

## TEE-902-Sustainable Thermal Energy Systems

### Educational Objectives

1. Detailed objectives of the course.
  - a. To enable post-graduate students to incorporate sustainability aspects in designing and modeling of thermal energy systems
  - b. To nurture students in advanced energy analysis such as life cycle assessment, exergy analysis etc.
  - c. To provide insight in energy efficiency considering environmental and economical aspects.

### Course Contents

2. Contents with suggested contact hours

<b>S. No.</b>	<b>Topics</b>	<b>Contact Hours</b>
a.	Sustainable design of Thermal Energy Systems	6
b.	Carbon Capture Technologies	6
c.	Sustainable Nuclear Energy Technologies and application	6
d.	Sustainability in Solar Energy Technologies	6
e.	Solid Wastes for Power Generation (Incineration, Pyrolysis and Gasification)	6
f.	Life Cycle Assessment of Thermal Energy Systems	
g.	Environmental, Economic and social aspects of Thermal Energy Storage Systems	5
h.	Turbo-machinery (sustainable design)	5
i.	Economic consideration of Thermal Energy Systems	5

## **Outcomes**

3. The course should enable the student to:
  - a. Comprehend sustainable thermal energy technologies, their characteristics and industrial applications.
  - b. Grasp the business drivers, rules of thumb, heuristics and quantitative economic information of sustainable thermal energy systems
  - c. Consider 'out-of-the-box' sustainable concepts in thermal energy engineering, where knowledge from multi-disciplinary domains is incorporated in new solutions.
  
4. **Recommended Reading (including Textbooks and Reference books).**

	<b>Title</b>	<b>Author(s)</b>	<b>Books</b>
a.	Mechanical Engineering, Energy Systems and Sustainable Development	Konstantin V. Frolov, Oleg N. Favorsky, R.A. Chaplin and Christos Frangopoulos	Ref
b.	Sustainable Energy Systems and Applications	Ibrahim Dincer, Calin Zamfirescu	Ref
c.	Thermal Energy Storage Technologies for Sustainability	S. Kalaiselvam, R. Parameshwaran	Ref
d.	Nuclear Technologies in a Sustainable Energy System	G.S. Bauer, A. McDonald	Ref
e.	Fluid Mechanics and Thermodynamics of Turbomachinery	Sydney Lawrence Dixon	Ref
f.	Progress in Sustainable Energy Technologies: Generating Renewable	Ibrahim Dincer, Adnan Midilli, Haydar Kucuk	Ref

	Energy		
g.	Exergy, Energy System Analysis and Optimization	Christos A. Frangopoulos	Ref
h.	Carbon Capture and Storage	Steve Rackley	Ref