Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering Department	
Module Name	Wind Energy	
Module Code		
Degree	Technical Diploma ☐ Bachler ■ High Diploma ☐ Master ☐ PhD ☐	
Semester	Annual	
Qualification	Bachelor of Science	
Scientific Title	Assistant Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours	6	
Weekly hours (Theory)	(2)hr Class	( )Total hrs Workload
Weekly hours (Practical)	(4)hr Class	( )Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Mr. Sirwan Farooq Omer	
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Lecturer (Practical)	Mr. Sirwan Farooq Omer	
E-Mail & Mobile NO.	07504827829	
Websites		

Course Book

Course Description	This course teaches students inclusive knowledge about the basics of energy produced by the wind, the design of turbines, the design of blades, and the energy conversion system from mechanical to electrical.
Course objectives	At the end of the course, the student will be able to: 1. Design the Blade 2. Design the turbine 3. Estimating the electrical load profile
Student's obligation	Throughout the academic year, students will be assessed with the following duties: 1. Home work 2. Seminar 3. Assay 4. Quiz In addition, the attendance and participation in the lectures are mandatory.
Required Learning Materials	Books, Lecture notes, and computer programs.

Evaluation

Task		Weight (Marks)	Due Week	Relevant Learning Outcome
Paper Review				
Assignments	Homework	3		
	Class Activity			
	Report	1		
	Seminar	2		
	Essay	2		
	Project	1		
Quiz		3		
Lab.		5		
Midterm Exam				
Final Exam				
Total				

Specific learning outcome:	Students who successfully complete the course should demonstrate the provided knowledge gradually according to the lectures by tests and homework.
Course References:	1. Wind Energy Explained – Theory, Design and Application 2. Power Conversion and Control of Wind Energy System **3.** Lecture Notes

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction about Wind Turbine and |Components	1	
Airfoils and general concepts of thermodynamics	2	
One dimensional momentum theory and the betz limit	3	
Ideal horizontal axis wind turbine with wake rotation	4	
Stall and pitch aerodynamic power control	5	
Momentum theory and blade element theory	6	
Blade shape for ideal rotor without wake rotation	7	
General rotor blade shape performance prediction	8	
Blade shape for optimum rotor with wake rotation	9	
Generalized rotor design procedure	10	
Simplified horizontal axis wind turbine rotor performance calculation procedure	11	
Effect of drag and blade number on optimum performance	12	
Vertical axis wind turbine	13	

Practical Topics	**Week**	**Learning Outcome**
Cut-In and Cut-Off Wind Speeds of the Wind Energy Conversion System	1	
Power Generation of the Wind Energy Conversion System	2	
Relationship between Power Coefficient, Blade Pitch Angle, and Tip Speed Ratio of the Wind Turbine	3	

Learning Outcomes:

Upon completion of the course, you will be able to:

- Understand how a wind turbine works.
- Demonstrate an overview of the main parts of the wind turbine.
- Recognize the classification of wind turbines and the shape of the airfoils.
- Determine the output power for a given wind flow velocity and swept area.
- Understand the effect of the aerodynamic forces on the blade wind turbines.
- Design the blade of wind turbines by using Momentum theory and blade element theory methods.