Forest – Fiber – Frame

The environmental, economic, and energetic imperatives of the global climate emergency have enabled – even demanded – a renewed interest in timber building. We can welcome this growing enthusiasm, but it is no longer sufficient to make broad claims about carbon and sustainability without situating them in a larger framework of environmental management. To that end, this year-long research and design studio takes a comprehensive view of wood construction as a material practice that extends from silviculture and forest management to manufacturing, construction and waste reclamation. In keeping with UC Berkeley's mission to serve the state, the course centers around issues that are especially pertinent to California, but the conditions and methods under consideration are broadly applicable to a wide range of places and institutions throughout the world.

Recent events across North America have brought attention to the destructive impacts of wildfires and helped to push forest management to the top of many state and federal agendas. In California, the problem is especially urgent. Seven of the state's largest fires have occurred in the last five years, claiming more than 7 million acres, thousands of buildings, and dozens of lives. These events are not only tragic for those immediately affected, but also detrimental to environmental efforts on a global scale. Recent analyses estimate that the carbon dioxide emissions released during only two years of California fires may have negated 17 years of emission reductions statewide.

For some design professionals, it is possible to engage directly with this predicament. Landscape architects, urban designers and city planners are actively working with vulnerable and affected communities to devise strategies for mitigation and risk management. But for architects, the most important connections between forest and building are often less evident. To expand and reframe this relationship, this course takes a wider view of wood, fire and construction.

After decades of fire suppression and limited harvest, a growing consensus has emerged around the need to reduce forest stocks in California to mitigate the destructive potential of future fires. Many scientists and agency officials now advocate for active forest management via prescribed burning and aggressive thinning in order to remove woody biomass and reduce the scale of uncontrolled fires. However, a decades long decline of the state's wood building industry has left forest owners with few options for processing and utilizing the trees that they cut. Despite state-wide efforts to reduce carbon emissions, burning wood (in forests, in fireplaces and as bio-fuel) remains the most viable option for many landowners.

A far preferable method of reducing biomass is to transform trees into building products, storing the carbon that they have sequestered into durable goods that will continue to support the state's growing population. However, current practices in construction make this difficult. Cutting and removing trees comes at substantial cost, and the species, scale and quality of logs cut from thinning operations makes them difficult to process in large-scale mills. As a result, it remains more cost effective to ship wood into California than it does to make use of the state's own resources.

This course frames the current situation as both a supply-chain problem and a design opportunity. Understanding architecture as a fundamentally material practice, we will reconsider how wood processes and structures and systems of assembly can support a reciprocal relationship between

forest management and building design. In the research phase, we will take advantage of UC Berkeley Forests to bring students to sites undergoing active management in order to learn more about the processes and equipment used in thinning operations as well as large scale removals and clear cuts. With support from faculty in the Rausser College of Natural Resources and the Berkeley Wood Lab, students will be introduced to processes of logging, milling and peeling in order to understand the qualities and production pipelines that support wood structures and systems. Alongside site visits and workshops, students will develop reports on current issues and challenges in California's wood industry, from species and growth projections to supply chains and re-use efforts.

Students will develop a collective body of research and knowledge through a progressive sequence of exercises, analyses and experiments. Focusing on physical studies and full-scale constructions they will design, develop and test novel techniques and materials to gain concrete knowledge of various species, processes and techniques, as well as a critical understanding of building materials as participants in biological, social and cultural networks.

Materials and Methods (Weeks 1-8)

The first portion of the studio examines wood at the scale of the individual, studying its specific material and aesthetic properties. We will investigate the physical, structural and sensory potentials of different types of wood and wood-based materials through an examination of local/regional species and products. We will evaluate how and why various materials differ in size, color, hardness, grain and strength then consider how these variations influence their use and value. A central question of these introductory studies will be how material *properties* are translated into experiential *qualities* through tooling, treatment and constructive technique.

Spaces and Structures (Weeks 9-14)

The second portion of the studio will examine wood at the scale of the building, studying the ways that different systems and techniques of building influence form and space. We will consider how vary strategies of assembly (ie. stacking, folding, rolling, layering, grouping, scattering) can be used to structure and enclose space, independent of a given building program.

Buildings and Types (Weeks 15-19)

Building on the studies of space and structure, we will consider a wide range of typologies applicable to various strategies of building. From data centers and storage facilities to housing and public facilities, we will investigate the essential features of form, site, span, circulation and environmental control that define various building types in order to identify the those that are be best suited to current and future needs of the wood building ecosystem.

Assemblies and Details (Weeks 20-22)

Working within a particular building type, students will identify connections, components and strategies of assembly for a prototypical building on a particular site.

Fabrication and Construction (Weeks 23-28)

In the final portion of the course, students will concentrate on the detailed design and construction of full-size prototypes that illustrate the potential of one formal/structural method developed in their previous studies.

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