Academic Quality Assurance Department

Course Syllabus Form

College	Engineering and Technology		
Department	Mechanical Engineering		
Program	Mechanical and Mechatronics Engineering		
Course Title	Renewable Energy Systems	**Course Number:**	12210588
Year	2024	**Semester:**	Summer
Prerequisite(s)	Thermodynamics (1), Heat Transfer and Fluid Mechanics		
Instructor	Dr. Fathi Anayah		
Instructor's e-mail	f.anayah@ptuk.edu.ps		
Office Hours	NA (Office: Eng. Bldg. H 340)		
Class Time	16 – 18 Sunday, Monday, and Tuesday	**Class Room:**	H 102
Course description	Energy concepts, solar energy, solar systems, wind energy, wind generators, hydropower, bio-energy, energy storage and conversion and other energy resources.		
Course Intended Learning Outcomes (CILOs)	1. to identify and use renewable energy terminology and principles 2. to perform calculations of renewable energy systems 3. to analyze the components of the renewable energy systems 4. to distinguish between renewable energy systems & create appropriate solutions to local challenges		
Textbook(s)	1. Yang, P., 2024. Renewable Energy: Challenges and Solutions (1st ed.). Springer, Switzerland. 2. Ehrlich, R., Geller, H.A., Cressman, J.R., 2023. Renewable Energy: A First Course (3rd Ed.). CRC Press, FL, U.S.		
Other required material (References):	1. Sen, Z., 2008. Solar energy fundamentals and modeling techniques: atmosphere, environment, climate change and renewable energy. Springer, London, U.K. 2. Keyhani, A., Marwali, M.N., Dai, M., 2010. Integration of green and renewable energy in electric power systems. John Wiley and Sons, N.Y., U.S. 3. Lynn, P.A., 2010. Electricity from sunlight: An introduction to Photovoltaic. John Wiley and Sons, N.Y., U.S. 4. Fraas, L., Partain, L., 2010. Solar cells and their applications, second edition. John Wiley and Sons, N.Y., U.S.		

Other Resources used (e.g. e-learning, field visits, periodicals, software, etc.)	

Course Teaching Methods	
Teaching Method	**CILOs**
Kinesthetic Learning (Low Tech Teacher-Centered)	1
Game-based Learning (High Tech Student-Centered)	2
Differentiated Instruction (Low Tech Student-Centered)	3
Inquiry-based Learning (High Tech Student-Centered)	4

Assessment Type	**Details/Explanation of assessment in relation to CILOs**	**Weight**	**Date(s)**
First Exam	CILOs 1, 2, and 3	35%	Week 5
Second Exam			
Quizzes			
Laboratory/Practical			
Assignments	All CILOs	20%	
Project			
Final Exam	All CILOs	45%	Week 8
Total		100%	

Course Intended Learning Outcomes (CILOs)										
CILOs	**Mapping to Program ILOs**									
On successful completion of the course, students will be able to:	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
1. to identify and use renewable energy terminology and principles					X					
2. to perform calculations of renewable energy systems					X					
3. to analyze the components of the renewable energy systems									X	
4. to distinguish between renewable energy systems & create appropriate solutions to local challenges								X		

Course Weekly Breakdown					
Week	**Date**	**Topics Covered**	**CILOs**	**Lab Activities**	**Assessment**
1		Introduction to renewable energy systems	1		
1-2		Solar radiation, solar cells,	1+2		

		photovoltaic engineering, PV-applications			
2-3		Solar thermal energy, flat plate collectors, concentrated systems	2+3		
3-4		Wind energy, wind energy engineering, types of wind energy turbines	2+3		
4-5		Hydraulic power, types of hydraulic turbines, hydro-power plants	2+3		Midterm Exam
5		Geothermal energy, geothermal energy plants, methods used to utilize geothermal energy	3+4		
5-6		Tides and wave energy, methods and applications of utilizing wave and tide energy	3+4		
6		Bio-energy (biomass), biomass sources, technologies of utilization of biomass energy	3+4		
7		Hydrogen energy, potential uses of hydrogen, production technologies, fuel cell construction and operation	3+4		
7-8		Review to energy storage and conversion	1-4		
8		Final Exam			Final Exam

Prepared by:	**Dr. Fathi Anayah**	**Signature**	
Head of Department	**Dr. Jafar Almasri**	**Signature**	
Date	**24 July 2024**		