

# Engineering Program

<b>Specialization</b>	<b>Technology of remote industrial sensing and controlling</b>
<b>Course Number</b>	20413245
<b>Course Title</b>	<b>Industrial Measurement</b>
<b>Credit Hours</b>	<b>3</b>
<b>Theoretical Hours</b>	<b>3</b>
<b>Practical Hours</b>	<b>0</b>

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**Brief Course Description:**

This course covers various types of measurements which take place in industry such as: measurement of electrical parameters, pressure, flow, level and temperature measurement. It is also concerned with other types of measurement such as: density, viscosity and torque. The course introduces the necessary background to deal with data acquisition and sampling techniques.

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**Course Objectives:**

Upon the completion of the course, the student will be able to:

1. Introduce various types of industrial measurement
2. Learn how to utilize sensors to build industrial measurement systems
3. To introduce theory of sampling and Data Acquisition
4. Understand principle of operation of industrial measurement system

**Detailed Course Description:**

Chapter No.	Unit Title	Content	Time Needed
1	Basic Electrical measurement	<ul style="list-style-type: none"><li>• Current Measurements</li><li>• Voltage Measurements</li><li>• Resistance Measurement</li><li>• Power measurement</li><li>• Frequency and phase measurement</li></ul>	2
2	Pressure measurement	<ul style="list-style-type: none"><li>• Basic Terms</li><li>• Pressure Measurement concept</li><li>• Diaphragms, capsules, and bellows</li><li>• Bourdon tubes</li><li>• Vacuum instruments</li></ul>	2
3	Flow Measurement	<ul style="list-style-type: none"><li>• Formulas and equations</li><li>• Flow losses</li><li>• Devices and instruments</li><li>• Flow velocity and Flow rate</li><li>• Total flow, mass flow volume flow</li></ul>	2
4	Temperature and Heat measurement	<ul style="list-style-type: none"><li>• Definitions for Temperature , Heat and Thermal expansion</li><li>• Formulas and Heat transfer</li><li>• Review of Temperature Measuring Devices</li><li>• Consideration</li></ul>	2
5	Level measurement	<ul style="list-style-type: none"><li>• Level Formulas</li><li>• Level Sensing Devices</li><li>• Direct level sensing</li><li>• Indirect level sensing</li><li>• Application Considerations</li></ul>	1
6	Humidity, Density, Viscosity	<ul style="list-style-type: none"><li>• Humidity measurement</li><li>• Density and Specific Gravity measurement</li><li>• application considerations</li><li>• Viscosity measurement</li></ul>	2
7	Special types of Measurement	<ul style="list-style-type: none"><li>• Position and Motion measurement</li><li>• Force, Torque, and Load Cells</li><li>• Smoke and Chemical measurement</li><li>• Sound and Light measurement</li></ul>	2
8	Data Acquisition and sampling	<ul style="list-style-type: none"><li>• Sampling Concepts</li><li>• Digital Devices: Bits and Words</li></ul>	3



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		<ul style="list-style-type: none"><li>• Transmitting Digital Numbers: High and Low Signals</li><li>• Data-Acquisition Systems</li><li>• Data-Acquisition System Components</li><li>• Analog Input-Output Communication</li><li>• Digital Input-Output Communication</li></ul>	
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**Evaluation Strategies:**

		Percentage	Date
<b>1. Exams</b>	<b>First Exam</b>	20%	/ /20__
	<b>Second Exam</b>	20%	/ /20__
	<b>Final Exam</b>	50%	/ /20__
<b>2. Homework and Projects</b>		10%	/ /20__
<b>Total</b>		100%	

**Teaching Methodology:**

- Lectures
- PowerPoint slides
- Term projects

**Text Books & References:**

**Textbooks**

1. Fundamentals of Industrial Instrumentation and Process Control ,William C. Dunn, 2005 by The McGraw-Hill
2. Theory and Design for Mechanical Measurements, Richard S. Figliola , Donald E. Beasley ,5th edition

**References**