

The Living Building: Principles and Practices of Making a Habitable Environment

Course Description

We shape space and create environments to fulfill many essential human functions, including expression of culture, self, power and the spiritual. However, we also shape our environment to provide essential physiologic regulation for comfort, enjoyment, productivity and well-being. Human-made environments, such as buildings, can act as an extension of our body's regulatory mechanisms and mediate the challenges of the natural and developed world.

In the developed world, we now spend more than 90% of our lives and 40% of the total energy we consume in buildings; therefore, decisions we make about how these environments are designed, constructed and operated have significant implications for our own health, and for the health of our planet. Our built environment has evolved to be highly engineered, segregated from natural systems in which our ancestors evolved, and even virtual. Since our human biology has not evolved as quickly as built environments, our human biology often responds poorly to these modern environments; however, buildings are rich ecosystems that are shaped by humans through architectural design decisions, occupancy and operation. Therefore, designers need to holistically consider how to make energy conscious "living buildings" that connect us to an evolutionary past and not just consume but provide.

Scope

This course will introduce fundamental environmental control design concepts and strategies that consider climate, human occupant and energy when planning in schematic architectural design. Solutions that are holistic, appropriate to site, and provide for the health and performance of the human occupant, including passive and active (mechanical) systems will be covered. Primary topics will include environmental thermal and ventilation control of buildings with a focus on energy use, conservation, human thermal response, prevailing codes and standards, renewable energy, indoor circulation systems, measurement and verification, and the tools needed to understand an ecological approach to design. The course will be facilitated by instrumentation from the Energy Studies in Buildings Laboratory.

Objectives

This course is intended to develop a basic understanding of climate and building environmental strategies that employ climate as a resource in providing local adaptation to make habitable human space and living building ecosystems. Students will learn to develop a dialog between building form, function and human occupant physiologic regulation. Students will also develop an understanding of the trade-offs between active mechanical and passive control strategies and be able to make early design decisions regarding the appropriateness of each using a set of tools to investigate. Furthermore, students will learn to consider energy and carbon consequences due to design decisions and understand how to design for carbon neutrality, passive design and renewable energy.

Outcomes

The course is intended to introduce the designer to concepts in providing habitable built environments while considering direct and indirect effects of decisions implemented by the designer at early design stages. Systems will be introduced that will allow the designer to communicate with the client, other members of the design team and project collaborators through an understanding of basic terminology, measurement units, appropriateness of various systems, basic selection, integration and project coordination.