

**COURSE CODE:** ENS-443  
**COURSE NAME:** Renewable Energy  
**CREDIT HOURS:** Theory = 3 Practical = 0 Total = 3  
**CONTACT HOURS:** Theory = 48 Practical = 0 Total = 48  
**PREREQUISITE:** None  
**MODE OF TEACHING:** Three hours of lecture per week

**Course Description:**

A course aiming to provide physical principles behind energy, its generation, sources, uses and effects on our environment. To highlight the effect of production and use, on the environment, of the various energy resources being used by man and discuss viable alternatives.

**TOPICS COVERED:**

<b>Week#</b>	<b>Topics</b>
1	Introduction: Energy Units, forms and types of energy, energy resources
2	Energy use and growth patterns, energy conversion, energy use in developing countries and losses
3	Energy Mix; Coal Characteristics
4	Problems associated with Mining & Transportation and use
5	Petroleum history and Processing; Problems associated with petroleum production, transportation and storage
6	Energy Conversion, Electric Power Generation
7	Hydroelectricity: Environmental Issues during Survey, Population Displacement and Construction
8	Nuclear Energy: Nuclear Fission
9	<b>Midterm Exam – MSE</b>
10	Electromagnetic Spectrum, Solar Spectrum, Light Intensity at Earth
11	Problems with use of energy resources: Wood, Coal and Fossil fuels; local and global issues, Ecological Effects of Large Dams;
12	Spent Nuclear Fuel Disposal Issues

	Nuclear Accidents: three-Mile Island, Chernobyl, Fukushima etc.
13	Renewable Energy Sources: Microhydel, wind, Solar thermal, Photovoltaic cells
14	Biogas, Geothermal, Wave, Tidal energy
	Novel Energy sources: Biofuels
15	Hydrogen as an Energy Carrier, Fuel Cells, Hybrid Vehicles
16	<b>End Semester Exam</b>

### **Text and Material:**

1. Energy: Its use and the Environment, 5<sup>th</sup> Edition, Roger A. Hinrichs and Merlin Kleinbach, Brooks Cole, 2013.
2. V. Quaschnig, Renewable Energy and Climate Change, Wiley-IEEE, 2<sup>nd</sup> edition, 2019.
3. R. Ristinen and J.K. Kraushaar, Energy and Environment, John Wiley, 4<sup>th</sup> edition, 2022.
4. G. Boyle, Renewable Energy: Power for a Sustainable Future, Oxford University Press, 3<sup>rd</sup> edition, 2012.

### **ASSESSMENT SYSTEM:**

<b>Theoretical/Instruction</b>	<b>100%</b>
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%
<b>Practical Work</b>	<b>0%</b>
Lab Attendance	0%
Lab Report	0%
Lab Quiz	0%
Lab Rubrics	0%