

Course Type	Course Code	Name of the Course	L	T	P	Credits
DE	NESD508	Energy Auditing and Management	3	0	0	3

#### Course Objectives

- Expose students to the area of energy management
- Exposure to energy auditing.
- Exposure to energy accounting.
- Focus on various energy-intensive industries and techniques for energy savings.

#### Learning Outcomes

Upon successful completion of this course, students will be able to:

- Understand the role of energy management and auditing in an energy-intensive facility and identify the energy-saving options.
- Application of techno-economic analysis to the process and calculate the avoidable cost.
- Identify the alternate renewable resources for the existing fossil fuel-based systems.

Unit No.	Topics to be covered	Lecture Hours	Learning outcomes
1.	<b>Energy Management</b> Energy management and its importance, Energy management as a profession, Design an energy management program in an organization, Management of programs, Status of energy management in India.	5	Student will be learning about the importance of energy management in an organization.
2.	<b>Energy Auditing</b> Energy auditing and its process, Types of an energy audit, Implementation of an energy audit, Tools for an energy audit, Examples.	8	Students will be exposed to different processes to carry out energy audit to determine the energy consumption associated with a facility and the potential savings associated with that energy consumption.
3.	<b>Understanding the energy consumption/bills</b> Rate structures for large scale industry, Rate structures for small to medium scale industry, Rate structures for residential buildings, Energy consumption for: – Electricity – Natural gas – Fuel oil – Coal.	7	This unit helps them to understand the breakdown of energy bill for various facilities.
4.	<b>Economic Analysis of Energy Management Options</b> Various methods for comparing energy management options, Present worth factor, future worth factor, discounted cash flow analysis etc., Real-life examples, Life cycle costing for energy management opportunities, Real-life examples.	8	Students will learn to evaluate the economic attractiveness of energy retrofitting projects.
5.	<b>Audits of various energy-intensive systems</b> Insulation audit, Boilers audit, Steam distribution systems audit, Heating, ventilation and air conditioning audit, Lighting systems audit, Water resource audit, Other miscellaneous systems, Implementation of ISO 50001.	7	In this unit, they will be learning about various energy intensive systems in terms of electricity, water, natural gas etc.
6.	<b>Different alternatives</b> Possibility of using renewable energy sources – Solar in the building – Biomass etc., Process Energy Management – Electrical motors – Compressors, Distribution systems – Piping etc., Case Studies from Industries – Cement. Thermal Plant – Utilities. – Steel. – Other energy-intensive industries. – Small firms.	7	In this section, they will be exposed to different alternatives to minimize the energy requirement in the system.
		42	

#### Text Books:

1. Kreith F and Goswami DG. Energy management and conservation handbook. CRC Press, Taylor and Francis Group, Boca Raton, London, New York, USA, ISBN-13: 978-1- 4200-4429-4, 2008.
2. Capehart BL, Turner WC, Kennedy WJ. Guide to energy management - 5 th Edition. The Fairmont Press Inc., 700 Indian Trail, Lilburn, GA 30047, USA, ISBN: 0-88173-477-2, 2006.

#### Reference books:

1. Thumann A and Younger WJ. Handbook of energy audits – sixth edition. The Fairmont Press Inc., 700 Indian Trail, Lilburn, GA 30047, USA, ISBN: 0-88173-416-0, 2003.
2. Turner CW and Doty S. Energy management handbook (sixth edition). The Fairmont Press Inc, 700 Indian Trail, Lilburn, GA 30047, USA, ISBN: 0-88173-542-6, 2007.