FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

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
Professor	Mohamed Mahmoud Samy Abdel Aziz	
Assistant Lecturer	Ahmed Moreab Hussien Mohamed	2
Teaching Assistant	Mohamed Hassan Mohamed Mahmoud Abdelaal	
Teaching Assistant	Ibrahim Mohamed Ibrahim Farag	

Area Of Study :

ÅUnderstand the fundamentals of renewable energy systems, especially wind energy systems and photovoltaic (PV) systems.
ÅIdentify the different components of wind energy systems and PV systems.
ÅSolve engineering problems related to wind energy systems and PV systems.

Description :

Fuel Cells, fuel cell theory and history, types of fuel cells, applications, performance, future developments. Solar Energy, basic principles, history, collectors and cell types, performance, application and use. Advanced Wind Energy, wind turbine aerodynamics, characteristic of airfoil, lift, drag, stall, betz limit, simple vortex and blade element theory, blade pitch, cut-in rated and cut-out wind speed, wind turbine dynamics with induction and synchronous generators, modeling and wind turbine enhancement devices. Wave and Tidal Power, properties of waves, resources assessment, measurement methods, wave energy conversion devices, tidal behavior and power generation schemes. Safety and environmental issues.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	a1. Define terms related to wind energy systems and PV systems.
2 -	a2. Recall the operating principles of wind energy systems and PV systems
3 -	a3. Memorize the components of wind energy systems and PV systems
4 -	a4. Identify the principle of electricity generation from other renewable energy resources
b.Intellectual Skills: :	
1 -	b1. Classify the different topologies of wind energy systems and PV systems
2 -	b2. Analyze the performance of wind energy systems and PV systems.
3 -	b3. Illustrate the power conversion process in wind energy systems and PV systems

c.Professional and Practical Skills: :	
1 -	c1. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results
2 -	c2. Apply safe systems at work and observe the appropriate steps to manage risks
3 -	c3. Perform experiments related to renewable energy systems
4 -	c4. Prepare and present technical reports
d.General and Transferable Skills: :	
1 -	d1. Collaborate effectively within multidisciplinary team
2 -	d2. Work in stressful environment and within constraints
3 -	d3. Communicate effectively
4 -	d4. Effectively manage tasks, time, and resources
5 -	d5. Search for information and engage in life-long self learning discipline
6 -	d6. 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 ï 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 ï Hydro power ï Tidal power ï Concentrated Solar thermal systems)	10	6	4

Teaching And Learning Methodologies :

Interactive lectures
Experiential learning
Self reading
Report writing
Collaborative projects

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 ñRenewable and Efficient Electric Power Systems, 2nd Editionò, August 2013, Wiley-IEEE Press 2) Thomas Ackermann, ñWind Power in Power Systems, 2nd Editionò, May 21, 2012, Willey. 3) Mukund R. Patel, ñWind and Solar Power Systemsò, March 30, 1999 by CRC Press