The University of Jordan
School of Engineering
Department of Mechatronics Engineering
First Semester – 2019/2020

Course: Measurements and Signal Processing – 0908352 (3 Cr. – Mandatory Course)

Instructor: Dr. Ahmad Malkawi
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Catalog Data: The overall aim of the course is to present the topics of sensors and instrumentation and their use within measurement systems as an integrated and coherent subject. The course develops the conceptual design framework for selecting and specifying equipment and test procedures and for interpreting test results, which are necessary and common bases for the practice of test engineering.

Prerequisites by Course:
- Electronics For Mechatronics– 0908222.

Prerequisites By Topic: The student should have the basic knowledge of electronics, and components of mechatronic systems.

Textbook:
- Handouts on easyclass.

References:
- *Process Control Instrumentation Technology*, Curtis D. Johnson 8th Edition.
- *Mechanical Measurements*, Thomas G. Beckwith, 6th Ed., SAE.
- *Experimental Methods for Engineers*, J. P. Holman,7th Ed., McGraw-Hill
- *Theory and Design for Mechanical Measurements*, Richard Figliola and Donald Beasley, 5th Ed. John Wiley & Sons, Inc.
- *Measurement and Instrumentation Principles*, Alan Morris, 3rd Ed., Butterworth-Heinemann.

Schedule & Duration: 15 weeks, 45 lectures (60 minutes each) plus exams.

Minimum Student Material: Textbook, class handouts, scientific calculator, and an access to a personal computer.

Minimum College Facilities: Classroom with whiteboard and projection display facilities, library, computational facilities with MATLAB and other engineering programs.

Course Objectives: The course provides the student with the necessary tools to design a measurement system. Also it discusses the basic components of a measurement instruments. The course also covers the basic signal processing and analysis techniques in mechatronics.

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

1. Recognize the role of measurements and instrumentation in engineering.
2. Recognize the types and basic components of a measurement instruments.
3. Understand and determine the static and dynamic charachteristics of instruments.
4. Understand systematic and random errors, their quantification and reduction.
5. Understand electrical measurement devices.
6. Understand mechanical measurement devices.
7. Understand basic signal analysis techniques in mechatronics for control and automation.
8. Conduct a project in which a full measurement system is designed. (3)

Course Topics:

	Topic Description	Hrs
1.	Introduction to Measurement Systems	3
2.	Units	3
3.	Measurement System Types	2
4.	Static and Dyamic Characteristics	4
5.	Systematic and Random Measurement Errors	5
6.	Calibration	2
7.	Noise, Interference, and Grounding	3
8.	Electrical Measurements	4
9.	Mechanical Measurements	4
10.	Intelligent Devices	2
11.	Discrete-time signal and sampling	4
12.	Filters	4

Ground Rules:

Attendance is required and highly encouraged. To that end, attendance will be taken every lecture; absence of more than *7 hours* will result in the expulsion of the student from the course.

Assessments:

Exams and Projects.
Midterm exam on November 12.

Grading policy:

Midterm Exam	**30%**
Project	**20%**
Final Exam	**50 %**
Total	**100%**

Last Updated:

Sep. 2019