Structure, Space and Order in Contemporary Architecture

In this advanced seminar we will consider the relationship between structure, space and form in modern architecture, from the middle of the 19th century to the present day. We will begin our investigations by looking at how changes in materials, fabrication and assembly processes, and ideas about architecture in the industrial revolution began to transform the way structure was used in buildings. Our study will be broad-based and will include consideration of:

- Attitudes towards structure in early modernism, functionalism, rationalism, and the Bauhaus.
- The influence of innovations in the design of bridges and tall buildings.
- The possibilities afforded by the use of reinforced and pre-stressed concrete: the plastic forms of Le Corbusier and Saarinen, the cantilevers of Wright, others.
- The thin concrete shells of Torroja, Dieste, Candela and Isler.
- Frei Otto and his experimental work at the Institute for Lightweight Structures.
- The funicular forms Gaudi, Maillart, Meno, Calatrava, Schlaich and others.
- More recent innovations in the use of tension and membrane structures.
- High tech modernism and the influence of Peter Rice, Anthony Hunt, Bruno Happold and others.
- The impact of late 20th and early 21st century technology (new methods of analysis, new materials, developments in fabrication, design computing)
- Recent innovations in structural optimization, form-finding, morphogenesis, biomimicry, parametric modeling, and genetic algorithms, including the work of Cecil Balmond and the Advanced Geometry group at Arup, the Specialist Modeling Group at Foster and Partners, and others.

Our goal is to develop understandings of the role of structure in architecture as a design determinant, constraint, and opportunity. While responding to the imperatives of support, span and brace, how does structure fill space and how does space fill structure? How do architectural and engineering design processes interact? How is force distribution related to form? How does structure create and define volumes of space and interact with light? What is the relationship of structure to enclosure? How fundamental is structure to the order of buildings and to architectural expression?

This seminar will require active participation and recurring in-class presentations. Prerequisites: completion of ARCH 4/561 and 4/562 or consent of the instructor.