



Energy Efficiency, Acoustics and daylighting in Building Civil Engineering

Instructor Name: Prof. B. Bhattacharjee

Institute: IIT Delhi

Department: Civil Engineering

About Instructor: B.Bhattacharjee, B.Tech(IIT KGP:1978), M.Tech. (IIT D:1982) and Ph.D. (IITD:1990)
Field Experience: M/s Gammon India Limited:1978-80. Professor Bishwajit Bhattacharjee is working with the Department of Civil Engineering, Indian Institute of Technology Delhi, New Delhi (India). 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. He has been teaching a similar course in IITD for last 31 years (Building Science[3-0-0])

Pre Requisites: : BE/BSc. Level Physics & Mathematics

Core/Elective: : Core_Elective

UG/PG: : Both

Industry Support : All Industry involved in Building design and construction. L&T, TERI etc. CPWD and all other PWDs. Dr. Fixit Institute

Course Intro: : The objectives of this course is to expose the students to the concepts functional design of building for thermal aspects and energy efficiency; especially in tropical climates i.e. in Indian context. Further objective is to make the student capable of performing fenestration design for natural ventilation and daylighting & design of space for external and internal noise control.

COURSE PLAN

SL.NO	Week	Module Name
1	1	Environmental Factors: Factors and their representation, tropical environments and site environments, etc.
2	2	Human response to environment: Factors affecting human comfort, Human response to thermal environment, noise, visual environment etc.; Comfort indices
3	3	Response of building to thermal environment: Processes of heat exchange of building with environment; Effect of solar radiation; Thermal properties of material and sections and their influence
4	4	Steady and periodic heat transfer in buildings
5	5	Heat flow computations: Transmission matrix, Admittance method, etc.-1
6	6	Heat flow computations: Transmission matrix, Admittance method, etc.-2



7	7	Structural control and design for energy efficiency: Selection of envelope elements, Orientations, shape, Glasses and shading devices
8	8	Natural ventilation: Purpose of ventilation, Mechanisms, Fenestration Design for natural ventilation
9	9	Noise and Building: Basic acoustics and noise, Planning, Sound in free field, protection against external noise.
10	10	Internal noise sources and protection against air borne & structure borne noise.
11	11	Day lighting: Lighting principles and fundamentals
12	12	Sky, Indian sky, daylight prediction and design of fenestration.