



<b>Program</b>	Engineering
<b>Specialty</b>	Common
<b>Course Number</b>	20308211
<b>Course Title</b>	Transducers
<b>Credit Hours</b>	3
<b>Theoretical Hours</b>	3
<b>Practical Hours</b>	0





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### **Brief Course Description:**

The course is intended to give the students the theoretical and technological experience related to different types of transducers used for measurements and control. The course classifies transducers and gives the principles of functioning and application of pressure, displacement, strain, flow, temperature and level transducers

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### **Course Objectives:**

The course aims at giving the student the necessary theoretical and technological knowledge and skills in order to specify, select, install, wire, and troubleshoot the different types of industrial transducers and proximity sensors



**Detailed Course Description:**

Unit number	Unite name	Unite content	Time Needed
1.	<b>Classifications of transducers</b>	<ul style="list-style-type: none"> <li>▪ Active and passive transducers, linear and nonlinear transducers, basic requirements of transducers, applications of transducers in measurements and control</li> </ul>	
2.	<b>Transducers characteristics</b>	<ul style="list-style-type: none"> <li>▪ Static and dynamic characteristics</li> <li>▪ First order and second order transducers</li> <li>▪ Primary and secondary transducers</li> <li>▪ Examples</li> </ul>	
3.	<b>Elastic pressure transducers</b>	<ul style="list-style-type: none"> <li>▪ Bourdon tubes</li> <li>▪ Diaphragms, bellows, application examples</li> </ul>	
4.	<b>Strain transducers</b>	<ul style="list-style-type: none"> <li>▪ Lateral and axial strain</li> <li>▪ Static and dynamic strain</li> <li>▪ Wire strain gauges and semiconductor strain gauges</li> <li>▪ Effect of temperature on strain gauges performance</li> <li>▪ 1/4 bridge, 1/2 bridge and complete bridge strain gauges</li> </ul>	
5.	<b>Potentiometric transducers</b>	<ul style="list-style-type: none"> <li>▪ Types of potentiometric transducers and their applications</li> <li>▪ Using of operational amplifiers and Whetston bridges for signal conditioning</li> </ul>	
6.	<b>Capacitive transducers</b>	<ul style="list-style-type: none"> <li>▪ Principle of operation and basic relations</li> <li>▪ Circuit analysis and applications</li> <li>▪ Capacitive proximity sensors</li> </ul>	
7.	<b>Piezoelectric transducers</b>	<ul style="list-style-type: none"> <li>▪ Basic theory and types of piezoelectric transducers</li> </ul>	

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		<ul style="list-style-type: none"> <li>▪ Forward and reverse piezoelectric transducers</li> <li>▪ Piezoelectric strain gauges</li> <li>▪ Applications of piezoelectric transducers</li> </ul>	
8.	<b>Inductive transducers</b>	<ul style="list-style-type: none"> <li>▪ Principle of operation and basic relations</li> <li>▪ Variable inductance transducers</li> <li>▪ Variable reluctance transducers</li> <li>▪ Eddy current transducers</li> <li>▪ Inductive proximity sensors</li> <li>▪ Applications of inductive transducers for displacement measurement and in tachometry and torque measurements</li> </ul>	
9.	<b>Temperature transducers</b>	<ul style="list-style-type: none"> <li>▪ Bimetallic temperature sensors, RTDs. Thermocouples and thermopiles</li> <li>▪ I.C temperature transducers</li> </ul>	
10.	<b>Environmental transducers</b>	<ul style="list-style-type: none"> <li>▪ Smoke and fire detectors</li> <li>▪ Sound, infrasound and ultrasound sensors</li> <li>▪ Humidity sensors</li> </ul>	
11.	<b>Optical transducers</b>	<ul style="list-style-type: none"> <li>▪ Photo-resistor, photo-diode, photo-transistor and photo-thyristor. Optical proximity sensors. Optical couplers. Optical encoders</li> </ul>	

□ **Evaluation Strategies:**

		Percentage	Date
1. Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Assignments	10%	
	Final Exam	50%	--/--/----

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



□ Teaching Methodology:

1. Lecture

**Text Books & References:**

**Text Book:**

1. Sensors technology handbook ,Editor-in-chief Jon S.Wifson, Elsevier Inc. 2005 U.K, ISBN 0-7506-7729-5

**References:**

1. أجهزة الاستشعار و تطبيقاتها : (مجسات،نواقل طاقة، قياسات) ، د.محمد عالية، د.محمد أبو زلطة ، 2004مكتبة المجتمع العربي للنشر-الاردن.
2. Sensors and transducers , Ian Sinclair , Newness, 2001, ISBN 0750649321



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



<b>Program</b>	Engineering
<b>Specialty</b>	Common
<b>Course Number</b>	20308212
<b>Course Title</b>	Transducers Lab
<b>Credit Hours</b>	1
<b>Theoretical Hours</b>	0
<b>Practical Hours</b>	3



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### **Brief Course Description:**

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At the conclusion of the laboratory course, the student shall be able to select, wire or tube, calibrate and specify a wide range of different transducers used in industrial control Also, the student will be able to carry out troubleshooting, and elementary modifications to that range of transducers

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### **Course Objectives:**

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1. To gain practical experience in building the conditioning circuits(bridges, resonance circuits, potentiometric circuits, modulators) necessary for proper functioning of different transducers
2. To gain experience in using proximity switches (capacitive, inductive and optical)
3. To gain experience in data acquisition systems



**Detailed Course Description:**

Lab number	Lab name	Lab content	Time Needed
1	Investigation of LVDT static characteristics		
2	Practical study of bimetallic temperature transducers and RTD transducers		
3	Practical study of the thermocouple transducers		
4	Investigation the properties of 1/4 bridge and 1/2 bridge strain gauges		
5	Practical investigation of the properties of variable area capacitive transducers		
6	Investigation of the characteristics of DC and AC tachogenerators and photo-reflective velocity transducers		
7	Investigation of characteristics of inductive proximity sensors		
8	Investigation of the characteristics of capacitive proximity sensors		
9	Investigation of the characteristics of optical proximity sensors		
10	Different assignments defined by the instructor		

 **Evaluation Strategies:**

		Percentage	Date
1. Exams	Reports	30%	
	Midterm Exam	20%	
	Final Exam	50%	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



□ **Teaching Methodology:**

1. Lab

**Text Books & References:**

1. أجهزة الإستشعار وتطبيقاتها ، (مجسات، نواقل طاقة، قياسات) ، د.محمد عالية، د.محمد أبو زلطة ؛ مكتبة المجتمع العربي للنشر – الأردن-2004
2. Sensors and Transducers, Ian Sinclair, Newness ,2001 ; ISBN 0750649321

