

Faculty of Engineering & Technology

Energy Conversion Systems

Information :

Course Code : MPR 555

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Anas Mohamed Abdelrahman Ali	3
Lecturer	Anas Mohamed Abdelrahman Ali	3
Assistant Lecturer	Moustafa Raafat Aziz Shousha	1
Teaching Assistant	Ahmed Ibrahim Sadek Mostafa Elgindy	

Area Of Study :

This course aims to:

- Enrich the student knowledge about energy resources, crises and future.
- Prepare the student to apply fundamentals principles of Mechanical energy generation systems.
- Develop student skills for analyzing energy conversion systems.
- Train the student to explore the fundamentals of energy conversion using Re-newable sources.
- Train the student to share ideas and search for novel ideas and solutions.

Description :

The world energy crises from engineering perspective; Energy resources, reserves and environmental impacts. Principles and technologies of conventional energy conversion systems; fossil fuels plants, nuclear power and hydro power systems. Potential and characteristics of renewable energy systems; solar thermal power, photovoltaics, wind energy, sea water and OTEC systems, geothermal plants, biomass and fuel cells. Development of energy storage technologies.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Identify engineering economy, legislation, business and management techniques and practices appropriate to energy conversion systems.
2 -	Demonstrate knowledge of basic components of conventional energy conversion systems and related engineering contemporary issues.
3 -	Describe most successful and promising conventional and renewable energy conversion systems.
4 -	Identify principles in the field of fluid flow, thermodynamics, gas dynamics, turbo- machinery, heat transfer engineering and fundamentals of thermal and fluid processes.
5 -	Recognize performance concerns of mechanical components, in the field of power producing systems.
6 -	Identify basic parameters and engineering principles governing energy conversion processes.

b.Intellectual Skills: :

1 -	Analyze the solution alternatives to choose the optimum one.
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2 -	Analyze the performance of the basic types of thermal power systems, hydraulic systems and renewable power systems.
3 -	Derive different solution alternatives for the engineering problems of conventional and renewable energy systems based on analyzing and interpreting data and evaluating the power losses in these systems.
4 -	Evaluate designs, processes, and performance of energy conversion systems and propose improvements.

c. Professional and Practical Skills: :

1 -	Analyze the record data in the laboratory.
2 -	Use laboratory, workshop equipment and field devices competently and safely.

d. General and Transferable Skills: :

1 -	Use digital libraries and/or Learning systems and demonstrate efficient IT capabilities.
2 -	Share and motivate individuals and work with others according to the rules of the professional Ethics.
3 -	Share ideas, communicate effectively and work in stressful environment and within constraints.
4 -	Collaborate effectively within multidisciplinary team.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction and course outlines	4	2	2
Conventional energy conversion systems-I	8	4	4
Nuclear energy conversion systems	4	2	2
Hydro energy conversion systems-IV : +Mid-term Examination	8	4	4
Renewable energy conversion systems-I : Wind Turbines	4	2	2
Renewable energy conversion systems-II : Tidal & Wave	4	2	2
Renewable energy conversion-III : OTEC and Geothermal	4	2	2
Solar thermal-non concentrating systems	6	2	4
Solar thermal-concentrating systems	6	2	4
Solar Photovoltaic energy conversion	4	2	2
Energy storage systems, Bio mass and fuel cells	6	4	2
Term Research presentation	2	2	

Teaching And Learning Methodologies :

Interactive Lecture
Problem based learning
Discussion
Experimental learning
Project based learning
Search

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	10.00	12	
Final Exam	40.00	16	Written
Mid- Exam I	15.00	6	written exam
Oral Exam	5.00	16	
Participation	10.00	15	Activities, participation and discipline
Quizzes	5.00	3	Follow up during the course & written exam
Term Project	15.00	11	Reports, follow up during tut. /lab work.

Recommended books :

Energy Conversion Systems, Harry A. Sorensen John Wiley& sons , 1983