Masters of Science: Sustainability in the Urban Environment

CASE STUDIES IN SUSTAINABILITY

Course  SUS-7400 A : ARCH 57403 : ARCH 61388 : UD 62006
Case Studies in Sustainability: ecological principles for next generation public works

Time  Wednesdays 5 pm to 7:40  Room 107 Auditorium

Professor  Hillary Brown  FAIA
Office hours: Wednesday 3:30-4:30 pm; Thursdays 10:30 – 12:00 by appointment  3M15 Spitzer
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Description  Bulletin Description: This course will be structured to enable students to more broadly appreciate the complex dynamics of, and processes involved in, implementing successful sustainable development initiatives. Students will study and critique completed (or in some cases ‘in-progress’) projects. These may vary in terms of scale and in typology from individual buildings, to urban or neighborhood developments, or more complex civil infrastructural systems. The organization of the course will reveal a critical point of view and thematic approach to sustainability that unifies the projects being explored in detail. Lectures and readings will emphasize the crucial role of stakeholder involvement and cross-disciplinary partnership that are the basis of holistic, integrated designs. The course will combine seminar lectures, participant presentation of assignment exercises, and presentations of final projects.

Spring 2017 Emphases:
Through a case studies approach examining innovative multi-purpose, complex interdisciplinary projects, this course postulates a framework for the next generation of small and large-scale urban public works, namely infrastructure systems. These “multiplex” projects will serve multiple functions, align with, and leverage the workings of natural systems. They must perform in a carbon-constrained world and be resilient in the face of climate uncertainties. And ultimately, as ‘distributed’ or de-centralized public utilities/facilities, they must be beneficially embedded in, and connected to communities.
What kinds of pan-disciplinary collaboration will be required among architects, landscape architect and engineers and their clients to put in place the needed next generation of public works? How does ecological or “whole systems design,” which builds on interconnections and dependencies among diverse systems, help achieve synergistic solutions that solve multiple problems – both within and external to the project boundary? How can developing nations putting in place critical infrastructure today avoid many of the negative externalities associated with carbon-based infrastructure?

Through discussions on readings and individual and team assignments, students will become familiar with principles that shape integrated design decision-making. The seminar course will include discussion of readings, participant presentation of assignment exercises. The semester’s work will culminate in a collective design project bringing interdisciplinary students skills to bear on a problem in the developing world.

Readings Some of the readings will be selected from Brown, H. Next Generation Infrastructure: Principles for Post-Industrial Public Works, (Island Press 2014) but purchase of the book is optional as a pdf for readings will be supplied. Other readings will be in PDF format and available on blackboard. Readings are mandatory. Students will be required to submit short reading critiques/summaries.

Learning 1) Learn critical principles of ecological design and whole systems, integrated thinking

Objectives 2) Understand the inter-dependencies of various urban infrastructural systems, with design implications for synergies across sectors
3) Understand and experience emerging practices in interdisciplinary design and develop teamwork skills in applied research

Part I Frameworks for Sustainability

1. Overview
   • Course objectives
   • An infrastructure crisis?
   • Disaster/Response: Case Study: Minneapolis I35W bridge, old and new; Infrastructure in crisis
   • Environmental imperative and principles of whole-system, ecological design

Assignment # 1: Pre-industrial infrastructure: case study

2. Design Principles; Preindustrial Precedents
   • Overview of integrative principles – integration across living and nonliving systems
   • Case studies – from bridges to water-harvesting infrastructures, and ancient urban sanitation systems.

3. Integrated Design – Student presentations
   • Principles of industrial ecology applied to infrastructure
   • Case study: Kalundborg, Denmark, Hammarby Sjostad, other eco-industrial complexes
   • Multi-functioning infrastructure case studies
   • Towards a circular economy!
Assignment # 2: Innovative, Integrative Systems- Case Study

Part II Ecological Principles in Buildings and Infrastructure: Case studies

4. Capitalizing on Natural Processes—Student presentations, cont.
   • Towards Soft Path Water Systems
   • Ecologically- Reflexive Treatment Systems: Croton Filtration, Arcata Wastewater, Sherbourne Stormwater

5. Going Carbon Neutral – Student presentations Innovative, Integrative Systems,
   • “Infrastructure Ecologies” Combined or hybrid systems
   • Utilization of local energy resources

6. Going Carbon Neutral Student presentations
   • Energy-Water-Waste Nexus (multi-sector approaches)
   • Case studies from the developing world

7. Intelligent Materials – Student Presentation, cont.
   • Resource inefficiency
   • De-materialization; light-weighting structures; Hybridized and composite materials
   • Bio-mimetic materials; Smart materials; energy-producing (piezoelectric) materials

Assignment # 3 Group Infrastructure project, due (in parts)

8. Assimilated Infrastructure: embedded into the community
   • De-stigmatizing infrastructure
   • Cultural and recreational assets: Phoenix Solid Waste Facility, Hiroshima municipal solid waste plant, others

9. Decommissioned Infrastructures & Adaptive Reuse – Student presentations
   • From industrial artifact, repurposed for culture or recreational use: Emscher Park, Grimshaw projects
   • NYC examples – The Highline and Freshkills Park 8A EPA: Emscher Park Case Study | Brownfields and Land Revitalization, PDF

10. Climate-adapted and Defensive Infrastructure: Sea Level Rise, Inland Flooding
    • Poldering in the Netherlands
    • Singapore, Jakarta and Indonesian strategies
    • Natural solutions for least developed countries

11. Climate-adapted Infrastructure: Water Scarcity & Stress
    • Responses to desertification
    • Advances in “passive” desalination
Part III Student Projects/Class Project Presentations Weeks 12, 13, 14

Final Project due: TBD

Class time after the lecture will be devoted to student presentation of research, conceptual sketches of project components and diagrams showing integration. We will likely have outside participants in this planning/design project. The final project, a real project envisioned for TBD will be a joint class project.

General Course information

Grading: Your course grade will be determined as follows:
20 % on the quality of your preparation for and participation in class discussions and written reading summaries; 40 % on the quality of your short assignments (1 & 2); 40 % on the quality of final project/paper.

Class Preparation and Participation:
Reading assignments and some questions to guide your thinking about these assignments are given in the class schedule for each class session. You are expected to come to class prepared to discuss the reading and respond when called on for questions. Your individual class participation grade will be based upon your in-class remarks during discussions.

Class Attendance Mandatory: More than two unexcused absences will lower your grade. Turn in your written work on time. Late work will be penalized: the grade will drop one step for each class meeting that the work is late. Incompletes will not be granted except in the case of an extreme medical or family emergency, supported by a doctor’s note or other written proof of the serious situation. Please send assignments the night before or early morning of class to:

Read ACADEMIC INTEGRITY NOTICE: Written assignments must be your original work, including any short submittals, papers, powerpoint and the final assignment. In your papers, cite all sources, using footnotes, endnotes, or in-text citations, and include a bibliography of references. For the correct format, see the Chicago Manual of Style. Be cautious about information posted online.

Please prepare all submittals and assignments as ADOBE PDFs. Generally, these are due THE EVENING BEFORE THE CLASS by email to me or the teaching assistant: Tuesday midnight.

ASSIGNMENTS
There will be two short assignments and a third larger project.

The final envisioned project for Haiti, or another developing country, will be a joint class project. It may entail student participation in developing conceptual design and visualization materials for an integrated system of critical infrastructure. The goal will entail develop a self-sustaining renewable energy system for a region, aligned with its multiple social, economic and cultural needs, and integrated with other critical infrastructure systems such as transportation, sanitation, water management, food production, flood control.

Students not wishing to participate in the class final project may prepare another topic as research paper.

RESOURCES: Architecture Library - Spitzer 101 x 8766 or nsanchez@ccny.cuny.edu Library