

Course title: Energy audit and management				
Course code: ENR 116		No. of credits: 3	L-T-P: 33-08-08	Learning hours: 49
Pre-requisite course code and title (if any): NA				
Department: Department of Energy and Environment				
Course coordinator: Dr. Sapan Thapar			Course instructor: Dr. Sapan Thapar	
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Course type: Elective			Course offered in: Semester 3	
Course description				
<p>Energy Audit helps to map the flow of energy (in its various forms) across the value chain, highlighting areas for interventions. It shall complement the knowledge gained by students in the subject 'Energy Management'. This course is designed to sensitize students on the mechanism of energy audit and the technologies/ tools typically employed to undertake an audit exercise, supported by case studies & site visits.</p>				
Course objectives				
<ul style="list-style-type: none"> ▪ To understand Energy Audit procedure along with relevant technologies/ tools ▪ To understand Energy Conservation measures undertaken across different user segments using case studies ▪ To develop Energy Audit Report writing skills 				
Course contents				
Module	Topic	L	T	P
1	Energy Management & Government Programmes Introduction to Energy Management Energy Conservation Act BEE & State Development Agencies Government & EESL Programmes PAT Scheme Ujala & SEEP Programmes Municipal & Agriculture DSM Initiatives Standards and Labelling Programme EEC initiatives in Other Sectors Global Programmes & Initiatives Energy Efficiency & Climate Change	7	0	0
2	Energy Audit Basics Definition and Objectives Energy Profiling Energy Flow diagram Types of Energy Audit Duties of Energy Auditor & Manager	4	0	0
3	Energy Audit Procedure Energy Audit Procedure Tools/ Techniques/ Equipment Energy Audit Report Financing EEC Activities	4	0	0
5	Energy Analytics Energy & ITES Applications Building Management System	4	0	0
6	Case Studies / Best Practices Large Industries (Cement/ Iron & Steel/ Thermal Power Plants) SME Units Power Distribution Utilities / Railways Buildings/ Hotel/ Other Sectors	8	4	0

7	Site Visits & Practical Work Institutional Visit Developing Energy Audit Report	6	4	8
	Total	30	8	8

Evaluation criteria:

Test 1: Assignments (after completion of modules 1, 2 and 3)- 20%
 Test 2: Written test (after completion of modules 1, 2, 3 and 4)- 25%
 Test 3: Written test/ Case Study Presentation (after completion of modules 5 and 6)- 25%
 Test 4: Audit Report Cum Presentation (after completion of modules 6 and 7) - 30%

Learning outcomes:

- Identification of energy conservation opportunities in various industrial processes (Test 1)
- Gain knowledge on tools and techniques employed in energy auditing (Test 2 and 3)
- Comprehend an Energy Audit report, including economic parameters (Test 4)

Pedagogical approach:

A combination of class-room interactions, tutorials, assignments, site visits, expert talks and project work

Materials:

Text Books:

LC Witte, PS Schmidt and DR Brown: **Industrial Energy Management and Utilization**
 (Hemisphere Publishing Corporation, Washington, 1998).

Reference Books:

JL Threlkeld: **Thermal Environmental Engineering**, Second Edition (Prentice Hall, 1970)
 YP Abbi and Shashank Jain: **Handbook on Energy Audit and Environment Management**, (TERIPress, 2006)
 WC Turner: **Energy Management Handbook**, Seventh Edition, (Fairmont Press Inc., 2007) George
 Polimeros: **Energy Cogeneration Handbook**, (Industrial Press, Inc., New York, 1981)

Websites:

National Productivity Council (<http://www.npcindia.gov.in/>) Bureau
 of Energy Efficiency (<https://www.beeindia.gov.in/>)
 Petroleum Conservation Research Association (<http://www.pcr.org/>) EA/EM Guide
 Books (<http://www.em-ea.org/>)

Additional information (if any): N. A.

Student responsibilities:

Attendance, feedback, discipline: as per university rules.

Course reviewers:

- 1) Mr RP Gokul, Head (Energy Efficiency Division), ICF International
- 2) Mr Amit Kumar, Sr. Director, TERI