



## School of Planning and Architecture: Vijayawada

(An institution of National Importance under the Ministry of Education, Govt. of India)

Survey No.4/4, ITI Road, Vijayawada-520008, Andhra Pradesh, India

### Department of Architecture

<b>Course: M.Arch.(SA)</b>	<b>Subject Code:</b> MSAR123 <b>Name - Smart Materials for Green Buildings</b>	<b>Class:</b> 1 <sup>st</sup> Year M.Arch.(SA) II Sem A.Y. 2023-24
<b>Instructors:</b>	Subject Instructors - <b>Dr. Amitava Sarkar</b>	<b>Internal Assessment:</b> 50 <b>End Semester Theory Exam:</b> 50
<b>Contact Periods/ week:</b> 03 periods (55 min each)		<b>Total Marks:</b> 100
<b>Time Table:</b>	Wednesday	<b>Credits:</b> 3
<b>Attendance:</b> Min 75%	<b>Min. Passing Marks:</b> As per the Academic Ordinances for PG Courses	

**Objective-** To educate the student with state-of-art smart materials available for green buildings.

		<u>LECTURE PLAN</u>	
S.NO	DATE	TOPIC OF CLASS LECTURE & DISCUSSION	REMARKS
1	Week-1 (10 <sup>th</sup> Jan, 2024)	Introduction to sustainable building materials, qualities, use, examples	Lecture and Discussion
2	Week-2 (17 <sup>th</sup> Jan, 2024)	Natural building materials, locally available and locally manufactured materials, bio materials	Lecture and Discussion
3	Week-3 (24 <sup>th</sup> Jan, 2024)	Salvaged and recycled materials - Nontoxic materials: low VOC paints, coating and adhesives.	Lecture and Discussion
4	Week-4 (31 <sup>st</sup> Jan, 2024)	Alternative construction techniques such as SMB, CSEB, and steam cured blocks, composite beam and panel, etc.	Assignment-1 Presentation
5	Week 5 (7 <sup>th</sup> Feb, 2024)	Funicular shells, filler slabs, reinforced concrete masonry, vaulted roofs, ferrocement walls etc.	Lecture and Discussion
6	Week-6 (10 <sup>th</sup> - 18 <sup>th</sup> Feb, 2024)	<b>Study Tour</b>	
7	Week-7 (21 <sup>st</sup> Feb, 2024)	Idea of embodied energy - Development of the concept, factors to be considered, calculation techniques for embodied energy	Lecture and Discussion
8	Week-8 (26 <sup>th</sup> Feb - 1 <sup>st</sup> March, 2024)	<b>Mid-Sem Assessment</b>	Written Exam/ Assignments
9	Week-9 (6 <sup>th</sup> March, 2024)	Data sets available for calculation of embodied energy - Case studies of embodied energy calculations - Sample embodied energy calculations for a material.	Lecture and Discussion
10	Week-10 (13 <sup>th</sup> March, 2024)	Concept of embodied carbon or carbon footprint of material, calculation	Assignment-2 Discussion

		techniques. Assignment-2	
11	Week-11 (20 <sup>th</sup> March, 2024)	Methods to off-set high embodied energy - Cradle to cradle material; Whole life cycle and life cycle costing analysis techniques.	Lecture and Discussion
12	Week-12 (27 <sup>th</sup> March, 2024)	Use of waste materials such as paper, glass bottles, tires, shipping containers	Lecture and Discussion
13	Week-13 (3 <sup>rd</sup> April, 2024)	Use of postconsumer and industrial waste such as fly-ash, bags, building demolition waste	Lecture and Discussion
14	Week-14 (10 <sup>th</sup> April, 2024)	Use of salvaged materials from flooring, columns, beams, timber, glass, etc. - appropriate Case studies for all.	Lecture and Discussion
15	Week-15 (17 <sup>th</sup> April, 2024)	Appropriate Case Studies. Assignment-II presentation	Presentation

**Outcome:** Students shall learn the appropriate materials based on climate, availability and sustainability that are relevant for green rating system.

S. No.	Stages of Evaluation	Weightage
1	First stage: Assessment -1	15
2	Second stage: Mid-semester Examination	20
3	Third stage: Assessment -3	15
	Total	50

**References:**

1. Sustainable Building - Design Manual Pt 1 & 2, The Energy and Resources Institute, TERI, 2004.
2. Ross Spiegel G., Green Building Materials A Guide to Product Selection and Specification, 3rd Edition by, John Wiley & Sons, 2010.
3. Jagadish. K.S. Alternative Building Materials and Technologies, New age International Pvt Ltd Publishers, 2008.
4. Traci Rose Rider, Stacy Glass, Jessica McNaughton, Understanding Green Building Materials, W.W. Norton and Company, 2011.
5. Johan van Lengen, The Barefoot Architect: A Handbook for Green Building, Shelter Publication, 2008.

**Course Instructors:**

**Sd/-**

(Dr. Amitava Sarkar)

**Head of Department**