The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Solar Energy	0904554	

2019 Course Catalog Description

Fundamentals of Solar radiation: The properties of sunlight. Spectral distribution of sunlight. Calculation of solar irradiance at surfaces. Solar thermal: Thermo-dynamical description of solar collectors. Optical properties of solar collectors. Selection of solar collectors. Solar thermal systems design for different applications: schemes and components. Solar electric: Solar cell systems. System components and their functions. Calculating output and dimensioning of solar cell systems. Analysis and simulation of a solar collector and panel system by computerized tools.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	

Text Books

	Text book 1	Text book 2
Title	Solar Engineering of Thermal Processes	(Handouts)
Author(s)	J. A. Duffie, W. A. Beckman	-
Publisher, Year, Edition	Wiley, 2006, 3rd edition	-

References

Books	
Journals	
Internet links	http://oayadi.wix.com/course

Prerequisites

Prerequisites by topic	-
Prerequisites by course	Heat Transfer (1) 0904441
Co-requisites by course	-
Prerequisite for	-

Topics Covered

Week	Topics	Chapter in Text	Sections
1	Solar radiation	Ch. 1	
2	Available solar radiation	Ch. 2	
3	Selected topics in heat transfer (A quick review)	Ch. 3	
4	Radiation transmission through covers and absorption by collectors	Ch. 4	
4	Theory of flat-plate collectors	Ch. 6	
5	Energy storage	Handout	
6	System thermal calculations	Handout	
7	Solar water heating	Handout	

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
1	1. Understand the physics of solar radiation, solar times and angles. 2. Calculate the direction of solar radiation at any time and location. 3. Orient solar collection system at any time and location for maximum energy gain. 4. Model and predict thermal performance of a solar collection system
2	5. Select proper material for various components of solar energy collectors. 6. Evaluate energy storage capabilities of a solar collection system 7. Figure out the performance of various flat-plate solar collector combinations
6	8. Estimate and measure actual solar radiation at a surface of any orientation and position. 9. Select proper flat-plate solar collector for a desired job. 10. Evaluate the problems associated with local thermosyphonic solar collection systems.

Evaluation

Assessment Tools	Expected Due Date	Weight
Assignments		20 %
Midterm Exam		30 %
Final Exam		50 %

Contribution of Course to Meet the Professional Components

The course contributes to building the students' knowledge in energy and energy saving techniques.

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	X	X				X	

Relationship to Mechanical Engineering Program Objectives (MEPOs)

MEPO1	MEPO2	MEPO3	MEPO4	MEPO5

ABET Student Outcomes (SOs)

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

Updated by ABET Committee, 2024