

Daylighting and Energy

arch 597E: Topics in Energy Conservation, Design, and Management

professional elective; spring, 2001/02; 3 credit hours

Instructor:

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Description:

Arch 597E, Topics in Energy Conservation, Design, and Management (1 to 3cr). Prereq: Admission into Third Year or permission.

Group investigations into topics germane to “natural” or environmentally sustainable architecture.

- **Daylighting and Energy**

A seminar/workshop aimed at integrating daylighting strategies with the Solar5 interactive passive solar building design computer program developed at UCLA. By using both physical models to depict lighting excellence and computer models to perform energy analyses, this exercise will allow one to draw a direct connection between the use of natural light in buildings and the building’s energy consumption.

Educational Objectives:

PEDAGOGICAL OBJECTIVE:

Using architecture to help reshape our relationship to our surroundings and our neighbors by revealing connections between the poetics of place, sound ecological development, and individual actions.

COURSE OBJECTIVES:

- Discovering a connection between energy consumption and natural lighting strategies.
- Developing an interface for computer simulation within the design process – a design tool.
- Enhancing and applying skills in performing computer simulation, energy audits, post occupancy evaluations, critical thinking, model making, photography, and both verbal and graphic presentation skills.
- Provide a necessary understanding of the principles, language, and directions concerning environmental technology.
- Allow one further insight into the role technologies play in defining the built environment.

The intent of this course is to raise awareness to the energy and environmental problems confronting the world today and to provide the student with the tools needed to minimize the adverse impact of creating the buildings and spaces in which we live, work, and play.

NAAB Criteria:

As an advanced professional elective, the level of accomplishment as indicated by student work is expected to span the full range of NAAB established criteria: awareness, the familiarity with specific information, including facts, definitions, concepts, rules, examples, and procedures (students can recall their knowledge with appropriate circumstances); understanding, the assimilation and comprehension of knowledge (students can identify implications, critically assess, summarize, and paraphrase their knowledge); and ability, skill in interpreting knowledge, in abstracting principles, and relating specific knowledge to the accomplishment of tasks (students can appropriately apply knowledge and skills to specific problems). Specifically, this course is meant to deal with:

#1. Verbal And Writing Skills; ability to speak and write effectively on subject matter contained in the professional curriculum

#2. Graphic Skills; ability to employ appropriate representational media, including computer technology, to convey essential formal elements at each stage of the programming and design process.

3. Research Skills; ability to employ basic methods of data collection and analysis to inform all aspects of the programming and design process.
- #4. Critical Thinking Skills; ability to make comprehensive analysis and evaluation of a building, building complex, or urban space.
- #5. Fundamental Design Skills; ability to apply basic organizational, spatial, structural, and constructional principles to the conception and development of interior and exterior spaces, building elements, and components.
- #6. Collaborative Skills; ability to identify and assume divergent roles that maximize individual talents, and to cooperate with other students when working as members of a design team and in other settings.
- #7. Human Behavior; awareness of the theories and methods of inquiry that seek to clarify the relationships between human behavior and the physical environment.
- #9. Use of Precedents; ability to provide a coherent rationale for the programmatic and formal precedents employed in the conceptualization and development of architecture and urban design projects.
- #13. Environmental Conservation; understanding of the basic principles of ecology and architects' responsibilities with respect to environmental and resource conservation in architecture and urban design.
- #15. Site Conditions; ability to respond to natural and built site characteristics in the development of a program and design of a project.
- #18. Environmental Systems; understanding of the basic principles that inform the design of environmental systems, including acoustics, lighting, and climate modification systems, and energy use.
- #20. Building Envelope Systems; understanding of the basic principles that inform the design of building envelope systems.
- #22. Building Systems Integration; ability to assess, select, and integrate structural systems, environmental systems, life-safety systems, building envelope systems, and building service systems into building design.
- #25. Building Materials and Assemblies; understanding of the principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies.
- #36. The Context of Architecture; understanding the shifts which occur, and have occurred, in the social, political, technological, ecological, and economic factors that shape the practice of architecture.

Instructional Methodology:

Although technically a lecture course, the realization of most of the course and instructional objectives is accomplished through direct application. Formal class meetings are structured as both lecture, demonstration, and discussion in format: new information is introduced and the student is expected to analyze and form conclusions regarding that information's value, with discussion to follow. Through the assignments, the application of that information (the principles and conclusions) allows the direct transformation of that information from the concrete (information, fact, as presented and understood) into the abstract (principles, directions for the design process), and back to the "concrete again" (design solutions). And at this point, the student is expected to form opinions and attitudes regarding the success of his/her applications and set direction for future explorations.

EDUCATIONAL QUESTIONS:

1. Can design embody more than just aesthetics – shouldn't "design" be more than its own activity, shouldn't design in fact be the blending of the myriad of issues involved in the creation of architecture (an integration of the complexities) that will set both objective and subjective criteria upon which success or failure may be judged?

2. By using design and the design process as the basis of “technological” exploration, can we not leave a more lasting impression upon the student as to the importance of the architectural and environmental technologies?
3. Is there a “sustainable aesthetic?”

STATEMENT OF WHY:

By re-appraising the methodology as well as the subject matter used in the design studio and by actually bringing the design studio into the lecture hall, a more comprehensive approach to design as architectural synthesis can be achieved. The course is offered here as a case study in attempting to use the entire curriculum as a means of synthesis, lifting the burden from the design studio and allowing a more integrated approach to architectural education.