



**Course Title:** Energy Assessment of Buildings

**Credit Units: 04**

	T	P/S	SW/FW	TOTAL CREDIT UNITS
<b>L</b>				
4	-	-	-	4

**Course Level:**UG

**Course Code:** CEE409

**Course Objectives: After successfully completing the course, students will be able to:**

Our built environment has a substantial impact on energy and material resources as well as being a critical determinant of health, comfort, and productivity for occupants. In response, there are numerous local, national, and international entities adopting green, sustainable criteria for new construction and renovations. This course approaches sustainable development for buildings by examining physiology required for human function (comfort, ergonomics, and respiratory requirements, as well as sensory perception) and then by considering how building components and systems affect human performance and well being

**Pre-requisites:** NIL

**Course Contents/Syllabus:**

	Weightage (%)
<b>Module I</b>	<b>20</b>
<b>Global Energy Scenario</b>  Role of energy in economic development and social transformation: Energy & GDP, GNP and its dynamics. Discovery of various energy sources: Energy Sources and Overall Energy demand and availability, Energy Consumption in various sectors and its changing pattern, Exponential increase in energy consumption and projected future demands. Indian Energy Scenario; Energy resources & Consumption: Commercial and noncommercial forms of energy	
<b>Module II</b>	<b>20</b>
<b>Energy Policy</b>  Global Energy Issues, National & State Level Energy Issues, National & State Energy Policy, Industrial Energy Policy, Energy Security, Energy Vision. Energy, Pricing & Impact of Global Variations, Energy Productivity (National & Sector wise productivity)	
<b>Module III</b>	<b>20</b>
<b>Energy Environment and Sustainable Development</b>  Energy sources: Introduction to nexus between Energy, Environment and Sustainable Development; Energy transformation from source to services; Energy sources, sun as the source of energy; biological processes; photosynthesis; food chains, classification of energy sources, quality and concentration of energy sources; fossil fuel reserves - estimates, duration; theory of renewability, renewable resources; overview of global/ India's energy scenario. Kyoto Protocol; Conference of Parties (COP); Clean Development Mechanism (CDM); Reducing Emissions from Deforestation and Degradation (REDD).	

<b>Module IV</b>	<b>20</b>
<b>Green Innovation and Sustainability</b> Criteria for choosing appropriate green energy Technologies, life cycle cost; the emerging trends – process/product innovation-, technological/ environmental leap-frogging; Eco/green technologies for addressing the problems of Water, Energy, Health, Agriculture and Biodiversity- WEHAB (eco-restoration/ phyto-remediation, ecological sanitation, renewable energy technologies, industrial ecology, agro ecology and other appropriate green technologies); design for sustainability (D4S).	
<b>Module V</b>	<b>20</b>
<b>Green Energy and Sustainable Development</b> The inseparable linkages of life supporting systems, biodiversity and ecosystem services and their implications for sustainable development; global warming; greenhouse gas emissions, impacts, mitigation and adaptation ; future energy Systems- clean/green energy technologies; International agreements/conventions on energy and sustainability - United Nations Framework Convention on Climate Change (UNFCCC); sustainable development;	

**Student Learning Outcomes:** The students will be able to:

1. Energy consumption in various sectors and its changing pattern globally
2. National and state level energy issues and policies
3. Linkage between energy, environment and sustainable development
4. Green building concept and sustainable development

**Pedagogy for Course Delivery:**

1. Class room teaching supported with presentation for enabling better understanding of the subject.
2. Application oriented assignments.
3. Class room lectures will be supplemented with field related examples.

**Assessment/ Examination Scheme:**

<b>Theory L/T (%)</b>	<b>Lab/Practical/Studio (%)</b>	<b>TOTAL</b>
<b>100</b>	<b>0</b>	<b>100</b>

**Theory Assessment (L&T):**

<b>Continuous Assessment/Internal Assessment</b>					<b>End Term Examination</b>
<b>Components (Drop down)</b>	<b>A</b>	<b>S/V/Q</b>	<b>CT</b>	<b>HA</b>	<b>EE</b>
<b>Weightage (%)</b>	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

## **Text and References**

- Energy and EnvironmentSet: Mathematics of Decision Making, Loulou, Richard; Waaub, Jean-Philippe;
- Zaccour, Georges (Eds.), 2005, XVIII, 282 p. ISBN: 978-0-387-25351-0
- Energy and the Environment, 2nd Edition, John Wiley, 2006, ISBN:9780471172482; Authors: Ristinen, Robert
- Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., Publisher: Wiley, Location: New York, 2006.
- Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.