Kurdistan Region Government
Ministry of Higher Education and Scientific Research
Erbil Polytechnic University

Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	**Erbil Technical Engineering College**		
Department	**Mechanical and Energy Engineering**		
Module Name	**Solar Energy**		
Module Code	**SOE602**		
Degree	**Technical Diploma** ☐ **Bachelor** ☒ **High Diploma** ☐ **Master** ☐ **PhD** ☐		
Semester	**6**		
Qualification	**PhD**		
Scientific Title	**Assistance Professor**		
ECTS (Credits)	**6**		
Module type	**Prerequisite** ☐ **Core** ☒ **Assist.** ☐		
Weekly hours			
Weekly hours (Theory)	**(2)hr Class**	**(28) Total hrs Workload**	
Weekly hours (Practical)	**(2)hr Class**	**(26) Total hrs Workload**	
Number of Weeks	**12**		
Lecturer (Theory)	**Dr. Ranj Sirwan Abdullah**		
E-Mail & Mobile NO.	**ranj.abdullah@epu.edu.iq**		
Lecturer (Practical)			
E-Mail & Mobile NO.			
Websites			

Course Book

Course Description	This course will describe the following issue a. A review of Solar Energy, thermodynamic, and electrical quantities, and units. b. The solar spectrum, blackbody radiation, direct and diffuse insolation. c. Explaining the technical and physical principle of solar collectors d. Designing and calculating of solar radiation e. Design estimation of Photovoltaic
Course objectives	a) To apply knowledge of mathematics, science, and fundamental engineering principles b) To understanding the Solar Energy in particular (Technologies and applications c) A recognition of the need for solar Energy, and an ability to engage in life style d) An ability to use the techniques, skills, and modern engineering tools for engineering practice. e) To design and calculate the solar energy radiation f) To enhance the soft skills in dealing with the solar systems
Student's obligation	✓ Attendance in the all lectures according to the regulations of the department ✓ One or more quizzes in each course. ✓ One or more homework (assignments) ✓ To Prepare a seminar about one topic in the field of Solar energy ✓ A final exam in end of first and second course.

Required Learning Materials	The new technology for the learning and techning at the class, through using of smart board or data show, white board, PowerPoint, Testing in department's Laboratory, and visitng some site for that implemented solar energy power station. • Using online plate form to publish all lecture notes in college and the department				
Evaluation	**Task**		**Weight (Marks)**	**Due Week**	**Relevant Learning Outcome**
	Paper Review				
	Assignments	Homework	5%	3-8	
		Class Activity	2%	1-12	
		Report	5%	7-8	
		Seminar	5%	8	
		Essay			
		Project			
	Quiz		8%	4 & 7	
	Lab.		10%		
	Midterm Exam		25%	6	
	Final Exam		40%	12	
	Total		100%		
Specific learning outcome:	1. Identify the Solar Energy system 2. Calculating the Solar Energy Radiation during the year 3. Ability to design solar Collectors (Thermal and Electrical)				
Course References:	1. Solar Engineering of thermal process 2. Solar Energy Fundamentals and Modeling techniques 3. ASHREA handbook 4. Solar energy Journal 5. Renewable energy Journal				

Course topics (Theory)	**Week**	**Learning Outcome**
Energy and Climate	1	
Solar Collectors type	2	

Solar System Types	3	
Solar radiation determination (calculation and design)	4-6	
Solar radiation devices and collectors	7	
Solar energy alternative	8	
Flate plate collector	8	
Tracking collector	8	
Tilted collector	8	
Solar pound collector	8	
Photovoltaic panel collector	9-10	
Clear Sky Radiation	11	
Energy Storage	12	
Cost of solar process system	13	
Solar water Heating (active and passive)	14-16	
Practical Topics	**Week**	**Learning Outcome**

Questions Example Design

- What is the benefit of using grid-tied PV system instead of stand-alone system?

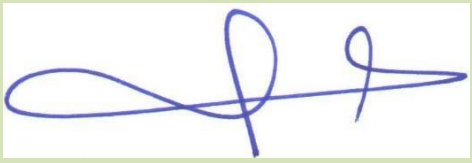
- Calculate the total radiation received on horizontal surface at ground surface at latitude 35º and longitude 45º (800 m above sea level), 1 PM solar time on June 21, 2018
  10 flat plate collectors each collector has an area of 2 m^2, located in Erbil 36º (800 m above sea level), June 21, 2018. The flow rate in the system is 0.235 kg/s, the water inlet and outlet from
  the collectors is 47.3 ℃ and 65 ℃ respectively. While the system is operated at 1 PM solar time. Find collector efficiency?

- Calculate the daily extra-terrestrial radiation on a horizontal surface which is located at latitude 36 ° N, on 10th of December.

Extra notes:

External Evaluator

I hereby confirm that the above syllabus is sufficient to cover the required subjects for this course.



Assist. Prof. Dr. Ahmed Mohammed Adham
22/01/2023