

# COURSE CONTENT

## Course

Course code: EIE 319

Course title: Electrical measurements & Instrumentation. 2Units

Course status: Compulsory

## SEMETER ALPHA

## Course Duration

*Two hours per week for 15 weeks (30hours)*

**VENUE:** ROOM 303

**TIME:** 3-4PM

## Lecturer's Data

1. Dr. Henry .A. Ojongbede  
Qualifications obtained: B.Sc. (Zaria), M.Sc., Ph.D. (Wales), FNSE  
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Faculty: College of Science and Engineering  
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2. Mr Diarah Reuben  
Qualifications obtained: B. Eng.  
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Faculty: College of Science and Engineering  
**E-mail:** diarah.samuel@lmu.edu.ng  
**Office Location:** Room A014; 1<sup>st</sup> floor, Engineering building.

**Consultation Hours:** By Appointment (10am – 5pm)

## Course Content – Illustration below:

### MODULES

#### 1. BASIC PRINCIPLES

Measurement of electrical quantities, classification of instruments, essential features of indicating instruments, methods of producing deflecting, controlling and damping torques.

#### 2. MEASUREMENT OF CURRENT AND VOLTAGES

Ammeters and Voltmeters, basic principles, the various types. Details of construction, operation and characteristics of two most widely used devices: the permanent magnet moving coil instrument (for dc) and the moving iron instrument (for ac and dc).

#### 3. MEASUREMENT OF POWER

The wattmeter, basic principles, the various types. Details of dynamometer moving coil instrument– construction, operation, deflecting torque. Wattmeter connections -dc, single phase, three phase ac systems.

#### **4. MEASUREMENT OF ENERGY**

The watt-hour meter – construction/operation, counting mechanism, meter constant.

#### **5. MEASUREMENT OF RESISTANCE**

The Wheatstone bridge, ohm meter, Megger, voltmeter – ammeter, methods. The Multimeter – use as voltmeter, ammeter and ohm meter, digital multimeters.

#### **6. OSCILLOSCOPES**

The cathode ray oscilloscope (CRO), building blocks, controls, etc. Display of signal waveform on the screen, role of saw-tooth generator, trigger circuit. Measurements using the CRO – voltage, frequency, phase angle, Lissajous figures.

#### **7. TRANSDUCERS**

Measurement of non-electrical quantities, classification of transducers. Application of transducers - aircraft/boat rudder, thermocouple. Communication transducers – microphones, pickups, loudspeakers, headphones, telephone handset.

### **Course Description – Illustration below:**

### **Course Justification – Illustration below:**

*This course is a basic requirement for understanding the principles behind Electrical Engineering, Digital electronics, circuits and the numerous applications. In today's world, virtually every device, ranging from our phones, modems, television sets, computers, printers, etc. use one form of Electrical technology or the other. Being able to fit into a fast growing digital world requires a deep understanding of Electrical Engineering measurement and Instrumentation and how they are being applied in modular systems which form the building blocks of digital devices used today. This course affords our students the privilege to have the fundamental knowledge and basic theories of Electrical Engineering measurement and instrumentation.*

### **Course objectives**

To outline the categories and classification of instruments and to explain which instrument is used for measuring the different quantities.

To explain the essential features that are needed for proper operations – deflecting, controlling and damping torques and agencies for producing them.

Systematic analysis of the working of the different types of instruments – for measurement of

current, voltage, power, energy, and non-electrical quantities such as temperature, displacement, force, etc.

To explain how these instruments are connected in circuits to measure the various quantities. A good understanding of this course will prepare the students for future practice as engineers whether in academics or in the industry. It will give the students a rock solid foundation in the handling and uses of all electrical instruments. It will also equip the students with the basic knowledge and ability necessary to analyze and solve real life problems using the various types of electrical instruments.

**Course Requirement – Illustration below:**

*To derive maximum benefits from the course the students should have a good knowledge of basic mathematics, physic etc. However, the course is structured to accommodate to some extent since some of these basics will be introduced. A good knowledge and understanding of the course requires that students carry out some laboratory practical. This is done in another practical course compulsory for all 200Level students during SWEP. The method of grading is shown in Table1. .*

**Table1: Method of Grading-**

S/N	Grading	Score (%)
1.	1 <sup>st</sup> Test	5
2.	2 <sup>nd</sup> Test CBT	10
3.	3 <sup>rd</sup> Test CBT	10
4.	Assignment	5
5.	Final Examination	70
	<b>Total</b>	<b>100</b>

**Course Delivery Strategies – Illustration below:**

1. Lecture delivery with explanations using lecture notes, real life examples, diagrams and graphs.
2. The use of the University’s Intranet e-platform for quizzes, assignments, group discussions, etc.
3. Giving off net assignments and class work.
4. Uploading the lecture materials on the e-learning platform.
5. Giving online assignments.
6. Having practical discussion sections at the end of the lecture.