**Outcome:** Students will be able to identify and explain the function of diverse types of measurement instruments/transmitters commonly utilized in the process industries. These will include physical (e.g., Pressure, Temperature, Flow, etc.) and analytical (e.g., pH, Conductivity, O2, etc.) measurements

**Lecture:** Lecture to review:

1. Types of measurements
   1. Physical
   2. Analytical
   3. Calculated
2. Transmitters
   1. Definition
   2. Basic operating principles
      1. Inputs
      2. Outputs
      3. Zero
      4. Span
3. Terminology
   1. Accuracy
   2. Repeatability
4. Measurement methods.
   1. Discrete
   2. Continuous
5. Common sensor technologies.
6. Operator operating considerations.
7. ISA symbology

**Demo(s) Utilized:**

1. Small equipment lab
   1. Pressure transmitter
   2. Temperature transmitter
   3. Multiple flow transmitters
   4. Position switches/transmitters

**Lab:**

1. location: HOT Unit (GRHS)
2. Students will identify the various transmitters deployed on the HOT unit and their function.

**Homework:**

1. Students will draw two items from a selection of analytical measurements, research the properties of that measurement (e.g., pH) and prepare a formal presentation on the attributes of the measurement, why it is measured, and the analyzers used to measure it.
2. Fundamentals of Process Control Theory
   1. Murrill
   2. Units 4, & 5

**Documentation:**

1. Measurements .ppt
2. Fundamentals of Process Control Theory
   1. Murrill
   2. Units 4, & 5

**Assessment:**

1. Homework
2. Lab Work
3. Lab Safety
4. Hands-on observation
5. Quiz(s) & Final Exam

**Homework Details**

You will randomly draw two process analytical measurements from the hat, research the analytical property, prepare a PowerPoint and present your findings in a formal presentation,

The procedure is due\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Presentations should take approximately 15 minutes (give or take). Please include the following items in your presentation:

**Presentation Requirements:**

* Define the properties of the measurement.
  + What is it that is we are measuring?
  + What are the units of measure?
* Describe at least one method/technology that is utilized by industry to measure the property.
* What industries require this measurement?
* Why is the measurement important?
* Pictures, relevant or graphical examples, and appropriate drawings.
* References
* The presentation must be neat and well organized:
  + Easy to read
  + Easy to follow
  + Pictures and visuals where necessary

**Grading Details**

This presentation will go towards your course grade and is worth 50 points

**Grade Breakdown**

* **\_\_\_/10 points:** Completeness of presentation.
* **\_\_\_/10 points:** Technical accuracy.
* **\_\_\_/10 points:** Illustrative techniques incorporated.
* **\_\_\_/10 points:** Presenter’s deportment, speech, and flow of the presentation.
* **\_\_\_/10 points:** Neatness and organization
  + - Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_\_\_\_\_\_