



School of Planning and Architecture: Vijayawada

(An institution of National Importance under the Ministry of Human Resource Development, Govt. of India)
Survey No.4/4, ITI Road, Vijayawada-520008, Andhra Pradesh, India

Department of Architecture

Course: AR326, Energy Efficient Architecture

Instructors: Karthik.Ch & Dr J Gupta

Class: IIIrd Yr B. Arch VI Sem A.Y. 2023-24

Internal Assessment: 50

External Theory Exam: 50

Total Marks: 100

Credits: 3

Contact Periods/ week: 03 periods

Time Table: Tuesday (Section-B)

Attendance: Min 75%

Min. Passing Marks: 50% each in Internal & External Assessment, 50% in Aggregate

Objective:

To make students familiar with energy efficiency in the built form, energy auditing, energy modeling, thermal performance of building materials, embodied energy and Green Buildings.

Out Line of the Course:

Energy & Buildings: An Overview, Energy Audit & Energy Modeling, Thermal performance of building materials, Commonly used passive design strategies in buildings, Active techniques using renewable resources

LECTURE PLAN

WEEK	DATE	TOPIC OF CLASS LECTURE & DISCUSSION	Remarks
1	Week-1	Introduction to the subject UNIT-1: Energy & Buildings: An overview Global Energy Issues, Energy use in construction sector in India, Energy and built Environment-An appraisal.	Theory class
2	Week-2	UNIT-1: Energy & Buildings: An overview Global Energy Issues, Energy use in construction sector in India, Energy and built Environment-An appraisal.	Theory class
3	Week-3	UNIT-1: Energy & Buildings: An overview Global Energy Issues, Energy use in construction sector in India, Energy and built Environment-An appraisal.	Theory class
4	Week-4	UNIT-1: Energy & Buildings: An overview Introduction to Energy Conservation Building Codes, Energy Conservation Act-2001, Bureau of Energy Efficiency, Star rating of Buildings, Equipment & Appliances.	Theory class
5	Week-5	UNIT-1: Energy & Buildings: An overview Introduction to Energy Conservation Building Codes, Energy Conservation Act-2001, Bureau of Energy Efficiency, Star rating of Buildings, Equipment & Appliances.	Theory class
6	Week-6	Unit IV Commonly used Passive Design Strategies in buildings Introduction to passive strategies in Architecture	Theory class
7	Week-7	Unit IV Commonly used Passive Design Strategies in buildings Thermal Mass, Wind Towers, Passive Down draught evaporative cooling, solar chimneys	Assignment-1 Identification of Green/Energy Efficient buildings in Indian Context and different parametres for choosing the case study
8	Week-8	Unit IV Commonly used Passive Design Strategies in buildings solar chimneys, Day lighting Strategies, thrombi walls, Thermal Insulation	Theory class
9	Week-9	Unit IV Commonly used Passive Design Strategies in buildings Thermal Insulation, Filler slabs, Rat-trap bonds etc	Theory class
10	Week-10	Unit IV Commonly used Passive Design Strategies in buildings Thermal Insulation, Filler slabs, Rat-trap bonds etc	Theory class

11	Week-11	Unit IV Commonly used Passive Design Strategies in buildings Thermal Insulation, Filler slabs, Rat-trap bonds, down cost passive design techniques.	Theory class
12	Week-12	Mid-semester examination	

13	Week-13	Unit II Energy Audit & Energy Modeling What is an Energy Audit, Methods and Need for Energy Audits of buildings	Theory class
14	Week-14	Unit II Energy Audit & Energy Modeling Energy models, software's used for Energy Modeling.	Theory class
15	Week-15	Unit III Thermal Performance of building materials Embodied Energy, Thermal properties of building materials, Thermal Performance of commonly used building materials, Thermal transmittance, Some Simple Numericals related to same	Theory class
16	Week-16	Unit III Thermal Performance of building materials Thermal conductivity, Thermal resistance, Thermal capacity & Thermal Insulation, concept of Net-Zero building, Visual & Thermal Comfort-basic principles.	Assignment-III Presentation of Detailed Case study on the Identified Green/Energy Efficient Buildings
17	Week-17	Unit V Active techniques using Renewable Resources Active solar Heating , Solar reflectors, Solar ponds,	Theory class
18	Week-18	Unit V Active techniques using Renewable Resources Solariums, Wind-Generated energy, Hydel Energy, Bio-gas and geothermal energy sources.	Theory class
19	Week-19	Presentations of Assignments & End of classwork	Offline Theory class

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. "Renewable Energy Sources and Their Environmental Impact", Shahid A. Abbasi, Naseema Abbasi; PHI Learning Pvt. Ltd., 2004
2. "Energy efficient buildings: Architecture, Engineering and Environment", Dean Hawkes, Wayne Forster; W.W. Norton & Company, 2002
3. Indian Energy Conservation Act 2001, Gol
4. Energy Conservation Building Code Manual, Gol
5. "GRIHA Manuals", The Energy and Resources Institute (TERI), 2011
6. "Energy-efficient Buildings in India", The Energy and Resources Institute (TERI), 2011
7. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
8. Arvind Krishnan et al, Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, McGraw Hill Education; 1st edition 2017.
9. Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.
10. Givoni .B, "Passive and Low Energy Cooling of Building", Van Nostrand Reinhold, New York, 1994.
11. Fuller Moore, "Environmental Control Systems", McGraw Hill INC, New Delhi-1993.
12. Sophia and Stefan Behling, Sol power, "The Evolution of Solar Architecture", Prestel, New York, 1996.
13. Patrick Waterfield, "The Energy Efficient Home: A Complete Guide", Crowood press Ltd, 2011.
14. Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering and Environment", W.W. Norton & Company, 2002.
15. David Johnson, Scott Gibson, "Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction", Taunton Press, 2008.
16. Gupta, J., Housing, Climate and Comfort published by Nolegein, An Imprint of E-Learning Consortium, under 'Centre for Construction and Architectural Excellence (CCEA). (Journal Pub), May 2022, ISBN: 978-93-87376-56-4

Karthik Chadalavada, Dr J Gupta

Source Instructors:

sd/-

Dr. Uma sankar Basina

Head of Department:

sd/-