The University of Texas at Austin School of Architecture Spring 2019

ARC 327R/386M Studies in Light and Materials

COURSE OVERVIEW

An oft-repeated cliché is that architects do not design buildings, they design "space." Architects and Interior Designers may draw surfaces and objects, but their ability to knowingly imbue those surfaces with territory and effect supposedly differentiates architecture from quotidian building. Presumptively, the more gifted the designer, the more cerebral the effects. And even though we cannot trace a line of causation from the objective precision of the geometrically constructed surface to the subjective perception of the imagined space, we unconditionally accept that the surface is the progenitor--the author--of the effects that determine perception.

In order to bring a more direct relationship between surfaces and space we have turned ever more to the idea of the active surface, the smart façade, the intelligent building. We know that effect cannot be accidental, incidental or simply the product of creative genius.
We hope that the intangible effects we so desire will appear if we can simply assign the responsibility for producing those effects to the same surfaces that we have always made, it is just that now our smart surfaces provide so many functional alternatives that surely one of those alternatives will create that elusive imagined environment. Smartness, however, is not manifest in the material choice, but in the instrumentality of the material. What we have not done well in our rush to activate every surface is actually imagine the intended environment. The objective of this seminar then is to understand and design for effect. Fundamental to this will be developing an understanding of the contingency of perceptual effects as instrumentalized, yet differentiated, from the constituency of material surfaces.

Materiality resides in an artifact, as substance and properties, and in its realization, as function and image. Materiality is therefore constituent in that it can be defined, specified, produced and controlled. Our normative means of design privileges materiality: we create, situate and represent surfaces, and we presume that those surfaces are the determinant of how we perceive the spatial environment. Materiality is, however, just a subordinate player in perception. Perception is driven by local, discrete, and transient energy exchanges between the human body and its immediate surroundings. The surfaces of the building might provide an armature for these exchanges, they might provide a context for the exchanges, but they do not generate them. The architecture of a perceptual environment is instead an architecture of contingency. Not geometry and surface, but heat and light. Not form and materials, but sensuality and tactility. A contingent architecture emerges through the interaction of the body and responds to each body with behaviors that are specific to that moment in time and to that given individual. The objective totality of a geometrically derived architecture gives way to subjective discretion when the contingencies are designed.

In their seminal essay "Transparency: Literal and Phenomenal" of 1964, Colin Rowe and Robert Slutzky differentiated literal transparency as being a "physical fact" such as that associated with material properties, whereas phenomenal transparency was more difficult to define, as it was ambiguous, such as due to the conditions produced by overlapping or interpenetrating entities. We might consider that the terms we are using this semester--constituent and contingent--could be directly substituted for literal and phenomenal, but this would be incorrect, as what Rowe and Slutsky consider to be physical fact is also phenomenal or contingent, and those conditions that they consider to be ambiguous do indeed have physical facts or constituent properties underpinning their results. They have oversimplified the literal and over-mystified the phenomenal.

We typically think of two boundaries in architecture: the literal or physical boundary between exterior and interior, and the figural or "phenomenal" boundary between public and private. Paradoxically, however, the architectural manifestation of both boundaries tends to be quite similar. Interior and exterior, or public and private are typically represented by distinct zones in plan or section, and their boundaries are treated as discontinuities with the exception of a "threshold condition" which serves more as a gate than it does as a transition. The interior and

the private thereby become defensible zones. Exterior and the public become that which is the indefinite "other."

In architecture, boundaries demarcate and establish difference; as a result, the architectural boundary is definite and didactic. In thermodynamics, boundaries negotiate and mediate difference; as a result, the thermodynamic boundary is dynamic and transient. Can we design an architectural boundary that *behaves* thermodynamically? Essentially, we want to create active zones of negotiation to mediate between static architectural conditions.

COURSE OBJECTIVES

The primary objective is to establish a framework for a more strategic instrumentalization of materials and technologies into the design process in which architects and interior designers are able to fully exploit new developments without the constraints of empiricism. This course will re-open the question of light in architecture. Rather than "training" the class participants in the application of strategies and techniques accepted by practice, this course will begin to redefine the problem. Among the widely-held assumptions and practices that will be questioned are: the privileging of the envelope as the boundary between daylight supply and its interior utilization, the use of planar glazing as the mediating material, and the integration of exterior view and interior luminosity as a composite function. Fundamental to challenging these assumptions is an understanding of the physical behavior and properties of light, and necessary for developing a response is the ability to manipulate those behaviors and properties. Recognizing that much of this knowledge is not inherent to our profession, we will turn to those disciplines in which the knowledge is housed.

Instead of a descriptive survey of advancements in materials and technologies, the course will extract the persistent behaviors of these materials, essentially using them to invert our normative approach to technology in design. These behaviors will serve to query the fundamental purpose of many of our building technologies so that rather than searching for the means to optimize performance, we will re-open the question as to what phenomena we wish to act on, and how they can manipulated. The phenomena that matter are not those of the building environment, but those that produce the perception of that environment. The materials and technologies become our tools, not our object, in redesigning the sensual experience of the human body.

COURSE DESCRIPTION

This seminar will overview the basic characteristics and families of "phenomenological" materials, with a special focus on materials and technologies that have a relationship to light and vision. We will examine, in depth, materials and technologies such as LEDs, smart glazing, displays and interactive surfaces and explore some of the contemporary experiments taking place in the architecture profession. Throughout the semester, we will catalog the relevant behaviors and begin to develop a mapping between behaviors and phenomena. Each student will be required to be able to coherently discuss material fundamentals and comprehensively analyze current applications. There will be weekly brief exercises, and three major assignments, including a precedent analysis and materials demonstration assignment, leading up to the final project.

Final Project: For the final project of the seminar, each student will develop and 'build' a material installation to be located on different sites in our buildings. The installations, which may be either physical or computational, will each negotiate a specific boundary condition. Although the installation will be constructed as a constituent material system, it must be capable of creating multiple contingent environments. These environments will be contingent upon both the physical environment--for example the position of the sun--as well as the physiological condition--for example contrast in the retinal receptor field. The ultimate objective of the final project is to produce a single (and minimal) physical intervention with multiple perceptual manifestations.

COURSE REQUIREMENTS

This course is a seminar meeting only once per week, therefore regular attendance and participation are necessary, as well as timely completion of all exercises, assignments and presentations. Students should expect to present prepared material and/or participate every week. There will be a final project/mockup review in April. There will be a local field trip to the Ellsworth Kelly Installation at the Blanton that will occur on a day other than scheduled for our class meeting, and there may also be some reshuffling of the sequence due to administrative conflicts. A limited number of smart / high-performance materials and light technologies will be available for student use, but they must be returned at the culmination of the course.

The course grade will be determined as follows:

- 20% course participation and exercises
- 50% student presentations
- 30% final project/installation

All aspects must be completed to the instructor's satisfaction for the student to pass the course. No late assignments will be accepted without a written medical excuse or documentation from Student Services. All assignments must be performed individually unless the Instructor explicitly provides instruction as to whether one is eligible to work with a partner.

COURSE INFORMATION

Instructor: Michelle Addington, Henry M. Rockwell Professor of Architecture
Contact: addington@utexas.edu

Teaching Assistant: Georges Fares georgesfares@utexas.edu

Course Time/Place: Most meetings to take place in room WMB 3.108 on Tuesdays from 1:00 pm to 4:00 pm. Due to the timing of administrative commitments and of a field trip, a few classes may have to be rescheduled.

Course references: The following book serves as a basis for much of the course and is recommended, however, PDF files of the relevant chapters will be available for free on the course site.

Addington, D. Michelle and Daniel Schodek, *Smart Materials and Technologies for the Architecture and Design Professions* (Oxford: Architectural Press, 2004)

COURSE SCHEDULE

22 January
Introduction to course
Course premise
Overview of course structure

29 January
Introduction to materials/phenomena/behaviors
Designer's experiments

5 February
Student Presentations / dislocated surfaces

12 February
Behavior / Phenomena
Light and Vision

19 February
No class

26 February
Behavior / Phenomena
The physics of light
Material interactions

5 March
Student Presentations / precedent analyses

12 March
Behavior / Phenomena
Natural phenomena

19 March
No class: Mid-term week

26 March
Behavior / Phenomena
Sources

2 April
Student presentations / window installations

9 April
Materials / Primer
High performance materials
Property changing materials
Chromatic materials

16 April
Materials / Primer
Energy exchanging materials/technologies
Light-emitting materials/technologies

23 April
Applications/Installations

30 April
Project presentations

7 May
Course Wrap-up