

Engineering Program

Specialization	Technology of remote industrial sensing and controlling
Course Number	
Course Title	Sensing Elements and Devices
Credit Hours	
Theoretical Hours	
Practical Hours	

Brief Course Description:

This course covers the basic of terms characterize sensing elements and sensing technology. It is also covers various types of sensing elements, devices and their applications in industry and control. Besides, it covers the principle of operation and physical phenomena used in sensing technology. The course also introduces the signal conditioning circuits used in industry and control.

Course Objectives:

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

- 1- Introduce terms characterizes sensors and sensing technology
- 2- Study the basic theories and physical phenomena used in sensing technology.
- 2- Explain the principle of operation of sensors.
- 3- Study the signal condition circuits.
- 4- Explain how to use sensing elements in measurement and control
- 5- Introduce the application of sensing elements

Detailed Course Description:

Chapter No.	Unit Title	Content	Time Needed
1	Static Characteristics of Measurement System Elements	<ul style="list-style-type: none"> • Systematic characteristics • Generalized model of a system element • Statistical characteristics. 	2 weeks
2	Thermal sensors	<ul style="list-style-type: none"> • Thermal Energy • Temperature • RTDs • Thermistors • Thermocouple • Bimetal strip • Gas Thermometers • Vapor pressure Thermometers • Liquid Expansion Thermometers • Solid state Temperature sensors 	3 weeks
3	Mechanical sensors	<ul style="list-style-type: none"> • Potentiometric sensors • Capacitive sensors • Inductive sensors • Strain sensors • Load cell • Motion sensors <p>Acceleration sensors</p>	4 weeks
4	Optical sensors	<ul style="list-style-type: none"> • Electromagnetic radiation • Light characteristics • Photometry • Photodetectors • Pyrometry • Optical sources 	3 weeks
5	Other Types of sensors	<ul style="list-style-type: none"> • Electromagnetic sensing elements • Elastic sensing elements • Piezoelectric sensing elements • Piezoresistive sensing elements • Electrochemical sensing elements 	4weeks

*تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي



		<ul style="list-style-type: none">• Hall effect sensors• Current Transformer• pH sensor	
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Evaluation Strategies:

*تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي

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

Teaching Methodology:

- Lectures
- PowerPoint slides
- Term projects

Text Books & References:

Textbooks

1. Process control instrumentation Technology Curtis D. Johnson 8-th ed.
2. Principles of measurement systems / John P. Bentley. – 4th ed

References

Modern sensors handbook/edited by Pavel Ripka, Alois Tipek.p. 2007