FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF

CIVIL ENGINEERING

Marwadi University Marwadi Chandarana Group NAAC A+

Sustainable Design Strategies

01CI0720

Objective of the Course:

- To analyze sustainability principles across various disciplines and apply them to everyday life.
- To evaluate global efforts and frameworks for tackling climate change and developing solutions.
- To design and assess built environments using scientific principles and sustainability rating tools.
- To apply UN SDGs and a systemic approach to analyze the environmental impact of built environments.

Credit Earned: 03

Prerequisite: Basics of Environmental Studies.

Student's learning outcomes:

After successful completion of the course, students will be able to,

1. Evaluate and apply sustainability across disciplines for real-world solutions.
2. Analyze global frameworks and design context-specific strategies for climate change mitigation.
3. Integrate scientific principles and sustainability tools to design efficiently built environments.
4. Use UN SDGs and systemic analysis to assess the environmental impact of buildings.

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: Sustainability in Industrial Design and Built Environments**	**06**
	1.1 Strategies for Sustainable Design – Introduction, Various Perspectives of Sustainability	3
	1.2 Spheres of Energy Efficient/Green/Environmental/Sustainable Designs	3
2	**ESE Aspects of Sustainability and Climate Change Mitigation**	**05**
	2.1 Environmental Sustainability, Social Sustainability and Economic Sustainability	2
	2.2 Climate Change Mitigation, Future of Human Habitation Design	3
3	**Current National and International Scenario of SD and Dependence on Energy**	**04**
	3.1 Relevance of Sustainable Design in Modern Context, Built Environment and Energy Consumption, Dependence of Building Design on Energy	2
	3.2 Current Indian and International Scenario of Sustainable Design	2
4	**Alternative Solutions for Health of Ecosystem**	**06**
	4.1 Designing Strategically for Preventing pollution: Air, Water, Soil, Noise, Light Radiation, etc., Low Environmental Impact	3
	4.2 Thinking for Alternatives through Systemic Design, Consumption and Commercial Lifestyle	3
5	**EIA, Policy, Lifecycle Analysis, Growth, Development and 3R's for Consumption**	**10**
	5.1 Environmental impact Assessment, Lifecycle Analysis, Life Cycle Assessment – Detailed Methodology and ISO Framework (Detailed Example on LCA Comparisons, LCA Benefits and Drawbacks, Historical Development and LCA Steps from ISO Framework)	5
	5.2 Growth and Development in Construction and Allied Sectors, Policy Push in Real Estate and Manufacturing Sectors, Policy Push for Development of the Low Economic Regions	3
	5.3 Sustainable Building Materials, Reduce/Reuse/Recycle	2
6	**NBC, ECBC, GRIHA, UN SDG and System Design tools such as SPSS, MSDS by LeNS**	**04**
	6.1 National Building Code 2016 - Part 11 and Energy Conservation Building Code, Guidelines for Building Design by SA Methods: GRIHA	2
	6.2 UN SDG for Sustainable Development, LeNS Design Method, and Tools such as SPSS, MSDS, DE, International Conventions, Laws and Emerging Technologies for SD	2
7	**Vernacular and Responsive Design**	**04**
	7.1 Vernacular Design Case Example, Climate Responsiveness	2

	7.2 Need for Innovation in Design Process, Design for Net-Zero Energy, Lighting, Ventilation, Views and Human Comfort	2
8	**Design for Sustainability and Nature as Inspiration**	**03**
	D4S with Inspiration from Nature, D4S for Optimization of Manufacturing, Strategies for Sustainable Design	3
	TOTAL	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as 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
5%	10%	30%	30%	15%	10%

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 the classroom 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

1. Rottle, Nancy., Yocom, Ken., Ecological Design, AVA Book, Switzerland. 2010
2. Tischner, Ursula, Eivind Sto, Unni Kjaernes, and Arnold Tukker, eds.System Innovation for Sustainability 3: Case Studies in Sustainable Consumption and Production - Food and Agriculture. Greenleaf Publishing,2009
3. Benyus, Janine M. Biomimicry: Innovation Inspired by Nature. William Morrow Paperbacks,2002
4. C. Vezzoli and E. Manzini, Design for Environmental Sustainbility, Springer – Verlag, London 2008.
5. A. Tukker and U. Tischner (eds.), New Business for Old Europe, Product Services, Sustainability and Competitiveness, Greenleaf Publishing, Shefield, 2008

Web Links

https://onlinecourses.nptel.ac.in/noc24_de01/preview
https://onlinecourses.swayam2.ac.in/aic19_ge05/preview