

ARCH 518:

Advanced Surface
Tectonics



Douglas Noble, FAIA, Ph.D.
dnoble@usc.edu

Jefrey C. Vaglio, Ph.D., PE, AIA
jvaglio@enclos.com

Chase L. Leavitt
Graduate Building Science

School of Architecture
University of Southern California

ADVANCED SURFACE TECTONICS: The Building Envelope

Syllabus

Tuesdays 11:00am – 12:20pm, Harris 101

Introduction and Purposes

The performance of the building envelope will be critical in defining building performance in the coming century. The building envelope mitigates outdoor conditions and indoor comfort, managing limited resources and meeting performance objectives in the face of climate stresses and the evolving context of indeterminacy and uncertainty. Climate change threatens existing envelopes that were designed in response to historical conditions. The need for substantial energy use reductions is already transforming this generation of building skins and further research is necessary to accelerate this process. The design of building envelopes will be uniquely interdisciplinary, integrating new types of expertise into the professional design process. High-Performance envelopes will significantly increase expectations for facade energy and daylighting performance and will require accurate analytical tools and processes for performance prediction. Active, responsive, intelligent skins could improve performance in the face of natural and man-made disasters. Architects are designing increasingly complex building skins using new materials and processes that were not imaginable just a few years ago. This course is intended to provide a solid foundation of building envelope design issues while exposing students to a set of some of the most advanced building skins today.

Sample Lectures

- Performative Aesthetics
- Glass Material Technologies
- Structural Glass Facades
- Structures in Tension
- Double-Skin Facades
- Geometrically Complex Enclosures
- Fabric Skins
- Building Envelope Case Studies

ASSIGNMENTS

Assignment 1: CASE STUDY SHADOW BOX

Assignment 2: CASE STUDY ANALYSIS RESEARCH REPORT

Required Statement for Students with Disabilities

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 me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Required Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

<http://www.usc.edu/dept/publications/SCAMPUS/gov/>

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at:

<http://www.usc.edu/student-affairs/SJACS>



3d Clipper
CAD Lab for Instruction,
Professional Partners,
and Electronic Research

PROJECT CASE STUDIES

Water Cube (ETFE)

Loyola Commons (double skin airflow)

Phare Tower (parametric diagrid)

1 Bligh St (double skin, adjustable louvers, atrium)

Jean-Marie Tjibau Cultural Center (laminated wood curved shells)

Perot Museum (precast)

Broad Museum (GFRC)

SFMOMA Expansion (FRP)

NY Times Building (double skin ceramic tube shading)

30 St. Mary Axe (double-skin ventilation shafts, TMD, diagonal structure)

Hearst Tower (grid, window cleaning)

KKR Tower (sunshading alternating glazing, rainwater harvesting, green)

Caltrans (active skin)

Federation Square Melbourne (triangulated Sandstone, and glass atrium)

Yas Hotel Abu Dhabi (grid shell second skin blanket and lighting)

Beekman Tower (Gehry crinkled stainless)

IAC Building (Gehry geometry)

Federation of Korean Industries (integrated angled BIPV, Smith Gill)

Liverpool Altabrisa (precast twisted “propellers” daylight/lighting)

Milsten Family Heart Center (structural glass cables)

Cambridge Public Library (double skin, chimney, sunshades, visors)

Bosco Verticale (trees)

Aurora Place (geometry, laminated fritted glass)

Manitoba Hydro Place (geometry, laminated fritted glass)

KfW Headquarters (serrated double-skin façade, natural ventilation)

Eden Project (ETFE)