

**Course objectives:**

- To analyse the energy use in buildings
- Develop integrated net-zero-energy concept for buildings
- Identification of sustainability challenges in building adaptations
- Translate design concepts into solutions for sustainable building adaptation.

Energy in the built environment, Introduction to zero energy Design, Analysis of building energy consumption. Reduction in energy consumption: Passive measures, Analysis of local climate, Influence of climate on vernacular architecture and the energy performance of buildings. Selection of passive measures –thermal insulation, shading devices. Overview of active measures to reduce energy demand-demand controlled cooling/heating and ventilation. Overview of the opportunities to reuse energy flows in buildings-heat/energy recovery from ventilation air and waste water. Overview of the opportunities to produce heat and electricity in the building – PV systems, ground source pumps .Integration of various zero-energy concepts.

Building adaption –the sustainability and managerial challenges involved, the cyclical development process of real estate, and need for management tools. Urban Development Management, dealing with contextual issues for building adaptation-sustainability policies. Adaptive Reuse Management, re-design concepts, highest-and-best-use proposals, and financial viability of transformation. Introduction to construction and project management, dealing with realizing adaptation plans, making use of organizational structures and smart planning methods. Housing transformation management-asset management, maintenance and operations, user preferences, and energy efficiency measures.

**References:**

1. Steve Doty and Wayne C, Turner, “Energy Management Handbook”, Fairmont Press, 2012.
2. Dejan Mumovic and Mat Santamouris (Ed), “A Handbook of sustainable Building Design and Engineering”, Earthscan Publishing, 2009.
3. Wilkinson, S.J., Remoy, H. and Langston, G., “Sustainable Building Adaption: Innovations in Decision-making”, Oxford, UK: Wiley Blackwell, 2014.
4. Chanter B and Swallow P, “Building Maintenance Management”, Black well Publishing, 2007.