



# Philadelphia University

Faculty of Engineering - Department of Mechanical Engineering

## Course Information

**Title:** Measurement and Control Lab. (620444)

**Prerequisite:** Automatic Control (620443)

**Credit Hours:** 1 credit hour (10 weeks per semester)

**Description:** The course is a requirement for Mechanical engineering students. At completing this course, the student should be able to understand the measurement of : Linear and angular measurement , resistance measurement , variable length and area transducer , strain gauge . And they understand the calibration of level and flow sensors , level control ( on-off ) , and level control ( PID controller ) .

**Instructor:** Eng. Nesreen Azboun

**Office:** Mechanical Engineering building, room E61313 , ext. : 2624

## Course Topics:

Week	Topic
1	Linear Measurement
2	Angular Measurement
3	Resistance Measurement ( Ohm's Law )
4	Resistance Measurement ( Wheatstone bridge )
5	Variable Length Transducer
6	Variable Area Transducer Strain Gauge
7	Strain Gauge
8	Introduction to Control
9	Level control ( on-off)
10	Level Control (PID Controller )

**Course Learning Outcomes and Relation to ABET Student Outcomes:**

Upon successful completion of this course, a student should be able to:

1. Know some important concepts in measurement such as :( accuracy , precision, error and uncertainty) and know how to use micrometer , Vernier caliper , sine bar , and bevel protractor .
2. Know how to measure resistance using ohm's law and Wheatstone bridge.
3. Have confirmed the relationship between length and resistance of a material and the relationship between the cross-section area and resistance of a material.
4. Know how the change in resistance of a material , caused by a change in its physical dimension , can be used to measure the strain in the material.
5. Revise some important concepts in control theory .
6. Define some of control system component like solenoid valve , needle valve , LVDT and flow sensors.
7. Understands different types of controller and the principle of On-Off controller.
8. Know the properties of the transient response of a system and the need for a controller.
9. Investigate the characteristics of the P , PI , PID controllers and effects on the system response.

## Assessment Instruments:

Evaluation of students' performance (final grade) will be based on the following categories:

**Reports:** Each experiment has a report describing theory, procedure, readings, results, discussion, and conclusion.

**Quizzes:** Three quizzes will be given to the students during the semester. These quizzes will cover each three experiments in the lab. Fifteen minutes for each quiz.

**Final Exam:** The final exam will cover all the class material.

## Grading policy:

First	20% (10% Reports, 10% Quiz)
Second	20% (10% Reports, 10% Quiz)
Third	20% (10% Reports, 10% Quiz)
Final Exam	40% (15% Practical, 25% Theoretical)
Total:	100%

## Attendance policy:

Absence from classes and/or tutorials shall not exceed 2 labs. Students who exceed the limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.