

University of Management and Technology
School of Engineering
Department of Electrical Engineering

Course Outline

Course code.....EL465.....

Course Title.....Instrumentation & Measurement Lab

Program	BSEE
Credit Hours	1
Duration	One semester
Prerequisites	Applied Physics
Resource Person	Awais Saeed
Counseling Timing	See Office Window
Contact	awais.saeed@umt.edu.pk

Chairman/Director signature.....

Dean's signature..... Date.....

Learning Objective:

This Lab is primarily intended to cover all necessary topics of instrumentation and measurement for students of electrical engineering. Student will learn the basic measurement techniques, instruments, and methods used in Electrical measurements. It covers in detail both analogue and digital instruments, measurements errors and uncertainty, instrument transformers, bridges, amplifiers, oscilloscopes, data acquisition, sensors, instrument controls and measurement systems. Participants will learn how to apply the most appropriate measurement method and instrument for a particular application.. The course directly contributes to **objectives** a, d, e and f of the HEC Electrical Engineering Curriculum.

In accordance with HEC curriculum **outcomes** a, b, d and e, the upon completion, students will be able

- Have good understanding of Measurement and Instrumentation.
- Analyzing the process of signals conditioning.
- acquire hands-on experience with Instruments e.g. Multimeters, Wattmeter, ADC etc
- Be able to study and understand the working and application of instruments in industry.

Learning Methodology:

Lecture, interactive, participative

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation

Marks in percentage

Lab Manuals & Performance:	40%
Final Viva Quiz + Performance + Project:	60%
Total:	100%

Recommended Text Books:

Text book:

1. Electronic Instrumentation and Measurement Techniques, W.D. Cooper & A.D. Helfrictal, 2nd Edition
2. Process Control Instrumentation Technology Eighth Edition by Curtis Johnson, 8th Edition

Reference Books:

1. Measurements and Instrumentation Principles by Alan S Morris, 3rd Edition
2. A course in Electrical Measurements and Instrumentation by J.B Gupta, Revised Edition



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List Of Experiments

Week	Experiments	Text Book Reading Topics
1	Introduction To Lab-VIEW	
2	Sub VI Designing to create a new control block in Lab-VIEW	
3	Errors In Measurement and Basic Statistical Sampling	
4	Temperature and Resistance Measurement Using Wheatstone Bridge	
5	Study the behavior of Thermal Sensors	
6	Study the bridge rectifier (by making use of cathode ray oscilloscope)	
7	(a) To Measure the Power and Power Factor by three Ammeter method (b) Measure the Power and Power Factor by Three Voltmeter method	
8	Finding Unknown Inductance using AC Bridge	
9	Design of basic signal conditioning using operational amplifier as Voltage Follower Inverting, Non-inverting, Summing, Integrator, & Differential Amplifier	
10	Measurement and Data Acquisition Using Lab-VIEW	
11	Introduction to PLC Implementation of Ladder Diagrams using Programmable Logic Controller (PLC)	
12	Sensors interfacing with PLC Implementation of Ladder Diagrams using Programmable Logic Controller (PLC)	
13	Analog to Digital Converter (ADC)	
14	Digital to Analog Converter (DAC)	