2023
TP-153

Course Specification
(Bachelor)

Course Title:	Renewable Energy
Course Code:	481-MEC-2
Program:	Bachelor of Science in Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	Najran University
Version:	1.0
Last Revision Date:	27 February 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Fifth Year \ Level 9)					
4. Course general Description:					
Energy fundamentals, Fossil fuels, Renewable energy Part-I: Solar radiation and solar energy (thermal, photovoltaics and electro- chemicals), Renewable energy Part-II: Other Energy Alternatives (hydropower, wind power, ocean thermal energy conversion, biomass, geothermal energy, tidal & wave energy), Energy conservation & storage, Energy and transportation و air pollution and environment.					
5. Pre-requirements for this course (if any):					
382-MEC-2 (Energy Efficiency)					
6. Co-requisites for this course (if any):					
NIL					
7. Course Main Objective(s):					
1.The student should have information about the importance of renewable energy and solar energy conversion 2.The student should be able to investigate the physics of solar radiation and solar cells 3.The student should be aware of the applications of the solar energy					

2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
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 recognize a background on energy fundamentals, Solar radiation, solar cells, and other kinds of energy conversion.	1	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	-Test performance evaluation -Evaluation of participation in discussion and group assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	To outline some mathematical formulations and laws that control the relation between the energy & environment and define some applications of renewable energy.	7	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Giving more assignment from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	-Test performance evaluation -Evaluation of participation in discussion and group assignments
2.0	**Skills**			
2.1	To explain the daily life applications of the studied topics. And the most famous and useful instruments build on the studied topics	2	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes
2.2	To recognize how technology is built from simple to	6	TS:1-Interactive lectures using PowerPoint slides	•Locally Developed Exams such as

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	advanced present states and summarize some interesting experiments and applications in the field of the studied course.		TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate solving problems and evaluate the Numerical skills through: solving problems- computation – data analysis – feeling physical reality of results.	5	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting midterm and Final Exam from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes

C. Course Content

No	List of Topics	Contact Hours
1.	Energy Fundamentals	5
2.	Solar Radiation, Solar energy	8
3.	Photovoltaics	7
4.	Other Energy Alternatives	8
5.	Energy Conservation and Storage	7
6.	Energy and Transportation	5
7.	Air pollution and environment.	5
	Total	**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	1-10	10%
2.	Quizzes	1-10	10%
3.	Mid-term	4 & 8	30%
4.	labs	-	-
5.	Final exam	15	50%

*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	Anderson, E. E., Fundamentals of Solar Energy Conversion, Addison-Wesley Publishing Co., 1983.
Supportive References	1. A. Albassam, New and renewable energy: their types and resources, Dar Alkheraji for publishing and distribution, Saudi Arabia 2000. 2. A. Albassam, Solar energy and its applications, chair of renewable energy and its applications, Physics Dept. king Saud University 2012. 3. A. Albassam, Fossil and renewable Energy, chair of renewable energy and its applications, Physics Dept. king Saud University 2015.
Electronic Materials	Online custom books
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and laboratories
Technology equipment (projector, smart board, software)	--
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders and Peer Reviewer	Direct, Indirect
Effectiveness of Students assessment	Students & Faculty	Direct and Indirect
Quality of learning resources	Students & Faculty	Direct and Indirect
The extent to which CLOs have been achieved	Students & Faculty	Direct and Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT OF MECHANICAL ENGINEERING
REFERENCE NO.	
DATE	27/02/2024