MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering

Course Syllabus

Course Code	Course Name	Credits	Contact Hours
0401480	Renewable Energy Systems	3	3 T

INSTRUCTOR/COORDINATOR	
Name	Dr. Ziyad S. Almajali
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TEXTBOOK	
Title	IREEDER D2.2 Teaching Materials - Renewable Energy Lecture Notes
Author/Year/Edition	By the team of iREEDER project - funded by Erasmus+/2021/v2.0
Other Supplemental Materials	
Title	
Author/Year/Edition	

SPECIFIC COURSE INFORMATION

A. Brief Description of the Content of the Course (Catalog Description)

This course is an introductory course in renewable energy systems. It provides the students with the knowledge and in-depth understanding of renewable energy systems; their classifications, technologies, operational principles and economical aspects. The course starts with an overview of the renewable energy resources. The next part of the course addresses photovoltaic (PV) power systems, starting with the solar resource, PV technologies, cell, module and array characteristics and models, proceeding to design issues in grid-connected and stand-alone PV power systems. Wind power systems are introduced next, including the wind resource, constant-speed and variable-speed wind turbines, with emphasis on electrical components including generators, 3-phase power electronics, and interface to the grid. Finally, energy storage systems, hybrid energy system and modern electric vehicles are introduced.

B. Pre-requisites (P) or Co-requisites (C)

Power Electronics (0401464) **(P)**

C. Course Type (Required or Elective)

Required

SPECIFIC GOALS

A. Course Learning Outcomes (CLOs)

By the end of this course, the student should be able to:

CLO1: Describe the challenges, problems and potential solutions associated with the use of various Renewable Energy sources [1].

CLO2: Understand the fundamental principles and technologies of renewable energy components and systems, and other related topics such energy storage systems, hybrid energy systems, and distribution (smart) grid [1].

CLO3: Describe the use of renewables and the various components used in the energy production with respect to applications (e.g. heating, cooling, desalination, power generation) [1].

CLO4: Gain specific knowledge in special fields such solar, wind, fuel cell and battery storage [1].

B. Student Learning Outcomes (SOs) Addressed by the Course

1	2	3	4	5	6	7
✓						

BRIEF LIST OF TOPICS TO BE COVERED

List of Topics	No. of Weeks	Contact Hours
Introduction and Overview of Renewable Energy Resources	2	6
Physics of sunlight and photovoltaics	1	3
Photovoltaic system components	1	3
Photovoltaic system calculation and aspects	2	6
Solar thermal systems	1	3
Wind Energy Fundamentals	1	3
Wind Turbines operation and Control	2	6
Energy storage	2	6
OFF-grid/ Stand-alone systems	1	3
Integrating of Renewable Energy into electrical grid (Challenges, Solutions and Grid Code)	1	3
Total	*14*	*42*

EVALUATION

Assessment Tool	Due Date	Weight (%)
Mid Exam	According to the university calendar	30
Course Work (Homeworks, Quizzes, Projects, …etc.)	One week after being assigned	20
Final Exam	According to the university calendar	50

ABET's Students Learning Outcomes (Criterion # 3)		
	Relationship to program outcomes	
ABET 1-7		**Engineering Student Outcomes**
1	√	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2		an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3		an ability to communicate effectively with a range of audiences.
4		an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5		an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6		an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7		an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.