

Re•Expanding Architectural Practice

Science of Design + Technology | 6+1 mini-courses

The NCARB Prize

Abstract

We continually hear lamentations about the shrinking of the expertise boundaries in the profession of architecture. The frontiers of architecture are eroding in the face of the continuing growth of new areas of specialization. Architects must maintain a broad and deep understanding of a full range of design issues in their practices, and they need not abandon their leadership roles in the face of rapidly advancing technologies.

To demonstrate the breadth of the architectural design profession 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.¹ This innovative course was taught for the first time in the Fall of 2006. The key points for the mini-seminars included:

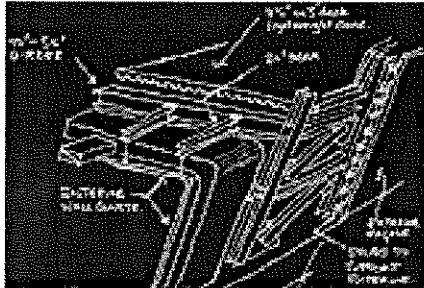
- learn from the profession: taught by faculty / practitioner teams
- work quickly: a maximum of 5 class meetings, including charrettes and field trips
- high interaction: very high instructor / student ratios
- media intensive: use new media teaching technologies (such as podcasting)
- real world: work with professional practitioners in their own environment, such as evening/weekend charrettes in the firm offices)
- include a hands-on "making" component
- "publish" the results: on the internet or in a museum exhibit
- push the boundaries back: choose topics on the frontier of traditional architectural practice and treat them as a normal part of practice so that students do not see them as unique
- real professionals: use licensed, practicing professional architects when possible
- best practices: create ties with the highest caliber firms
- solve real problems
- mix undergraduate and graduate students
- integrate the design studio studies
- broad exposure: require students to participate in more than just their favorite seminar. Students take clusters of seminars to widen their professional perspectives

For the first series, we selected a set of topics in the building sciences and technology. For future series, we plan to include mini-seminars on subjects such as sustainability, building Information Modeling (BIM), practice management, global practice. Each set of 6 seminars will focus on a single broad topic, The Fall 2007 series will focus on design computing and BIM. For the Spring 2008 series we will create a series on sustainable design, green environments and LEED.

¹In addition to the series of six mini-seminars, we conducted a seventh course that could not be compressed into the 5-meeting format. The 7th course maintained many of the key points (co-taught by professionals, hands-on, etc.), but it did not fit the full profile. The 7th course included the design, manufacture, and installation of a fabric tension structure. This project was also completed during the fall 2006 semester. (We offer the 7th course here as a footnote, but did not include the faculty, professionals, students and firms as part of this submission. The course did not meet the full criteria. For this reason, this course became "6+1" rather than "7 minicourses."

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Seminar 1: Case Studies of Leading Edge Engineering Systems

A team of noted specialists from the world's most renowned architectural engineering firm will give special lectures on the leading edge research and projects they are working on. The first three classes consist 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 have seen, students will perform a self-review of the applicability of these disciplines to a current or recent studio project and prepare schematic level of design for their project.

On a Saturday, the students will bring the information to participate in a design charrette at the office, where 9 professional engineers will interact with students to push their initial schematic design thoughts towards realistic and yet cutting edge, holistic design solutions. By the end of the charrette, the students will turn 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.

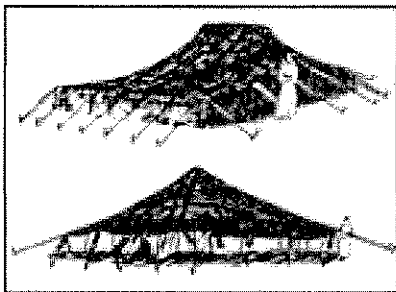


Seminar 2: *Space Frame Systems and Suspended Glass Walls in Contemporary Architecture*

The world's leading designers of space frame systems and cable truss glass walls will provide two instructors in a crash course of glass wall systems with the cable suspended trusses. Learn from experts about cable net, tension glass wall, and bent glass systems. The course will cover 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, and a final project where one will apply the concepts to the design of a glass table.

The final project will be the design of a glass conference table. The presentation boards are to be accompanied by a paper documenting the design as discussed in the assignment. This should be organized with supporting drawings, details and specifications at the front, backed up with all your sketches and notes created during your design development.

The professional firm will continue working with the winning designer to achieve a buildable table that teaches concepts about glass design and help the School of Architecture raise funding for the construction of the table.



Seminar 3: *Ritual House: Drawing on Nature's Rhythms for Architecture and Urban Design*

Prof. XXX is a world-renowned, award-winning faculty member who has taught and written about the importance of natural forces in architecture for more than 40 years. He retired a few years ago, but has agreed to come back once more to teach this 5-week seminar about how nature's rhythms can be used in architecture. The readings for this course will be from his 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 addresses 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 will look 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 will be in two parts, generally following the order of chapters in the required text, *Ritual House*. First is 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 is 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.

Seminar 4: Acoustics: The Sonic Environment in Architecture over the Centuries - from Greeks to Geeks

XXXX is an internationally recognized architectural acoustical engineer. He has taught graduate students in the USC School of Architecture for several years. He has worked on well-known projects all over the world. The goal of this course is to increase the awareness of the student to the sonic environment both outside and inside buildings. Examples will be selected from the antiquities to the present and will illustrate important acoustical phenomena and principles including echoes, reverberation, clarity and intelligibility. Students will participate in field trips to learn first hand about the design of performance spaces.

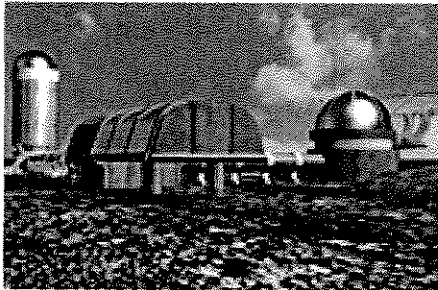
A case study that received wide pre-publicity but failed to fulfill its acoustical billing will be presented as an example of how solutions to real problems are developed. After an understanding of how acoustical problems are approached, the students will be assigned a final project. Each student will be expected to develop solutions that are unique in terms of forms and finish materials. Final presentations to the class may be made through models or a poster.

Seminar 5: Rapid Prototyping, 3D Printing, and CAD/CAM Manufacturing

This course will cover the latest 3d printing and rapid prototyping technologies as used in leading architecture firms. XXXXX is among the world's leading architecture firms at the forefront of design innovation. Each student will develop a project over the course of six weeks during which time they will **play, explore and test** formal notions in a virtual environment. We will print three times during the course, and discuss the projects' evolution and development. Along the way we will cover the pros and cons of 3d printing, its place 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 student will develop a virtual solid model. To begin the student must select three distinct elements with which to work: one found object, one figure object, and a field condition (3 F's). The primary states of the 3 F's must be distinct in their individual characteristics and should be different enough that when operated upon in the same space,

their characteristics are still traceable. 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.



Seminar 6: *Lunar Architecture and Space Systems Design*

XXXXX is in charge of the Space Exploration Architectures Concept Synthesis Studio in the Department of Aerospace Engineering. He is alumnus of the International Space University and is a co-author of the book "The Moon: Resources, Future Development, and Colonization." The International Space Station is well underway and potential missions to Mars are being planned. Create 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.