



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Power Quality for Energy Applications – ERE375

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Power Quality for Energy Applications				
Course Code (according to the bylaw)	ERE375				
Prerequisite:	Electrical Power Engineering – ERE222, Power Electronics (2) – ERE312				
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 Hours	Contact Hours			
		Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Elective - Minor Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fifth 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. Eng. Mohamed Ahmed Ebrahim				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Analysis and characterization of electric Power Quality: Power Outage, Harmonics, Unbalance, Distortion, Voltage Sag, and Flicker. Standards of power quality and grid interconnection. Shunt and series compensation of various power quality events. Design of passive power filters. Instantaneous real and imaginary power theory and its application into custom power devices. Active filters: types, operation and control. Instantaneous real & imaginary power theory and applications on conditioning. PQ analyzers, parameters analyzed. PQ monitoring and management.

3. Course Learning Outcomes CLOs

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

Program Outcomes (NARS/ARS) (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
B1	Select, model and analyze electrical power systems applicable to the Electrical Power and Renewable Energy Engineering Program by applying the concepts of: generation, transmission and distribution of electrical power systems.	CLO1	Analyze the performance of electrical power systems under normal and fault conditions using power system analysis techniques.
B4	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	CLO2	Estimate the performance of electrical systems and circuits under specified operating conditions and input excitations using analytical methods.
		CLO3	Measure key electrical parameters such as voltage, current, power, frequency, and efficiency using appropriate instruments and testing procedures.
B5	Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	CLO4	Apply appropriate standards in the design of electrical/electronic/digital equipment and systems to ensure compliance and safety.
		CLO5	Evaluate system and equipment performance against standards and codes to verify compliance and reliability.
D4	Select, analyze and control appropriate driving systems for different energy applications;	CLO6	Select suitable driving systems based on application requirements, load characteristics, and energy efficiency.



4. Teaching and Learning Methods

1. Interactive Lectures
2. Self-Learning
3. Discussion
4. Tutorials

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 (Assignments/ Project)
1, 2	Analysis and characterization of Power :electric Power Quality ,Unbalance ,Harmonics ,Outage and ,Voltage Sag ,Distortion Flicker.	6	2	2	0	2
3, 4	Standards of power quality and Shunt and .grid interconnection series compensation of various power quality events.	6	2	2	0	2
5	Design of passive power filters.	6	2	2	0	2
6	Instantaneous real and imaginary power theory and its application into custom power devices.	6	2	2	0	2
7	Mid Term Exam					
8	Instantaneous real and imaginary power theory and its application into custom power devices..	6	2	2	0	2
9, 10	operation ,types :Active filters and control.	6	2	2	0	2
11	Instantaneous real & imaginary power theory and applications on conditioning.	6	2	2	0	2
12	parameters ,PQ analyzers analyzed.	6	2	2	0	2
13, 14	PQ monitoring and management.	6	2	2	0	2
15	Revision	6	2	2	0	2
16	Final Term Exam					



5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term written Exam	7	20	20%
2	Final Written Exam	16	40	40%
3	Assignments	2 - 14	20	20%
4	Quizzes	5, 10	20	20%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	Sanjeevikumar et al., Power Quality in Modern Power Systems, Academic Press, 2020.
	Other References	Fuchs & Masoum, Power Quality in Power Systems, Electrical Machines, and Power-Electronic Drives, 3rd Ed., 2023.
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data Show
	Supplies	White Board
	Electronic Programs	MATLAB Programs
	Skill Labs/ Simulators	–
	Virtual Labs	–
	Other (to be mentioned)	Lecture Hall and Laboratory Usage

Prof. Dr. Eng. Mohamed Ahmed Ebrahim
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator