

<b>Course title:</b> Energy conservation and management				
<b>Course code:</b> ENR 111		<b>No. of credits:</b> 2	<b>L-T-P:</b> 22-06-04	<b>Learning hours:</b> 32
<b>Pre-requisite course code and title (if any):</b> NA				
<b>Department:</b> Department of Energy and Environment				
<b>Course coordinator:</b> Dr. Sapan Thapar		<b>Course instructor(s):</b> Dr. Sapan Thapar		
<b>Contact details:</b> sapan.thapar@terisas.ac.in				
<b>Course type:</b> Core		<b>Course offered in:</b> Semester 1		
<b>Course description</b>				
Energy Management has been identified as a key instrument to reduce greenhouse gas emissions, besides increasing the cost competitiveness of the entity/ facility while enhancing the energy security of the nation. Policy makers and technology providers have been working towards the cause of energy efficiency and its overall management. This course is designed to educate students on the various dimensions of energy management across the entire value chain.				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>▪ To impart knowledge in the domain of energy conservation</li> <li>▪ To bring out Energy Conservation Potential and Business opportunities across different user segments under innovative business models</li> <li>▪ To inculcate knowledge and skills about assessing the energy efficiency of an entity/ establishment</li> </ul>				
<b>Course contents</b>				
Module	Topic	L	T	P
1	<b>Introduction to Energy Conservation</b>	4		
	Need for Energy Conservation Energy Sources, Supply & Demand Overview of Electrical and Thermal Energy			
2	<b>Policy &amp; Regulations for Energy Conservation</b>	4		
	Institutional Structure Energy Conservation Policies & Legislations National and International Programmes			
3	<b>Energy Conservation Opportunities – Electrical</b>	3		
	Buildings & Lighting Systems Motors, Pumps, Transformers Power Transmission & Distribution System			
4	<b>Energy Conservation Opportunities – Thermal</b>	3		
	Boilers, Furnaces & Waste Heat Recovery Systems Cogeneration Systems HVAC, Cooling Towers & DG Systems			
5	<b>Energy Data Analysis</b>	4		
	IT Tools and Applications Smart Energy Systems Industrial Use Cases			
6	<b>Business Approaches</b>	4	6	
	Market Opportunities EE Financing & ESCO Business Models Case studies on Innovations and Best Practices			
7	<b>Site Visit</b>			

	Power Distribution Utility Industry/ Building			4
		22	6	4
<b>Evaluation criteria</b>				
<ul style="list-style-type: none"> <li>▪ Assignments: 20%</li> <li>▪ Test 1 (Written): 20%</li> <li>▪ Test 2 (Written): 20%</li> <li>▪ Test 3 (Written + Presentation): 40%</li> </ul>				
<b>Learning outcomes</b>				
<ul style="list-style-type: none"> <li>▪ Obtain knowledge about energy conservation policy, regulations and business practices</li> <li>▪ Analyse energy systems from a supply and demand perspective</li> <li>▪ Recognize opportunities for enabling rational use of energy</li> <li>▪ Apply knowledge of Energy Conservation Opportunities in a range of contexts</li> <li>▪ Develop innovative energy efficiency solutions and demand management strategies</li> </ul>				
<b>Pedagogical approach</b>				
A combination of class-room interactions, group discussions, tutorials, assignments and site visits				
<b>Materials</b>				
<b>Text Books</b>				
LC Witte, PS Schmidt and DR Brown: <b>Industrial Energy Management and Utilization</b> (Hemisphere Publishing Corporation, Washington, 1998)				
<b>Reference Books</b>				
WC Turner and Steve Doty: <b>Energy Management Handbook</b> , Seventh Edition, (Fairmont Press Inc., 2007)				
Sumper Andreas and Baggini Angelo: <b>Electrical Energy Efficiency: Technologies and Applications</b> (John Wiley 2012)				
Frank Kreith: <b>Handbook on Energy Efficiency and Renewable Energy</b> (CRC Press, 2007)				
George Polimeros: <b>Energy Cogeneration Handbook</b> (Industrial Press, Inc., New York, 1981)				
<b>Websites</b>				
National Productivity Council ( <a href="http://www.npcindia.gov.in">http://www.npcindia.gov.in</a> )				
Bureau of Energy Efficiency ( <a href="https://www.beeindia.gov.in">https://www.beeindia.gov.in</a> )				
Petroleum Conservation Research Association ( <a href="http://www.pcra.org">http://www.pcra.org</a> )				
<b>Additional information (if any):</b> N.A.				
<b>Student responsibilities</b>				
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