



SUSTAINABLE MATERIALS AND GREEN BUILDINGS

PROF. B BHATTACHARJEE

Department of Civil Engineering
IIT Delhi

TYPE OF COURSE : New | Elective | PG/UG

COURSE DURATION : 12 weeks (29 Jul'19 - 18 Oct'19)

EXAM DATE : 16 Nov 2019

PRE-REQUISITES : BE/BSc. Level Physics & Mathematics

INTENDED AUDIENCE : Civil Engineering & Architecture students and professionals

INDUSTRIES APPLICABLE TO : All Industry involved in Building design and construction.

L&T,MES,CPWD

COURSE OUTLINE :

The objective of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water. VOC and indoor air quality. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV. The course also intend to make student aware of ECBC, LEED, GRIHA etc

ABOUT INSTRUCTOR :

Professor Bishwajit Bhattacharjee is working with the Department of Civil Engineering, Indian Institute of Technology, Delhi. He completed his PhD from IIT Delhi. His research interests pertain to the domains of Building science, Sustainable construction, Concrete technology, and Health monitoring of structures etc. His publications in these areas are well cited. He is also a recipient of the Indian Concrete Institute's Life Time Achievement Award.

COURSE PLAN :

Week 1 : Introduction

Week 2 : Embodied energy, Operational energy in Building and Life cycle energy. Ecological foot print, Bio-capacity and calculation of planet equivalent

Week 3 : Role of Material:Carbon from Cement,alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete

Week 4: Role of quality, minimization of natural resource utilization, High volume fly ash concrete, geo-polymer concrete etc. concrete with alternative material for sustainability'

Week 5: Reduction in water consumption in concrete, Recycled aggregate, Energy for grinding crushing of cement aggregate etc. and reduction.Operational energy in building role of materials and thermal conductivity

Week 6: Clay Bricks, Types kilns, Comparative energy performance emission performance and financial performance, Indoor air quality

Week 7: Paints,Adhesive and sealants for use in building,Volatile organic content (VOC) emission issues and indoor air quality for Sustainability and Health hazard

Week 8: Operational energy reduction and net zero building,Optimization for design of building for energy efficiency and example of optimization through use of Evolutionary genetic algorithm

Week 9: Radiation budget,Surface water balance, Effects of trees and microclimatic modification through greening,

Week 10:Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts and efficiency

Week 11: Energy codes ECBC requirement, Concepts of OTTV etc

Week 12: Green Performance rating, requirements of LEED, GRIHA etc.