.
- t) Distinguish between causal and correlational relationships between processes.
- u) Recognize methods of inquiry that lead to scientific knowledge for completion of projects.
- v) Use problem solving skills to advance a project from the drawing board to a working system.

### Major Topics to be Included

- a) Overview of Instrumentation Principles
- b) Instrumentation Devices
- c) Temperature Control
- d) Pressure Control
- e) Level Control
- f) Flow Control
- g) Analysis (Gas, Humidity, Solids Moisture, Liquid, Electrochemical, Composition)
- h) Transmission and Communication
- i) Automatic Control
- j) Final Element