Hashemite University
College of Engineering
Department of Mechatronics
Transducers and Interfacing 110405431
(3 Credit Hours)

Instructor

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Office hours:	As Attached

Grading info

Test 1	30
Test 2	30
Final	40

Class Info

Days	Sun, tue, thu
Time	11:00 – 12:00
Location	E

Course

Course Number:	110405431
Prerequisite:	110406329
Textbook:	Curtis D. Johnson, "Process Control Instrumentation Technology", Eighth Ed, Prentice Hall, 2006.
Course Description (as in the catalog):	The aim of this course is to provide students with a thorough understanding of measurement and signal-conditioning system design. Study includes analog and digital signal conditioning as well as sensors for measurement of temperature, displacement, stress/strain, pressure, flow, acceleration and light.
Specific Outcomes of Instruction (Course Outcomes):	The student shall be able to: 1. Define the main terminology (such as sensitivity, resolution, accuracy, static and dynamic characteristics, elementary statistical term,…) used in instrumentation (Outcome "a"). 2. Design different analog and digital electronic signal conditioning circuits (Outcome "c"). 3. Describe a variety of thermal, mechanical and photo sensors (Outcome "a"). 4. Apply main measurements concepts to components and systems of instrumentation (Outcome "e"). 5. Design measurement systems using thermal, mechanical and photo sensors (Outcome "c").
Important material	

References:

1. Richard Figliola and Donald Beasley, "Theory and design for mechanical measurements", 4th Ed., John Wiley and sons, Inc., 2006.
2. John P Bentley, "Principle of Measurement Systems", 3rd Ed., Addison Wesley Longman Limited, 1997.
3. Ramon Pallas-Areny and John G. Webster, "Sensor and Signal Conditioning", 2nd Ed., John-Wiley & Sons, Inc., 2001.

Major Topics Covered and Schedule in Weeks:

Topic	# Weeks	# Contact hours
Introduction to Measurements, Resolution, Sensitivity Calibration, Errors, Time Response, Statistics and Probability (Chapter 1)	1,2	6
Analog Signal Conditioning: Passive (Bridges and filters) and Active (Operational Amplifier) Interacting Circuits. Design aspects.	3, 4, 5	9
First Test Digital Signal Conditioning: Comparators, DAC, ADC. Characteristics of digital systems.	6, 7	6
Thermal Sensors (RTD, Thermistors, Thermocouples, Solid-state Temperature Sensors). Design Problems	8, 9	6
Second Exam Mechanical Sensors: Strain Gauges, Displacement sensors, Potentiometric sensor, Pressure sensors, Capacitive sensors, flow sensors	10, 11, 12, 13	12
Photo sensors: LDR, Photodiode, Phototransistors, Review, Final Exam	14, 15	6

Total	**15**	**45**

Course Policy

- Respect.
- Door policy (Relax in your seat waiting lectures before instructor comes, Shut door gently if you are requested to leave)
- Be on time
- Noise must be kept to a zero
- Not all Transducers in the world
- Grades: 90% --- 50%
- Moodle, Facebook
- Attendance is mandatory. You will be prohibited from attending the final exam if you missed more than (15%) lectures.
- No Make up for missing quizzes, 1st, 2nd, or midterm exams even excuse is acceptable (!!!)
- Cheating and copying is NOT tolerated
- No cell phones in lecturers and exams and No smart devices in exams.
- No calculator exchange

#	***Outcome Description***	***Contribution***
(a)	an ability to apply knowledge of mathematics, science, and engineering	***M***
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	***M***
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	***H***
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	

H=High, **M**= Medium, **L**=Low