



Electrical and Renewable Energy Engineering Program

Course Specification - (2025-2026)

Solar Energy in Buildings – ERE376

Academic Year	2025/2026	Semester	Fall
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1. Basic Information

Course Title (according to the bylaw)	Solar Energy in Buildings				
Course Code (according to the bylaw)	ERE376				
Prerequisite:	Solar Energy – ERE314				
Department/s participating in delivery of the course	Electrical and Renewable Energy Engineering				
Number of credit hours/points of the course (according to the bylaw)	Credit Hours	Contact Hours			
		Lecture	Tutorial	Practical	Total
	3	2	2	0	4
Course Type	Elective - Minor Requirements of Electrical and Renewable Energy Engineering				
Academic level at which the course is taught	Fifth Level				
Academic Program	Bachelor of Engineering of Electrical and Renewable Energy				
Faculty/Institute	Faculty of Engineering				
University/Academy	Nahda University				
Name of Course Coordinator	Assoc. Prof. Dr. Amir Yassin				
Course Specification Approval:	Department council			Faculty council	
Date of Approval of the course Specification:	13 / 9 / 2025			16 / 9 / 2025	



2. Course Overview

Energy used and thermal energy balance of different types of buildings, The potential for energy savings, Passive solar techniques for heating the buildings, Solar cooling: the roll of building design and orientation, Natural solar adopted in buildings: day lighting, natural ventilation, Application of solar energy in buildings: active elements, integration of active elements with solar thermal and PV system applications.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
B1	Select, model and analyze electrical power systems applicable to the Electrical Power and Renewable Energy Engineering Program by applying the concepts of: generation, transmission and distribution of electrical power .systems	CLO1	Recognize characteristics of energy used and thermal energy balance of different types of buildings.
		CLO2	Analyze performance of passive solar techniques for heating the buildings and solar cooling
D1	Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design .and Analysis, Dynamics and Vibrations	CLO1	Recognize characteristics of energy used and thermal energy balance of different types of buildings.
		CLO2	Analyze performance of passive solar techniques for heating the buildings and solar cooling
		CLO3	Discuss application of solar energy in buildings: active elements, integration of active elements with solar thermal and PV system applications.
D2	Identify, analyze and evaluate the energy's conversion processes and ;management techniques	CLO1	Recognize characteristics of energy used and thermal energy balance of different types of buildings.
		CLO2	Analyze performance of passive solar techniques for heating the buildings and solar cooling
		CLO3	Discuss application of solar energy in buildings: active elements, integration of active elements with solar thermal and PV system applications.



Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
D3	Model, analyze, design, implement, test and operate renewable energy systems such as solar photovoltaics, solar thermal, wind, biomass and waste, hydro-tidal and wave, and other .renewable energy applications	CLO1	Recognize characteristics of energy used and thermal energy balance of different types of buildings.
		CLO2	Analyze performance of passive solar techniques for heating the buildings and solar cooling
		CLO3	Discuss application of solar energy in buildings: active elements, integration of active elements with solar thermal and PV system applications.
		CLO4	Gain access to data and information from libraries and internet related to course subjects.

4. Teaching and Learning Methods

1. Interactive Lectures
2. Tutorials
3. Self-Learning
4. Case study
5. Report and research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours				
			Lecture Hours	Tutorial Hours	Practical Hours	Self-learning (Ass/ Project)	Other
1	Introduction to energy used of different types of buildings	6	2	2	0	2	-
2	Thermal energy balance of different types of buildings	6	2	2	0	2	-
3	The potential for energy savings	6	2	2	0	2	-
4	Passive solar techniques for heating the buildings	6	2	2	0	2	-
5	Solar cooling	8	2	2	0	2	Quiz 1 (2 Hr)
6	The roll of building design and orientation	6	2	2	0	2	-
7	Natural solar adopted in buildings: day lighting, natural ventilation						
8	First Mid-Term Exam	6	2	2	0	2	-



9	Application of solar energy in buildings	6	2	2	0	2	-
10	Active elements	8	2	2	0	2	Quiz 2 (2 Hr)
11	Integration of active elements with solar thermal	6	2	2	0	2	-
12	Different types of photovoltaic (PV) systems	6	2	2	0	2	-
13	Design of PV system	6	2	2	0	2	
14	Application of PV in buildings	6	2	2	0	2	-
15	Revision	6	2	2	0	2	-
16	Final Term Exam						

5. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term written Exam	7	20	20%
2	Final Written Exam	16	40	40%
3	Assignments	2-14	10	10%
4	Quizzes	5,10	20	20%
5	Report	12	10	10%

1. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course	1) Duffie and Beckman (1991), Solar engineering of thermal processes 2nd Ed., Wiley. 2) Yogi Goswami (2015), Principles of Solar Engineering, CRC Press.
	Other References	1) Reddy (1987), The design and sizing of active solar thermal systems, Clarendon. 2) Lunde (1980), Solar thermal engineering: space heating and hot water systems, Wiley. 3) Yogi Goswami (2015), Principles of Solar Engineering, CRC Press.
	Electronic Sources	www.ekb.eg
	Learning Platforms	https://lms.nub.edu.eg/login/index.php
	Devices/Instruments	Data Show



Supportive facilities & equipment for teaching and learning	Supplies	White Board
	Electronic Programs	–
	Skill Labs/ Simulators	MATLAB Simulink Software Programs
	Virtual Labs	–
	Other (to be mentioned)	Lecture Hall and Laboratory Usage

Assoc. Prof. Dr. Amir Yassin
Course Coordinator

Dr. Mohamed Kourany Saad
Program Coordinator