SUMA K4162 Responsibility and Resilience the Built Environment -Understanding and Impacting the Physical Dimensions of Sustainability

Thursdays, 6:10-8:00

Fulfills Graduation Requirement: Physical Dimensions of Sustainability Management

It is hard not to accept that human activity has touched everything on our globe: even core samples from polar ice show the physical evidence of human interaction with the environment. The history of human culture has meant the rise and expansion of the anthropogenic physical environment; the omnipresence of humankind's influence indicates that it is time to take responsibility for the ways we have intervened – for our own benefit and for the future.

To develop productive approaches to the physical dimensions of sustainability, it is important to rethink older, polarizing attitudes, which juxtapose "nature" and "culture." The idea that by "mastering" nature – by extracting all the resources we need without regard for consequences – we could sustain limitless growth and progress has created a flawed paradigm. Disturbances in our supplies of food, water, energy currencies, material resources, health and all around wellbeing are evidence of the need for change.

What are the alternatives? In this course, we will move from a linear model of how we use resources to one that works systemically, involving cycles and feedback loops in order to respond to, and work with, our dynamic environmental givens. Instead of the oppositional terms nature/culture, we will use **anthropogenic/non-anthropogenic** to describe our relationship to our environment. Rather than *resisting* forces – the potentially adverse effects of the climate, weather, and material properties in the found environment – we will discuss solutions that allow us to be **responsive and adaptive** to change.

We all have first-hand, daily experience with the built environment. It can serve us well as a microcosm of the way the physical dimensions of sustainability can be understood, analyzed, modeled, intervened into and appreciated. Semester-long group projects will consider our everyday built environment to study the process of assessment, benchmarking, intervention, feed-back and communications. Looking to the physical world we all share as an embodiment of our values can help to simplify and make more direct the complex ideas we are studying.

Ultimately, we will look for ways to work with anthropogenic processes that allow our physical environment to attain and maintain *resilience* as a system while still delivering the resources and wellbeing we need. We will consider the cultural shifts required for delivery systems to become sustainable, and how we might envision greater human wellbeing by enacting better procedures for broader quantification of and education about the physical dimensions of sustainability.

The course will teach using active and passive methods. Class discussion, student presentations, longer term group research and design-based projects, in-class lab time (during which you will have the opportunity to confer with other student groups, the professor and the TA) and an elective weekend design workshop are the active moments. Readings and lectures leverage passive learning techniques. These different modalities will culminate in the work you produce for the term project, a proposal for the sustainable use of the Newark Riverfront

By the end of this course, you should be able to:

- Describe basic concepts which define the scope and range of the physical dimensions of sustainability;
- Describe the interdependency of anthropogenic and non-anthropogenic forces as physicalized in the built environment;
- Describe the ways material, water, energy, labor and cultural practice interact with and on the built environment;
- Understand current models for assessing, benchmarking and communicating the sustainability of the anthropogenic environment;
- Understand the significance of material culture as a methodology for sustainability;
- Understand methods for communicating outcomes and proposing alternatives to standard practices in the management of the built environment.

Required Course Work and Evaluation:

- Class attendance and participation in the question and answer period after each lecture is expected. *individual 5% of grade*.
- Several key readings will be assigned with reading guides to frame central questions will be provided. You should anticipate posting concise written responses to the readings, and you will be evaluated on your in-class performance. You may also choose to submit notes on the readings at the end of the semester as part of your individual dossier or notebook. individual 10% of grade
- "Students have to eat" initial exercise: You will form a group of 4-6 and cook a meal together. You will be asked to quantify and track material, labor, energy and waste; and to diagram the meal's production and consumption. *group 10% of grade*
- Urban systems precedent study: Working in groups of 4-5 students, you will research one aspect of the systems that make up the city around you as historical, technical and cultural entities. You will present your work to the class as a whole and post your findings and analysis on the class site. *group 30% of grade*
- Urban systems design and proposal for the Newark Riverfront: Working in groups of 4-5 (you may chose to stay in your original group or reconfigure), you will develop integrated strategies for the development and revitalization of the Newark Riverfront, a stretch of land that has enormous potential and importance for urban resilience in the future and community activism in the present. Thinking about benchmarking, communication and education approaches is strongly encouraged. Workshop time in the second portion of the semester will be used as a lab for consultation with the professor. *group 45% of grade*

The criteria for grading will value deep, open-minded engagement with the course material. I expect active class participation, evidence of solid preparation and willingness to invest your own expertise in group work. The work submitted should be graphically clear and free of careless errors. Final projects should evidence research (roughly 20% of the portion of the grade represented by the final project), analysis (20%), synthesis/mission statement (20%), thoughtful presentation (10%) and creativity/integrative thinking (30%). You may email me or visit office hours for concerns and clarifications.

Evaluations for the projects will include both comments and letter grades so that students can improve their performance over the semester. However, final work may not be redone and resubmitted to a new grade. Requests for extensions will only be granted if made in advance and warranted by extenuating circumstances (sickness, personal or family matters, etc). Failure to submit an assignment will result in an F for that portion of the grade. Plagiarism is an academic offense that will result in automatic failure for the course.

Course Format and Assignments:

This course will be run as a hybrid lecture/workshop. You will be working in groups for all semester assignments, although you are welcome to switch or reconfigure groups after each benchmark deadline. As masters students from a broad spectrum of disciplines, group work will offer you the chance to leverage your colleagues' expertise in a creative, design-based set of projects. You will be responsible for recording your work for submission to me for grading, so please carefully document both process and product. I recommend a **dedicated course notebook** and/or dossier to facilitate this. You may include your preparation of readings for class discussions, class notes, sketches or research notes, brainstorming sessions, etc in addition to the required final submissions of the group projects.

We will meet once a week for just under two hours. For the first portion of the semester, we will use this time for a lecture lasting about an hour, and spend the rest of the course time reviewing readings and discussing questions. As needed, we will also dedicate part of the second hour to questions or concerns you may bring that affect and are of interest to the class as a whole.

In the latter portion of the semester, we will devote more time to consultation and group discussion about your proposals for the Newark Waterfront. I will continue to lecture of specific topics for the first part of the class, but the second part of the class will be dedicated to lab time and consultations. The last classes and two intermediary classes will consist of student group presentations; I will assemble a panel of guests to review and discuss your findings.

Elective Interdisciplinary Workshop:

I will be offering an interdisciplinary workshop in early October, in collaboration with a group of architecture students from a partner university. You will work together for a weekend to diagnose initially the challenges of the Newark waterfront and to brainstorm innovations and proposals.

Readings:

All readings will be made available to you. Please be sure that you have a paper or digital copy for reference during class. Reading guides (posted on courseworks) will help to structure our discussions, but you should take initiative to prepare questions and comments independently.

Schedule:

Part I: Overview and Central Concepts – lecture and discussion of readings

September 5:

Lecture: Where are the physical dimensions of sustainability located?

September 12:

Lecture: System Paradigms – inputs, throughput, cycles, framing, scale Readings: Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009) Chapter 1 'The Greening of Junk Space', Chapter 6 'Trash' p 95-108; William McDonough and Michael Braungart, *Cradle to Cradle* (NY: North Point Press, 2002), Introduction, Chapter 1, 'A Question of Design' p. 3-44; David Quammen, 'Living Water', in *Natual Acts* (Laurel: New York, 1986) Assignment: Students Have to Eat group meal mapping assignment

September 19:

Lecture: Nature/Culture – food supply and the anthropogenic environment (Guest lecture: Michael Conard, The Urban Design Lab, Columbia University)

Readings: Mike Davis, *Dead Cities* (New York: The New Press, 2002) 'Dead Cities: A Natural History', p 361-399; Han Lörzing, *The Nature of Landscape* (Rotterdam: 010 Publishers, 2001) 'A Line in the Sand' p 8-23

September 26:

Settlements and Agglomerations

Readings: Howard Davis, *The Culture of Building* (Oxford and New York: Oxford University Press, 1999) Chapter 1 'Building as a Unified Social Process' p27-42; A. Parr, *Hijacking Sustainability* Chapter 8 'Slums' p.127-146; Christopher Kennedy et al, 'The Changing Metabolism of Cities' in *Journal of Industrial Engineering,* Vol. 11, Number 2 (2007) Presentations: Students Have to Eat exercise Assignment: Precedent Studies for Newark Waterfront project

October 3:

Lecture: Material Culture – practices and artifacts as means to understanding the built environment

Readings: Bill Bryson, *At Home: A Short History of Private Life* (New York: Anchor Books, 2011) Chapter VI 'The Fuse Box' p. 131-159; Amy Seidl, *Finding Higher Ground: Adaptation in the Age of Warming* (Boston: Beacon, 2011) Chapter 5 'Our Oldest and Newest Energy' p.89-112; Parr, *Hijacking Sustainability*, Chapter 4 'The Greening and De-Greening of the White House' p.65-78

Saturday/Sunday, October 5th and 6th: Workshop "Charrette" in Newark with Harvard GSD students (tentative)

Part II: The Built Environment and Sustainability Factors – lectures and lab/workshop times

October 10: Lecture:	Energy – Relevant principles of energy currencies; energy transfer and material
Lab Time:	Precedent Studies for Newark Waterfront project
October 17: Lecture: Lab Time:	Thermal Energy – Traditional, Passive House and Low-Exergy paradigms Precedent Studies for Newark Waterfront project
October 24: Lecture: Presentation: Assignment:	Electrical Energy – Lighting, energy usage, renewable production models Precedent Studies presented and posted Newark Waterfront brief
October 31: Guest Lecture: Presentation:	The City and the Waterfront (guest lecture: James Lima) Initial analysis and hypothesis, Newark Waterfront
November 7: Lecture: Lab Time:	Urban Patterns – Histories of Agglomeration and Dispersal Developed hypothesis, methods of testing, proposal development
November 14: Presentation: Submission:	Mid-report by each group on Newark Waterfront proposals; guest discussants Newark Waterfront proposals submitted for professor's comments
November 21: Guest Lecture: Lab Time:	Communications strategies <mark>(guest lecture: TBA)</mark> Proposals returned, discussion
November 28:	Thanksgiving
December 5:	Lab time, in-class consultations with professor and TA
Student Prese December 12:	ntations, Urban Systems Project: Final Projects Due, Final Presentations with guest discussants
December 19:	Final Presentations completed for submission; additional in-class presentation time as needed

Additional Bibliography:

Millennium Assessment – contextualization of concern for resources relative to global considerations around human wellbeing. http://www.millenniumassessment.org/en/index.aspx

OMA/ AMO/ WWF, The Energy Report, 100% Renewable Energy by 2050, published in 2011

IPCC (Intergovernmental Panel on Climate Change) Working Group III – Mitigation of Climate Change 'Report on Renewable Energy Sources and Climate Change Mitigation' 2011, http://srren.ipcc-wg3.de/

Siegfried Giedion, *Mechanization Takes Command* (Oxford University Press: London, 1948): a cultural history of mechanization, including bathing, cooking, cleaning, and food production.

Cecil D. Elliott, *Technics and Architecture* (MIT Press: Cambridge, Ma and London, 1992): an historical overview of the production processes and technological advances over the course of construction history relative to both materials (wood, masonry, terracotta, metals, glass, cements, reinforced concrete), systems (lightning protection, sanitation, lighting, heating and ventilation, a/c, elevators, fire protection, structural engineering and acoustics), labor and technology.

Octavio Paz, *The Double Flame* Chapter 8 'Digressions on the Way to a Conclusion': takes speculations on the meaning of entropy and the origins of life to a highly poetic, speculative account of what is knowable, what can be structured and what must be left to faith. This has nothing to do with sustainability per se but it a really inspired way to think about the limits of human knowledge and intervention.

Andreas Huyssen, ed., *Other Cities, Other Worlds: Urban Imaginaries in a Globalizing Age* (Duke University Press: Durham and London, 2008): A fascinating set of essays on global cities and the cultural, economic and political imaginaries that drive their growth and perception.

Make Shift magazine: a monthly journal that tracks innovation in unexpected and politically challenging contexts, edited by a former student chapter leader of Engineers without Borders and founder of the Better x Design conference at Brown University.

Lynn Margulis and Dorion Sagan, *What is Life* (University of California Press: Berkley and Los Angeles, 1995): A philosophical, systems-based description of environmental evolution.

David Sandborn Scott, *Smelling Land: The Hydrogen Defense Against Climate Catastrophe* (Crown Publications: British Columbia, 2008): Part II is a clear, differentiated discussion of thermodynamics and offers a precise vocabulary for discussing energy.

John McPhee, *The Control of Nature* (Farrar Strauss Giroux: New York, 1989): three essays on heroic engineering projects and their ambiguous outcomes, including the rerouting of the Mississippi at Atchafalaya, the use of sprayed ocean water on an erupting Icelandic volcano and Los Angeles' battle against cyclical mountain fires