

Faculty of Engineering & Technology

Renewable Energy

Information :

Course Code : EPR 413

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Associate Professor	Walid Atef Hafez Elmetwally Omran	7
Teaching Assistant	Abeer Tharwat Said Awad	

Area Of Study :

- Develop the students' understanding about the fundamentals of renewable energy systems, especially wind energy systems and photovoltaic (PV) systems.
- Help the students identify the different components of wind energy systems and PV systems.
- Allow the students to solve engineering problems related to wind energy systems and PV systems.

Description :

Wind Energy Systems: Power in the wind - Rotor aerodynamics and efficiency - Power curve of wind turbines - Electric generators used with wind turbines – environmental impacts of wind turbines. Photovoltaic Systems: The solar resource - Types and characteristics of PV cells – Connection of PV cells, modules and arrays – Balance of system - Design of PV systems. Other Renewable Energy Resources: (e.g., Fuel cells - Wave energy – Hydro power – Tidal power – Concentrated Solar thermal systems).

Course outcomes :

a.Knowledge and Understanding: :

1 -	Define terms related to wind energy systems and PV systems.
2 -	Recall the operating principles of wind energy systems and PV systems
3 -	Memorize the components of wind energy systems and PV systems
4 -	Identify the principle of electricity generation from other renewable energy resources

b.Intellectual Skills: :

1 -	Classify the different topologies of wind energy systems and PV systems
2 -	Analyze the performance of wind energy systems and PV systems.
3 -	Illustrate the power conversion process in wind energy systems and PV systems
4 -	Design stand-alone PV systems to supply islanded loads

c. Professional and Practical Skills: :

1 -	Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results
2 -	Apply safe systems at work and observe the appropriate steps to manage risks
3 -	Perform experiments related to renewable energy systems
4 -	Prepare technical reports related to renewable energy systems

d. General and Transferable Skills: :

1 -	Collaborate effectively within multidisciplinary team
2 -	Work in stressful environment and within constraints
3 -	Communicate effectively
4 -	Effectively manage tasks, time, and resources
5 -	Search for information and engage in life-long self learning discipline
6 -	Refer to relevant literatures

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction	5	3	2
Wind Energy Systems: (Power in the wind - Rotor aerodynamics and efficiency - Power curve of wind turbines - Electric generators used with wind turbines – environmental impacts)	30	18	12
Photovoltaic Systems: (The solar resource - Types and characteristics of PV cells - Applications of PV systems and their design)	30	18	12
Other Renewable Energy Resources: (Fuel cells - Wave energy – Hydro power – Tidal power – Concentrated Solar thermal systems)	10	6	4

Teaching And Learning Methodologies :

Interactive lectures
Experiential learning
Self reading
Report writing
Collaborative projects
Problem-based learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
In Class Quizzes	5.00		
Laboratory	10.00		
Mid-Term exams	30.00		

Participation	5.00		
Project	10.00		

Recommended books :

- 1) Gilbert M. Masters "Renewable and Efficient Electric Power Systems, 2nd Edition", August 2013, Wiley-IEEE Press
- 2) Thomas Ackermann, "Wind Power in Power Systems, 2nd Edition", May 21, 2012, Wiley.
- 3) Nicholas Jenkins and Janaka Ekanayake "Renewable Energy Engineering", Cambridge University Press, 2017