



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Electrical Measurements and Instrumentation – CCE212

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Electrical Measurements and Instrumentation				
Course Code (according to the bylaw)	CCE212				
Prerequisite:	Electrical Circuits (1) - CCE111				
Department/s participating in delivery of the course	Electrical and Renewable Energy Engineering				
Number of credit hours/points of the course (according to the bylaw)	Credit	Contact Hours			
	Hours	Lecture	Tutorial	Practical	Total
	3	2	0	2	4
Course Type	Compulsory - Major Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Third Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Prof. Dr. Somia Esmael Ahmed				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Introduction about measurements, Errors in measurements, Statistical analysis of errors in measurements, Measurements of all electrical quantities (current, voltage, energy, and power) for dc and ac current, Measurement of resistances and capacitors, The multi-meter, The oscilloscope, Signal generators, Measurements of time period and frequency, Spectrum analyzers, Logic analyzers, Logic probe, Energy transducers (pressure, force, displacement, level, light, temperature, speed), A/D and D/A and applications, Data acquisition cards.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	CLO1	Define Errors and statistical analysis of errors, Measurements of all electrical quantities,
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	CLO2	Measure many electrical and electronic components.
B2	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO3	Utilizing function generator and Oscilloscope and spectrum analyzer
B4	Estimate and measure the performance of an electrical system and circuit under specific input excitation and evaluate its suitability for a specific application	CLO4	Define A/D converters and transducers with applications

4. Teaching and Learning Methods

1. Interactive Lectures
2. Problem Solving
3. Cooperative education
4. Projects
5. Online Learning
6. Self-learning
7. Research and Reports



Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours				
			Lecture Hours	Tutorial Hours	Practical Hours	Self-learning (Ass/ Project)	Other
1	Introduction to Measurements and its applications	6	2	0	2	2	-
2	Lecture: Main Terms and Definitions Lab: experimental lab for testing electrical devices	6	2	0	2	2	-
3	Lecture: Uncertainty of Measurements orbits. Lab: experimental lab	6	2	0	2	2	-
4	Lecture: Standards of Electrical Quantities Lab: experimental lab	6	2	0	2	2	-
5	Lecture: Indicating Measuring Instruments Lab: experimental lab for Measuring Instruments	8	2	0	2	2	Quiz 1 (2 Hr)
6	Lecture: Recording Instruments Lab: experimental lab for Recording Instruments	6	2	0	2	2	-
7	Lecture: Displaying Measuring Instruments Lab: experimental lab for Displaying Measuring Instruments	6	2	0	2	2	
8	Lecture: Bridge Circuits Lab: Simulink matalab	6	2	0	2	2	-
9	Lecture: Bridge Circuits Lab: Simulink matalab	6	2	0	2	2	-
10	Lecture: Potentiometers Lab : Simulink matalab	8	2	0	2	2	Quiz 2 (2 Hr)
11	Lecture: Comparators Lab: Simulink matalab	6	2	0	2	2	-
12	Lecture: Signal Conditioning Lab: software project discussion	6	2	0	2	2	-
13	Lecture: Amplification of the Signals Lab: Project discussion	6	2	0	2	2	
14	Lecture: The Improvement of the Quality of the Signals Lab: Project discussion	6	2	0	2	2	-
15	Revision	6	2	0	2	2	-
16	Final Term Exam						



5. Methods of students' assessment

No.	Method of assessment	Assessment Timing (Week Number)	Marks	Percentage of total course Marks
1	Quiz (1)	Week 6	10	10 %
2	Quiz (2)	Week 13	10	10 %
3	Midterm exam	Week 7	20	20 %
4	Final Practical Exam	Week 15	5	5 %
5	Final Oral Exam	Week 15	5	5 %
6	Final written exam	Week 17	40	40 %
7	Projects/ Assignments/...	Week 15	5	5%
8	Research and Reports	During the semester	5	5%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	David A. Bell , Electronic Instrumentation and Measurements, 3rd Edition, 2013
	Other References	Electrical Measurements and Instrumentation, C Late Ajay V. Bakshi, 2020
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data Show System
	Supplies	White Board
	Electronic Programs	MATLAB - PSPICE
	Skill Labs/ Simulators	Lab Facilities
	Virtual Labs	-
	Other (to be mentioned)	Library

Prof. Dr. Somia Esmael Ahmed
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator