COURSE DESCRIPTION

A   GENERAL
1.   Course: Architecture 513, 4 units
2.   Title: Advanced Structures
3.   Class meetings: One three hour seminar per week
4.   Student hours: 12 hours per week, including class time

B   OBJECTIVES
To develope informed intuition for structures, their response to natural forces (gravity, seismic, thermal, wind) and interaction with other design issues. To identify strategies for structure system selection, design development, optimization and system integration. Identify research topics and research methodologies.

C   SUBJECT MATTER
Study of building structures with emphasis on integration with other building systems; fit and synergy of form and structure. The study of loads acting on structures, gravity and lateral loads and load path, response of structures to loads. Study of computer aided design and analysis and static simulation models.
Handouts and past projects are posted on the web - *http://www.usc.edu/structures* **- bring handouts to class**

D   TEACHING METHODS
Weekly lecture presentations and reading assignments on building material, systems and components, structural behavior, design integration and optimization. Assigned reading, seminar discussions, computer workshops, lab model testing, field trips.

E   BASIS FOR COURSE GRADE
Assigned projects: 60%; class participation: 40%

Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to your professor during the first 3 weeks of each semester.   DSP is located in STU 301 and is open 8:30 am to 5:00 pm, Monday through Friday. The DSP phone is 213-740-0776.

F   READING LIST
Schierle (2006) *Structures in Architecture*
AISC (1991) *Manual of Steel Construction*, American Institute of Steel Construction *
Arnold/ Reitherman (1982) *Building Configuration and Seismic Design,* Wiley
Borrego (1968) *Space Grid Structures*, MIT Press
Davies (1988) *High Tech Architecture*, Rizzoli
Donin (1982) *Renzo Piano, Piece by Piece*, Casa del Libro Editrice
Engel (1987) *Structure Systems*, Praeger Publishers
Huxtable (1960) *Pier Luigi Nervi*, Brazillier
IBC (2003) *International Building Code*, International Code Council *
Lin (1988) *Structural Concepts & Systems for Architects & Engineers*, Van Nostrand
Natterer,et al (1989) *Timber Design and Construction Handbook*, McGraw Hill
Schierle (1968) *Lightweight Tension Structures*, UCB
Schueller (1983) *Horizontal Span Structures*, Wiley

* Reference books

G   SEMINAR OUTLINE

August
Tu 28   Seminar objectives, teaching method, and expected results.
Synergy of form and structure: historic and significant contemporary examples, structural and formal correlation; integration with architectural design objectives.

September
Tu 4   Selection criteria for structure systems: fit of structure and program morphology, resources, economy, technology, load. Introduction of static simulation models

Tu 11   Horizontal span systems: one and two-way systems; beam and girder, *Gerber* beam, *Vierendeel* girder, truss, space truss, tree, arch, dome, vault, hp shell, rotational, cylindrical and free-form shell, folded plate, cable-stayed systems

Tu 18   Tensile structures: suspension system, cable truss, anticlastic membrane and cable net, grid shell, pneumatic structure
Introduction of *Multiframe* computer program in **SAL 126**

Tu 25   Case Study review

October
Tu 2   Design and analysis of arch, vault, dome

Tu 9   Design and analysis of suspension structures

Tu 16   Design and analysis of anticlastic membranes

Tu 23   Design and analysis of truss structures

Tu 30   Design and analysis of cable truss, stayed and propped structures

November
Tu 6   Design and analysis of Vierendeel and shell structures

Tu 13   Term project review

Tu 20   Field trip to construction sites

Tu 27   Seismic Design and Seismic Failure

December
Tu 4   Term project review

Tu 11   Term Project Final Review