Columbia University - Graduate School of Architecture, Planning and Preservation

AT3 Architectural Technology 3 – Advanced Structures – A4113

Time: Fall Semester 2012, Thursdays 10am – 1pm

Location: Avery Hall, room 114

Credits:

Instructor: Will Laufs (W.Laufs@LaufsED.com and wl2249@columbia.edu)

Office Hours: by appointment

TA: to be announced

Course Overview

Structural Design as an essential part of architectural design accentuates both necessity and understanding of force flow concepts within a structure as well as esthetic structural opportunity to support the artistic overall design intend of an architectural process.

The course 'Architectural Technology AT3' covers an advanced- level study of structures and structural systems at building scale to teach a sound structural understanding of systems and principles as supportive technical knowledge for architecture students early in the design process, yet establishes more unusual, complex three- dimensional ways to form and support spaces.

After a brief revision of loading, more conventional structural systems, force-flow, boundary conditions, material stresses and deflections, the class focuses on advanced structures that go beyond the use of two-dimensional elements such as beams or columns, hence broadening tools to handle load- transfer through structures differently, such as cable-stayed & suspension structures, tensegrity systems, syn-clastic pneumatic structures carried by air and anti-clastic tensile fabric membrane structures.

The general concept of folded structures, transparent glazed envelopes and arches are presented as well as shell structures, domes and space frames. Classes will be composed of theory lectures accompanied by practical examples and visual diagrams, followed by related contemporary case studies of outstanding recent architectural projects that illustrate each topic. Guest speakers will be invited at the end of certain lectures to have a controversial, fruitful discussion of their projects from a structural point of view. Integrated student presentations of selective assignments will be included as well as related engineering software demonstrations and profiles of outstanding pioneering architects and engineers.

Educational Objectives

The goal of this course is to enable students to understand the available variety of structural systems and how they can be applied to support their architectural designs, visualize the force- flow through building volumes as an opportunity to use new materials and software as an available part of their technology tool box in design.

The teaching material will enable the student to establish suitable structural systems for various Architectural building types and artistic visions, based on fundamental principles and contemporary case study examples that go beyond well- known standard systems and allow room for plurality. Expression and placement of structure shall be understood not as a distant necessity during construction and building approval process, but as a rich opportunity to develop integrated design solutions, where structural members underline the overall expression of architectural context.