USC
UNIVERSITY OF SOUTHERN CALIFORNIA

School of Architecture

The Chase L. Leavitt
Graduate Building Science Program

University of
Southern California
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News from the Chase L. Leavitt Graduate Building Science Program

Volume 2007.5, May 2007

HEED: Home Energy Efficient Design

Prof. Murray Milne has posted a new version of HEED (Home Energy Efficient Design) on www.aud.ucla.edu/heed. This will be the last posting for a while, at least until they receive funding for a new version. But if you have suggestions for features they should add to their next release, please let them know. Last year over 4500 people downloaded HEED.

Prof. Spiegelhalter receives grant

Thomas Spiegelhalter was been granted a USC provosts Future Fuels and Energy Initiative (FFEII) Award ($24.800) for the "Implementation of the Environmental Management System at the School of Architecture"

NCARB Prize: ARCH 599: "Special Topics in Building Science"

An experimental course at USC has won a prize form the NCARB. To demonstrate the importance of the building sciences to architectural design and to encourage students to understand that they have the responsibility to maintain a broad understanding of design, a series of mini-courses was established. The idea was to have a series of six short mini-seminars be combined into a single course. This innovative course was taught for the first time in the Fall of 2006.

The NCARB Competition submission

1: *Case Studies of Leading Edge Engineering Systems*
ARUP

A team of noted specialists from ARUP, a renowned architectural engineering firm. Gave special lectures on the leading edge research and projects they are working on. The first three classes consisted of case study presentations by professional engineers from a variety of disciplines, including acoustics, telecommunications, security, fire and life safety, mechanical engineering, 3D services-structural coordination, sustainability, structural engineering, and construction/ commissioning. In response to what they learned, students performed a self-review of the applicability of these disciplines to a current or recent studio project and prepared schematic level of design for their project. On a Saturday, the students brought the information to participate in a design charrette at the office, where 9 professional engineers interacted with students to push their initial schematic design thoughts towards realistic and yet cutting edge, holistic design solutions. The students turned in the following five drawings:

1. an annotated "coordination" plan that shows the egress paths and fire-rated walls, acoustic separation walls, required column spacing and mechanical/electrical/IT spaces as required by the various engineers they spoke with.
2. a diagram that demonstrates that you understand how the structural system (including the lateral seismic system) will work.
3. a diagram that demonstrates that they understand how the mechanical system will work.
4. a sectional or isometric diagram that highlights how structure and mechanical/electrical/plumbing/IT services are integrated within ceiling voids in their building. -
5. an annotated "climate/envelope construction" set of elevations and a diagrammatic section showing how sun and wind impact the building, where (if anywhere) natural ventilation can exist and how it might work, what materials are appropriate for which faces of the building, what shading is appropriate and why.

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S. Mehta (1992)
Sanjeev Tankha (1995)
Sarada Chidambareswaran (2004)
Sasu Mitra (1993)
Serge Hrisafovic (1992)
Sharmilla Tankha
Shaw-Bing Chen (?)
Shen-shu Ho (?)
Shih-Hsin Lin (2008)
Shina Rau (?)
Shraddha Marathe (2008)
Shweta Japee (1995)
Sonal Puri (1997)
Soner Keskenell (1995)
Sourojit Dhar (?)
Sreemathi Iyer (2002)
Srinivas Rau (1991)
Suganya Thiagarajan (2004)
Sumedha Kumar (2008)
Sumit Brahmbhatt (2006)
Svastisinha "Wan" Runsrithep (1999)
T. H. Al-Qahtani (1987)
T. Ebina (1988)
Taehyun Kim (2008)
Tareq Baker (2007)
Thian Feng (1988)
Tomas Salgado (2005)
Tony Chen (1993)
Turki Al-Qahtani (?)
V•S•K Varma Namburi (2006)
Vagish Narang (1999)
W. Wu (1990)
Xiao Li (2003)
Xiaojun Cheng (2005)
Xin Wang (2004)
Xing Chen (2008)
Y. Kim (1991)
Yekaterina Boyajian (1994)
Yunzhi Huang (2008)

Building Science Faculty, and Thesis Advisors

Dmitry Vergun
Douglas Noble
Ed Woll
Elizabeth Valmont
Erin McConahey
G. Goetz Schierle
Jade Satterthwaite
Jeff Guh
Jerry Christoff
Jim Tyler
Karen Kensek
Len Marvin
Mahdu Thangevelu
Marc Schiler
Marty Doscher
Marty Summers
Mic Patterson
Murray Milne
Ralph Knowles
Sanjeev Tankha
Thomas Spiegelhalter

Visiting Professors

Noureddine Zemmouri (2003-4) Professor, University of Biskra, Algeria

Hway Su Kim (2002-3) Professor, Director, Building Science program, Dan Kook University, South Korea.

Dr. Seok Ho Tae (2005-6), Assistant Professor, Yeungnam University, South Korea,

Dr. Xuelian Bai (2005-6), Assistant Professor, Chongqing University, People's Republic of China

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2: Space Frame Systems and Suspended Glass Walls in Contemporary Architecture
Mic Patterson and Sanjeev Tankha
The world's leading designers of space frame systems and cable truss glass walls provided two instructors in a crash course of glass wall systems with the cable suspended trusses. Students learned from experts about cable net, tension glass wall, and bent glass systems. The course covered the antecedent technology from the Crystal Palace to Peter Rice, tension glass wall systems, case studies of cable net systems, a visit to the glass fabrication shop. The final project was the design of a glass conference table.

3: Ritual House: Drawing on Nature's Rhythms for Architecture and Urban Design
Ralph Knowles
The readings for this course were from Prof. Knowles' new book Ritual House. "Ritual House takes its rightful place among those classic works that become touchstones for the culture. The topic is architecture, but his ultimate aim is to describe a better place for us all, one where the buildings we inhabit link us to a particular place and add true meaning to our lives." This course addressed one of the gravest problems of our day: the lack of commitment to a sustainable relationship between human beings and the natural environment. Clearly not a new problem, it is one that has become critically multiplied by unprecedented, worldwide energy usage and urbanization. To address this problem, the course looked at time-honored ways people have sheltered themselves as a model for ecologically sustainable urban growth today. As we traditionally occupy dwellings, we make certain adjustments for comfort in response to changes in the natural environment. We repeat these adjustments in concert with the unique rhythms of weather and climate in our particular setting. This repetition can give rise to patterns of social behavior —– rituals that are spiritually rewarding and that match sustainable ways to achieve comfort. The study was in two parts, generally following the order of chapters in the required text, Ritual House. First was an examination of traditional sheltering rituals that once linked people practically and spiritually to their environments; correspondingly, how those rituals might be at work today in your own, private life. And second was a critical discussion of solar-envelope zoning in cities as a way to support traditional sheltering rituals for comfort, choice and energy balance with nature.

4: Acoustics: The Sonic Environment in Architecture over the Centuries - from Greeks to Geeks
Jerry Christoff and Lizzie Valmont
The goal of this course was to increase the awareness of the student to the sonic environment both outside and inside buildings. Examples were selected from the antiquities to the present and illustrated important acoustical phenomena and principles including echoes, reverberation, clarity and intelligibility. Students participated in field trips to learn first hand about the design of performance spaces. A case study that received wide pre-publicity but failed to fulfill its acoustical billing was presented as an example of how solutions to real problems are developed. After an understanding of how acoustical problems are approached, the students were assigned a final project. Each student developed solutions that are unique in terms of forms and finish materials.

5: Rapid Prototyping, 3D Printing, and CAD/CAM Manufacturing
Marty Doscher and Marty Summers, MORPHOSIS
This course covered the latest 3d printing and rapid prototyping technologies as used in leading architecture firms. Each student developed a project over the course of six weeks. They "printed" these 3D models three times during the course. The seminar explored the place of 3D printing in the context of a larger model-centric process, and how the architecture firm uses this technology in the everyday development of our work. The operations can consist of, but are not limited to; transformations, duplications, booleans and distortions. Through an iterative design process, a new whole will emerge that will convey the ideas and attitudes of the formation of the three elements.

6: Lunar Architecture and Space Systems Design
Mahdu Thangevelu
The International Space Station is well underway and potential missions to Mars are being planned. Students in this semeinar created a proposal for an exhibit at the local museum depicting alternative futures for humanity in space. Ideas of space activities include space stations, space tourism and sports, lunar and Mars exploration missions, and spinoffs. Topics in the course include the role of the architect in human space activity; pertinent concepts in human habitation for Earth orbiting facilities; International Space Station, Mir, Space Shuttle and re-entry crew capsules are studied with emphasis on human habitation; and issues are discussed including human comfort and productivity, safety and both physiological and psychological parameters in isolated and constrained interiors of spacecraft. Final projects included the following projects designed for the moon or orbit: a lunar polar community for 100 people, large scale agriculture, a lander, a crew escape vehicle, tensegrity structure, solar power tower, inflatable structures, United Nations summit headquarters, EVA suit, solar storm and micro-meteor shower warning system, orbiting hotels, and spaceports.