Sustainable Building Technology

01CI0726

Objective of the Course:

- To gain an understanding of the fundamentals of green design and sustainable development.
- To determine different areas where green design solutions should be included in projects to improve the built environment.
- To become familiar with the official requirements for creating and certifying green designs.

Credit Earned: 03

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Demonstrate green concept skills and apply tools of green building assessment.
2. Analyze appropriate green building materials and techniques for specific construction projects.
3. Evaluate engineering principles for design and construction of green structures to enhance sustainability and efficiency.
4. Create detailed performance evaluation reports of buildings using IGBC, LEED, & GRIHA standards.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No	Topic name	Hours
1	**Introduction**	**10**
	1.1 Life Cycle impacts of materials and products, sustainable design concepts, strategies of Design for the Environment, The sun-earth relationship and the energy balance on the earth's surface, climate, wind, Solar radiation and solar temperature, Sun shading and solar radiation on surfaces.	06

	1.2 Energy impact on the shape and orientation of buildings, Thermal properties of building materials, Green building rating systems: LEED & GRIHA etc.	04
2	**Energy Efficient Buildings**	**12**
	2.1 Passive cooling and day lighting, Active solar and photovoltaic, Building energy analysis methods, Building energy simulation, Building energy efficiency standards.	06
	2.2 Lighting system design, Lighting economics and aesthetics, Impacts of lighting efficiency, Energy audit and energy targeting, Technological options for energy management.	06
3	**Water Conservation and Waste Water Management**	**08**
	3.1 Introduction to Water Conservation and Wastewater Management, Water Scarcity and Pollution: Global Challenges and Local Implications,	03
	3.2 Sustainable Building Design Principles and Water Efficiency, Greywater Recycling and Reuse in Buildings,	03
	3.3 Regulatory Frameworks and Policy Considerations for Sustainable Water Management, Societal Impact and Community Engagement in Water Conservation Initiatives	02
4	**Indian Green Building Council Guidelines**	**12**
	4.1 Introduction; IGBC green new building Rating system , Overview and process – project checklist; Sustainable architecture and design; Site selection and planning; Water conservation and energy efficiency; Building materials and resources; Indoor Environment quality; Innovation and development	08
	4.2 Net zero energy buildings, Net zero water buildings, Net zero waste to landfill rating system, Net zero carbon guidelines	04
	TOTAL	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	35%	25%	15%	10%	5%

Instructional Method and Pedagogy:

1 Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2 Lectures shall be conducted in class room using various teaching aids.
3 Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.

4 At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.

Recommended Study Material:

Reference Book:

1. Kibert, C. "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2005.
2. Edward G Pita, "An Energy Approach- Air-conditioning Principles and Systems", Pearson Education, 2003.
3. M.A.Quaddus & M.A.B.Siddique "Handbook of sustainable development Planning: Studies in Modelling and Decision Support", Edward Elgar, 2004.
4. Sam Kubba, "LEED Practices, Certification, and Accreditation Handbook, 2015, Elsevier
5. IGBC Green New Buildings Rating System (Version 3.0 with Addendum 5) September 2016

Web Links

- https://archive.nptel.ac.in/courses/105/102/105102195/
- https://onlinecourses.nptel.ac.in/noc19_ce40/preview