هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Energy & Environment Physics
Course Code:	PHYS 477
Program:	B.Sc. in Physics
Department:	Department of Physics and astronomy
College:	College of Science
Institution:	King Saud University
Version:	2.0.0
Last Revision Date:	Sep 2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3(3+0+0)				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☐	Elective☒			
3. Level/year at which this course is offered:	8th level / Final Year				
4. Course general Description The course aims to introduce students to Energy fundamentals, Fossil fuels, Renewable energy Part-I: Solar radiation and solar energy (thermal, photovoltaics and electrochemicals), Renewable energy Part-II: Alternatives (hydropower, wind power, ocean thermal energy conversion, biomass, geothermal energy, tidal & wave energy), Energy conservation & storage, Energy and transportation, air pollution and environment.					
5. Pre-requirements for this course (if any): Phys 371					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) 1- The student should have information about the physics of renewable energy and solar energy conversion 2- The student should be aware with the applications of the solar energy 3- The student should acquire the energy fundamentals, Solar radiation, solar cells, and other kinds of energy conversion.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100%
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To get background on energy fundamentals, Solar radiation, solar cells and other kinds of energy conversions	K1	• Give extensive examples during lecture. • Give problem sheets to be discussed during lecture.	• Hold Class discussion. • Give quizzes, mid-term exam and final exam.
1.2	Demonstrate the applications of renewable energy and environmental problems.	K2		
1.3	Descibe the physics of Energy conservation & storage and energy transportation	K3	• Give extensive examples during lecture	• Hold Class discussion,
2.0	Skills			
2.1	Apply their knowledge and understanding to solve problems.	S1	• Give extensive examples during lecture • Give problem sheets to be discussed during lecture	• Hold Class discussion, • Home Work assignment.
2.2	Analyze scientific data using Excel OR origin lab software	S2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Understand the basic physical concepts.	S3	• Assignments. • Discussions in the classes	• Mini project reports • Quizzes, mid-term exam and final exam.
3.0	Values, autonomy, and responsibility			
3.1	Present a written report using appropriate scientific methods, think critically and work independently.	V1	• Assignments. • Homework • Evaluating the written reports.	• Hold Class discussion • Assessment of the mini project reports.
3.2	Work in a team and acknowledge others' work.		• Assignments. • Evaluating the written reports.	• Hold Class discussion • Assessment of the mini project reports.

C. Course Content

No	List of Topics	Contact Hours
1.	ENERGY	3
2.	SOLAR RADIATION	9
3.	THERMAL CONVERSION	6
4.	PHYSICS OF SEMICONDUCTORS	6
5.	PHOTOVOLTAIC CONVERSION	6
6.	PHYSICS OF SOLAR CELLS	6
7	RENEWABLE ENERGY SOURCES (WIND, BIOMASS, TIDAL, HYDROGEN, GEOTHERMAL)	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm examination	Approx. 6	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Class activities (in class quizzes, homework, presentation)	Approx. 10	20%
3.	Second Midterm examination	Approx. 12	20%
4.	Final examination	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"Renewable Energy Sources" by Prof./ Abdullah AlBassam, King Saud University Press.
Supportive References	1- Solar Cells, by:Martin A. Green, Publisher: Prentice-Hall, Inc. (1980). 2- Fundamentals of Solar Cells Photovoltaic Solar Energy Conversion,by: A.L. Fahrenburch, and R. H. Bube Publisher: Academic Press, Inc., New York, 1983. 3- Third Generation Photovoltaics - Advanced Solar Energy Conversion, (2003) Springer. 4- Design of solar thermal systems, by: Moustafa M. Elsayed et.al, Publisher: Scientific pub Center, KAA, Univ. Jeddah. 5- Fundamentals of Solar Energy Conversion, by: E. E. Anderson, 6- Publisher: Addison- Wesley Publishing Co. (1983). 7- Essential Guide to Solar Energy, Photovoltaics, Solar Cells, Roof Panels, Heating, Lighting, Concentrating, 2008 By: U.S. Government . Practical Photovoltaics: Electricity from Solar Cells (Paperback) , 1995 By: Richard J. Komp.
Electronic Materials	Websites on the internet that are relevant to the topics of the course
Other Learning Materials	Internet sites relevant to the course/ Multi-media associated with the text book and the relevant websites.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board

Items	Resources
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	10th (2nd term 1445)
DATE	12/07/1445