

Instrumentation and Measurement (3+1)

Code EE-383	Credit Hours 3-1
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Course Description:

The course introduces Instrumentation and Measurement, providing undergraduate students with both a basic and practical understanding of the subject. The main objective of this course is to study the fundamental principles of metrology along with the design techniques of electrical precision measurement equipment. The course is also intended to give students an idea that how instrumentation is achieved. The course also covers different sensors (transducers) and how simple physics concepts can be applied in their design. A try has also been made to introduce students to biosensors. Lab view is a nice software tool for modeling of an instrumentation system.

The goal is to instill in students a degree of comfort and familiarity with electronics instruments, so there is a great emphasis on practical aspect of the course. Students are required to design different electrical instruments setup in the lab. They are also given a semester project where they apply their knowledge of the course to develop a product (an instrument) by themselves.

Text Book:

Introduction to Measurements and Instrumentation, by Arun K Ghosh/ Measurement and Instrumentation, Theory and Application, Alan S Morris, Reza Lengari

Reference Books:

1. Modern Electronic Instrumentation and Measurement Techniques, Albert D. Helfrick, William D. Cooper.
2. Electronic Instruments and Instrumentation Technology, M.M.S. Anand
3. "Instrumentation for engineering measurements" by James W. Dally, William E. Riley, Kenneth G. McConnell

Pre-requisites: NA

ASSESSMENT SYSTEM

Quizzes	10%
Assignments	10%
MSE	30%
ESE	50%

Teaching Plan:

Week No.	Topics	Learning contents
	Measurements	<ul style="list-style-type: none">- Precision- Measurements terminologies- Principle of different measurement techniques- Types of Errors
	Instruments	<ul style="list-style-type: none">- Measurement of electrical and non-electrical quantities including voltmeter, ammeters, function generators, oscilloscopes- Systems for signal processing and signal transmission. Modern instrumentation techniques.- Static and dynamic responses of instrumentation and signal conditioning
Mid Semester Exam		
	Data Acquisition Systems	<ul style="list-style-type: none">- Principles of operation, construction and working of different analog and digital meters- Advanced Testing & Measuring instruments recording instruments, signal generators
	Transducers	<ul style="list-style-type: none">- Sensors, input and output transducers- Types of bridges for measurement of resistance, inductance, and capacitance;- Power and energy meters; High-voltage measurements, PLC Systems etc.
	Some Extra Topics	<ul style="list-style-type: none">- Instructor privilege (10-15%)
End Semester Exam		