



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Renewable Energy Resources Interfacing – ERE172

Academic Year	2025/2026	Semester	Fall
---------------	-----------	----------	------

1. Basic Information

Course Title (according to the bylaw)	Renewable Energy Resources Interfacing				
Course Code (according to the bylaw)	ERE172				
Prerequisite:	Electrical Machines (2) – ERE317, Solar Energy – ERE314, Wind Energy – ERE315				
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. Mohamed Mahmoud Samy				
Course Specification Approval:	Department council		Faculty council		
Date of Approval of the course Specification:	13 / 9 / 2025		16 / 9 / 2025		



2. Course Overview

Storage technologies: Supper Capacitors: structure, ratings, characteristics, use with the wind power plant, fuel cells, Superconducting magnetic energy storage (SMES): structure, operation, Batteries: types, characteristics and operation, charge and discharge, Flywheels energy storage. Interface technologies: Concept of Distributed Generation, Type of interface, Interconnection standards, static synchronous generators, control of active power and voltage regulation, Wind turbines and photovoltaic interface topologies.

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	Recognize characteristics of different types of energy storage methods, their field on power and renewable energy system
B3	Design and implement elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools	CLO5	Develop simulation to protect power systems using any Software packages
		CLO3	Compare between different technologies of energy storage systems
B5	Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services	CLO4	Discuss operations of different types of energy storage methods
D3	Select, analyze and control appropriate driving systems for different energy applications;	CLO2	Analyze the different types of distributed generation, interconnection standards, static synchronous generators, control of active power and voltage regulation.



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
D4	Select, analyze and control appropriate driving systems for different energy applications	CLO5	Develop simulation to protect power systems using any Software packages

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)	Other
1	Introduction to Energy and Renewable Systems Generalities on Energy Storage, Energy Storage Systems	7	2	2	0	3	-
2	Introduction to Energy and Renewable Systems Generalities on Energy Storage, Energy Storage Systems	7	2	2	0	3	-
3	Energy Storage methods and technologies and Comparative Ratings and Properties of Energy Storage systems	7	2	2	0	3	-
4	Energy Storage methods and technologies and Comparative Ratings and Properties of Energy Storage systems	7	2	2	0	3	-
5	Electrochemical Energy Storage, Energy Storage by Means of Super-capacitors	9	2	2	0	3	Quiz 1 (2 Hr)
6	Conventional Batteries and Flow Batteries and Superconducting Magnetic Energy Storage	7	2	2	0	3	-



7	Mid Term Exam						
8	Conventional Batteries and Flow Batteries and Superconducting Magnetic Energy Storage	7	2	2	0	3	-
9	Energy Storage Systems Based on Fuel cells and Hydrogen and Energy Storage Systems Based on Flywheel Systems.	7	2	2	0	3	-
10	Energy Storage Systems Based on Fuel cells and Hydrogen and Energy Storage Systems Based on Flywheel Systems.	9	2	2	0	3	Quiz 2 (2 Hr)
11	Concept of Distributed Generation, Type of interface.	7	2	2	0	3	-
12	Interconnection standards, static synchronous generators,	7	2	2	0	3	-
13	Control of active power and voltage regulation and Wind turbines and photovoltaic interface topologies	7	2	2	0	3	
14	Control of active power and voltage regulation and Wind turbines and photovoltaic interface topologies	7	2	2	0	3	-
15	Revision	7	2	2	0	3	-
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 and attendance	1-15	30	30%
4	Quizzes	10	10	10%



1. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	John Twidell and Tony Weir, Renewable Energy Resources, third edition, from Routledge, 2015.
	Other References	1)Zafirakis D., “Overview of energy storage technologies for renewable energy systems. In: Stand-alone and hybrid wind energy systems technology, energy storage and applications”, Kaldellis JK, editor. Woodhead Publishing; 2010. 2)Duffie and Beckman, Solar Engineering of Thermal Processes, John Wiley, 1980.
	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 and HOMER Software Programs
	Skill Labs/ Simulators	—
	Virtual Labs	—
	Other (to be mentioned)	Lecture Hall and Laboratory Usage

Prof. Dr. Mohamed Mahmoud Samy
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator