



# Philadelphia University

Faculty of Engineering - Department of Electrical Engineering

## Course Details:

- Title:** Instrumentation and Measurement (610332)
- Prerequisite:** Electronics (2) (610342)
- Credit Hours:** 3 credit hours (16 weeks per semester, approximately 45 contact hours)
- Textbook:** “Modern Electronic Instrumentation and Measurement Techniques”, A.D. Helfrick and W.D. Cooper, 1990.
- References:** “Principle of Electronic Instrumentation and Measurement”, H.M. Berlin and F.C. Getz, Jr., 1988.  
“Experimental methods for engineers” , J.P. Holman, 2001.
- Course Description:** This course will introduce the students to the basic measurement techniques, instrument construction, principle of operation, and measurement calculations.

## Course Outlines:

Week	Topic
1	Measurement and Errors: electrical units, measurement standard, error in measurement
2	Types of errors, statistical analysis, probability of errors, limiting errors
3	Electromechanical indicating instruments: permanent–magnetic moving-coil mechanism, DC ammeters
4	DC voltmeter, voltmeter sensitivity, series-type ohmmeter, calibration of DC instruments
5	Alternating current indicating instruments, electro-dynamometers in power measurements, thermos instruments
6	Bridge measurements: Wheatstone bridge
7	Kelvin bridge, AC bridge, Maxwell bridge, Wien bridge
8	Electronic Instruments for measuring basic parameters: Amplified DC meter, AC voltmeters using rectifiers
9	True-RMS responding voltmeter, digital voltmeters
10	Oscilloscopes: oscilloscope block diagram, cathode ray tube, CRT circuits, vertical deflection system, multiple trace, horizontal deflection system
11	vertical deflection system, multiple trace, horizontal deflection system
12	Transducers as input elements to instrumentation systems: photoconductive cell, photodiodes, photovoltaic cell
13	Transducers: capacitive, inductive
14	Temperature transducers: Thermistors, self-heating and dissipation constant, metal platinum probe, thermostat, bimetal switch, thermal reed switch
15	Digital counters and registers
16	Course Project Discussion (optional)

## Course Learning Outcomes with reference to ABET Student Outcomes:

Upon successful completion of this course, student should:

1.	Have Knowledge of measurement instruments construction and operation	[a , c , e]
2.	Know the performance of measurement instruments	[a , k]
3.	The ability of dealing with measurement experiments	[b]

## Assessment Guidance:

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

**Sub-Exams:** The students will be subjected to two scheduled written exams, first exam and second exam during the semester. Each exam will cover materials given in lectures in the previous 3-4 weeks.

**Quizzes:** (3-5) quizzes of (10-15) minutes will be conducted during the semester. The materials of the quizzes are set by the lecturer.

**Homework and Projects** Homework should be solved individually and submitted before or on a set agreed date. Student may be assigned to present project(s).

Cheating by copying homework from others is strictly forbidden and punishable by awarding the work with zero mark.

**Final Exam:** The students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

## Grading policy:

First Exam	20%
Second Exam	20%
Quizzes/Homework	20%
Final Exam	40%
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Total:	100%

## Attendance Regulation:

The semester has in total 45 credit hours. Total absence hours from classes and tutorials must not exceed 15% of the total credit hours. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from sitting the final exam and a zero mark will be recorded for the course. If the excuse is approved by the deanship the student will be considered withdrawn from the course.

January, 2018