

## Master of Science in Sustainability Management

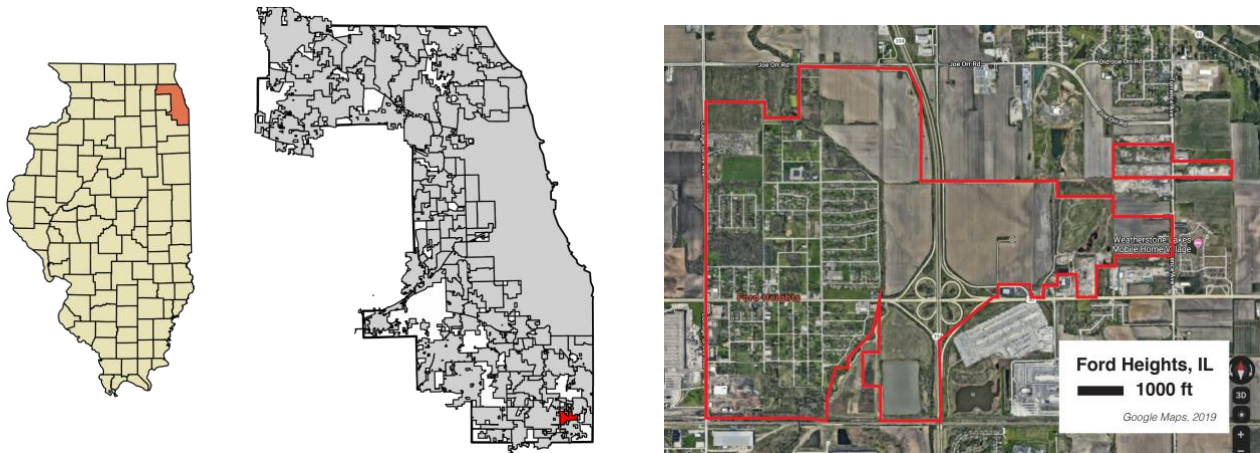
### **Responsiveness and Resilience in the Built Environment - PS5162** **3 Credits**

**Instructor:** Lynnette Widder

#### **Course Overview**

A sustainable and resilient built environment is part of a dynamic system. Conventional infrastructure and building has aimed to hold back or transform the non-anthropogenic forces around it. In this course, we will work to understand how manmade conditions can also accommodate and adapt to changing environmental conditions. Rather than focus on resisting forces – potentially adverse effects of climate, weather, and material properties in the environment – we will discuss solutions that allow us to be responsive and adaptive to change

21st century civic infrastructure can contribute to improving the way cities respond to long-term and catastrophic climate events while also enhancing their citizens' daily lives. We will study techniques and conditions contributing to this change in approach, and have the opportunity to apply our findings in a concrete setting. In past iterations of this course, students have developed solutions for sites in Brooklyn and Bronx, NY; Newark, NJ; Butte, Montana; Bridgeport, Ct; and Blue Island and Robbins, Il. This year, we will be collaborating with the city of Ford Heights, Il, south of Chicago. It is part of the Calumet Corridor, a region whose susceptibility to flooding is being addressed at present by collaboration among government, community, private sector firms and convener organizations. Unlike other communities in which this class has worked, Ford Heights is at the very beginning of its planning for resiliency.



Ultimately, we will look for ways to work with anthropogenic processes that will allow our physical environment to attain and maintain resilience, from the scale of the product all the way up to the scale of a city. We will consider cultural shifts required for delivery systems to become sustainable. And we will ask fundamental questions about how resilience and sustainability can be made relevant to social, spatial and technological approaches to the physical world. This class will also teach you how to visualize, diagram and convey these vital ideas.

#### **Learning Objectives**

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

- Describe the basic concepts by which the legacy built environment functions;
- Understand and use the terms that govern our discourse on sustainability and resiliency in the built environment;

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- Describe the ways material, water, energy, labor and cultural practice interact with and upon the built environment;
- Understand current models for assessing, benchmarking and communicating sustainability and resiliency of the anthropogenic environment;
- Use creative methods to communicate outcomes and propose alternatives to standard practices in managing the built environment.
- Develop and use highly effective visual communication techniques

## Course Format, Weekend Field Trip and Term Project

This course will ask you to engage actively as well as providing information through lectures and readings. The work includes class discussion, student presentations, longer-term group research projects, in-class lab time (to confer with Professor Widder, the TA, and other student groups), and an elective weekend design workshop. Outside experts will occasionally lecture; their profiles are provided at the end of this syllabus. All that you learn will be leveraged in your final group design project for Ford Heights, IL.

### Ford Heights History

Ford Heights was first incorporated in 1949, a fairly late point in time compared to its neighboring towns. Its first inhabitants had squatted on swampy ground adjacent to the town of Chicago Heights, near a Ford Motors stamping plant that supplied the tax base for the new town. In the 1950s or early 60s, the stamping plant was rezoned to fall within Chicago Heights, leaving Ford Heights with little funding for its schools and other town services. As flooding of Deer Creek, one of myriad small waterways cutting through the Calumet corridor, has increased over the past decade and homes have been affected, the town has seen 50% population loss. Despite its fragile economic and demographic status, however, it is part of the Lincoln Highway Corridor Strategic Plan, a transportation development plan based around a freight rail line that runs through Ford Heights.



Top: Entrance of Diplomat Lane Bottom: Intersection of Woodlawn and Route 30  
Images from Google Street View.



The Federal Department of Housing and Urban Development (HUD) originally owned three projects there, of which one has been successfully renovated and most of the other two demolished. The town was recently chosen by the Chicago Metropolitan Agency for Planning, a public agency that assists underfunded towns to develop urban and economic plans keyed to regional incentives and goals.

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We have funding for nine students in the course to visit Ford Heights and to participate in a design workshop there together with students from Illinois Institute of Technology's Landscape Architecture masters program and from University of Illinois – Chicago's Urban Planning program. We will meet with representatives from the city and from the Metropolitan Planning Council, which is convening the Calumet Stormwater Collaborative; from the City of Ford Heights; and from the Chicago Metropolitan Agency for Planning (CMAP). The results from this workshop will form the basis for your term projects. Should more than nine students want to attend, we can discuss housing and funding implications. For planning purposes, you should anticipate arriving in Chicago either on October 3rd or before 9:00 AM on the 4th. The workshop will end around 6:00 PM on the 5th; your overnight stay from the 3rd to the 4th and 5th to the 6th is included in the special course travel grant budget.

### Required Books and Readings

- Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009)
- William McDonough and Michael Braungart, *The Upcycle* (NY: North Point Press, 2013)

Available at:

- Book Culture, 536 West 112th St/ between Broadway & Amsterdam (pre-ordered)
- Avery and/ or Butler Library

Required readings are listed in the schedule below. In addition to selected chapters from *Hijacking Sustainability* and *The Upcycle*, other readings are required and all are provided on CourseWorks. Please prepare questions and comments on each reading, and have the readings (paper or digital) available for reference during class. A Reading Guide is provided on CourseWorks. Note, however, that the guide is intended to help structure our discussions, and is not a replacement for your independent preparation. Supplemental optional readings (listed after the schedule, below) are available in the library.

### Optional Readings

Topic: Ford Heights

- Joel Greenberg, *A Natural History of the Chicago Region* (Chicago: University of Chicago Press, 2002), Chapter 1: The Great Forces p. 1-15
- Great Lakes flooding and the Mississippi, recent news: <https://www.npr.org/2019/08/14/749062901/wet-wild-and-high-lakes-and-rivers-wreak-havoc-across-midwest-south>
- Background on the Calumet Stormwater Collaboration: <http://www.metroplanning.org/work/project/23/subpage/1>
- Useful information to the CSC monthly meetings/agendas/presentations: <http://www.metroplanning.org/news/7077/Calumet-Stormwater-Collaborative-meeting-materials>
- The larger, regional initiative run by the Calumet Collaborative, which catalyzes innovative partnerships between Illinois and Indiana community, government, business and nonprofit stakeholders to advance a thriving Calumet region. <http://www.calumetcollaborative.org/about-us.html>
- An initiative being run out of the University of IL Chicago that might be pertinent to know about: [http://www.metroplanning.org/uploads/cms/documents/eda\\_fact\\_sheet.pdf](http://www.metroplanning.org/uploads/cms/documents/eda_fact_sheet.pdf)
- Articles on Ford Heights: <http://www.chicagomag.com/Chicago-Magazine/December-2014/The-Trouble-with-Ford-Heights/>; <http://www.chicagotribune.com/suburbs/daily-southtown/opinion/ct-sta-slowik-irene-brodie-st-0125-20180124-story.html>; <http://www.encyclopedia.chicagohistory.org/pages/472.html>
- Access to South Suburban Mayors and Managers Association: <http://ssmma-gis.maps.arcgis.com/home/index.html>
- City of Ford Heights webpage <https://www.FordHeights-il.com/>
- Regional plan for transit oriented development in Ford Heights: <http://www.cmap.illinois.gov/programs/Ita/FordHeights>
- 'Hood too Hood' Documentary City of Ford Heights webpage <https://www.FordHeights-il.com/>

Topic: Resiliency

- HUD 2015a, *Harnessing Ecosystem Services for Water Management, Part 1, Overview of Floodplain Management*, slide deck at <https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-1.pdf>

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- HUD 2015b, Harnessing Ecosystem Services for Water Management, Part 2, Structural Measures at a Glance, slide deck at <https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-2.pdf>
- HUD 2015c, Harnessing Ecosystem Services for Water Management, Part 3, Permeable Pavement Parking, slide deck at <https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-3.pdf>
- HUD 2015d, Critical Infrastructure Resilience Webinar at <https://www.hudexchange.info/training-events/courses/critical-infrastructure-resilience/>
- HUD 2015e, Energy Investments for Disaster Resilience, slide deck at <https://www.hudexchange.info/course-content/energy-investment-for-disaster-resilience/Energy-Investments-for-Disaster-Resilience-Webinar-Slides-2015-02-03.pdf>
- HUD 2014a, Equity and Achieving Equitable Outcomes, slide deck at <https://www.hudexchange.info/course-content/ndrc-equity-and-achieving-equitable-outcomes-webinar1/NDRC-Equity-and-Equitable-Outcomes-Slides-2014-11-04.pdf>
- HUD 2014b, Climate Adaptation Planning, slide deck at <https://www.hudexchange.info/course-content/ndrc-climate-adaptation-planning-101-webinar1/NDRC-Climate-Adaptation-Planning-Slides-2014-11-20.pdf>
- HUD 2014c, National Disaster Resilience Competition, Innovative and Inclusive Citizen Engagement Webinar at <https://www.hudexchange.info/training-events/courses/ndrc-innovative-and-inclusive-citizen-engagement-webinar/>
- IPCC 2011, Renewable Energy Sources and Climate Change Mitigation, report at <http://srren.ipcc-wg3.de/report>
- WRI 2005, Millennium Ecosystem Assessment, General Synthesis Report On Ecosystems And Human Well-Being, report at <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>
- WWF 2011, The Energy Report- 100% Renewable Energy by 2050, report at [http://wwf.panda.org/what\\_we\\_do/footprint/climate\\_carbon\\_energy/energy\\_solutions22/renewable\\_energy/sustainable\\_energy\\_report/](http://wwf.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions22/renewable_energy/sustainable_energy_report/)

### Topic: General Culture and History, Built Environment (available through CLIO, or at Avery or Butler Library)

- 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.
- <https://www.citylab.com/> Source of an excellent newsletter on urban issues.
- <https://placesjournal.org/> Online journal covering architecture, landscape and urbanism in well-researched and unusual ways
- 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.
- 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.

## Required Coursework and Evaluation

### Readings and Written Discussions (individual assignment, 20% of grade)

- **Part A:** key readings will be assigned with a reading guide to frame central questions. Responses to the readings, although not necessarily specific answers to the questions, must be posted to CourseWorks by noon prior to that day's class. I expect students to respond to one another's comments.
- **Part B:** you must also submit a critical, 1,500-word response to one week's readings as individual work. You will choose the reading(s) you will address. Note that this will be formal writing, not an informal opinion piece.

### “Students Have to Eat” (group assignment, 10% of grade)

Form a group of 3-5 and cook a meal together. Quantify and track material, labor, energy and waste; then diagram the meal's production and consumption. Each group will present their diagrams in class.

### Precedent Studies (group assignment, 30% of grade)

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Work in new groups of 3-5 to research one of the assigned case studies into both small scale and large scale resilient urban infrastructure and architecture. A separate assignment sheet will be available. Results will be presented by each group and posted to CourseWorks.

### **Ford Heights, II Term Project (group assignment, 40% of grade)**

Urban systems design and proposal; working in groups of 3-5, you will develop integrated strategies for development and revitalization of our sites in Ford Heights. The proposals developed during the on-site workshop will form the basis for each group's approach. Lab time in the second portion of the semester will be used for interactive consultation with Professor Widder.

### **Special consideration of individual effort**

If you believe that your contribution to a project is not fairly represented by the grade given to you group, you have the option of submitting evidence of your individual effort as described below (in Assignments and Submissions).

The criteria for grading will value deep, open-minded engagement with course material. Active class participation is expected, as well as evidence of solid preparation and willingness to invest personal expertise into group work. The work submitted should be graphically clear and free of careless errors. For example, your term projects will be graded using the following rubric:

- research evidence - 20%
- analysis - 20%
- synthesis and mission statement - 20%
- thoughtful presentation - 10%
- creativity and integrative thinking - 30%

Feedback on projects will include both letter grades and comments to help you consistently improve performance through the semester. However, final work may not be redone and resubmitted for a new grade. Requests for extensions will only be granted if made in advance and warranted by extenuating circumstances (e.g., sickness, personal or family matters).

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. Grading concerns and clarifications can be discussed through email or during office hours.

### **Assignments and Submissions**

We meet once a week for just under two hours. During the first part of the semester we will generally have a lecture lasting about an hour, and spend the rest of the period reviewing readings and discussing questions.

All in-class presentations must be submitted to the TA by noon on the day of the class in which the presentations will occur. The TA will specify whether submission via email or courseworks is preferred.

In the latter part of the semester, we will devote more time to consultation and group discussion about your Ford Heights proposals. Lectures at the beginning of the period will cover topics related directly to the term project, and the remainder of class will be dedicated to lab time and consultations. To aid review and discussion of your group's term project, a panel of guest experts will be present during presentation of both your initial proposal and its ultimate iteration.

Fair grading of group work has its challenges. If you would like your individual contributions considered for grading, it is your responsibility to document carefully both process and product, and submit it. Your work should be well organized in a digital or physical folder that includes research notes, sketches, notes from brainstorming sessions, and your individual input into the group's work. (If it's more convenient, you can submit your course notebook, including any other class materials, as long as the work you want reviewed is clearly marked.)

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### **Ford Heights Tour and Workshop, Weekend**

Professor Widder, in collaboration with Profs. Ron Henderson (IIT) and Moira Zellner (UIC), will offer an optional interdisciplinary workshop in October. We will have the opportunity to tour Ford Heights, meet with a variety of experts and stakeholders, and develop initial ideas for response to the problems raised. Participants from Columbia, IIT and UIC will work together to develop an initial diagnosis of Ford Heights' resiliency challenges and to brainstorm potential solutions. Attendance is not mandatory, but is strongly recommended. Hostel beds have been reserved for nine attendees on a first come-first served basis. Detailed information will be shared separately.

## **Profiles for Guest Lecturers**

### **Kubi Ackerman**

Kubi Ackerman is an independent consultant and curator. With an expertise in design strategies for resilience, he has focused on climate change communication, food systems, green infrastructure, and transportation. He is currently working on projects for Thinc Design, the Museum of the City of New York, and the National Building Museum.

Experience: transportation, logistics, regional food systems, urban development patterns.

LinkedIn: <https://www.linkedin.com/in/kubi-ackerman-5595386/>

### **Alison Bridges**

Allison Bridges joined the Earth Institute's Research Program on Sustainability Policy and Management in fall 2017 as a Postdoctoral Fellow after receiving her PhD from the Bloustein School of Planning and Public Policy at Rutgers University.

Experience: institutional and technological innovation in improving the sustainability of urban systems, use of sustainability indicators in decision making

LinkedIn: <https://www.linkedin.com/in/allison-bridges-a687329/>

### **Carter Craft**

Carter Craft is an urban planner with over 20 years of experience in waterfront and transportation issues. He has been involved in creating and growing more than two dozen water-related non-profit organizations.

Experience: water-related resiliency

LinkedIn: <https://www.linkedin.com/in/carter-craft-532224/>

## **School Policies**

### *Copyright Policy*

Please note—Due to copyright restrictions, online access to this material is limited to instructors and students currently registered for this course. Please be advised that by clicking the link to the electronic materials in this course, you have read and accept the following:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

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### *Academic Integrity*

Columbia University expects its students to act with honesty and propriety at all times and to respect the rights of others. It is fundamental University policy that academic dishonesty in any guise or personal conduct of any sort that disrupts the life of the University or denigrates or endangers members of the University community is unacceptable and will be dealt with severely. It is essential to the academic integrity and vitality of this community that individuals do their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based. Academic honesty in class assignments and exams is expected of all students at all times.

SPS holds each member of its community responsible for understanding and abiding by the SPS Academic Integrity and Community Standards posted at <http://sps.columbia.edu/student-life-and-alumni-relations/academic-integrity-and-community-standards>. You are required to read these standards within the first few days of class. Ignorance of the School's policy concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

### *Accessibility*

Columbia is committed to providing equal access to qualified students with documented disabilities. A student's disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process. For more information regarding this service, please visit the University's Health Services website: <http://health.columbia.edu/services/ods/support>.

## Course Schedule

**PART I** - Overview and Central Concepts: Understanding the Physical Dimensions Lecture and discussion of readings - Lecture and Discussion of Readings

### **Class 1**

Lecture – Where are the physical dimensions of sustainability? Why resiliency?

Assignment – Group mapping exercise ‘Students Have to Eat’ will be initiated

### **Class 2**

Lecture – Settlements and Agglomerations: legacy and new, systems and stand-alones

### Readings

- Raven Cretney, ‘Resilience for Whom? Emerging Critical Geographies of Socio- ecological Resilience,’ *Geography Compass* (2014) 8/9: 627-640
- Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009), Ch 1 ‘The Greening of Junkspace’ pp 15-31, and Ch 6 ‘Trash’ pp 95-107
- William McDonough and Michael Braungart, *The Upcycle* (NY: North Point Press, 2013), Introduction and Ch 1-2, pp 3-83
- Listen – Nature: the next big thing in climate adaptation technology? Jul 18, 2019 <https://www.marketplace.org/shows/marketplace-tech/nature-the-next-big-thing-in-climate-adaptation-technology/>
- Assignment – Group mapping exercise ‘Students Have to Eat’ continues, students adding or dropping the class to be accommodated.

### **Class 3**

Discussion – Cities and their Metabolism

### Readings

- Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009), Ch 8 ‘Slums’ pp 127-146

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- Christopher Kennedy et al., 'The Changing Metabolism of Cities,' *Journal of Industrial Engineering*, (2007) 11/2: 43-59
- Christopher Kennedy, *The Evolution of Great World Cities: Urban Wealth and Economic Growth* (Toronto: University of Toronto Press, 2011), Ch 6 'The Ecology of Urban Economies' pp 139-166

Presentations – Results of 'Students Have to Eat'

Assignment – Precedent Studies in anticipation of term project will be initiated

### Class 4

Lecture – Providing Resources, at Urban and Building Scale Readings

- Bill Bryson, *At Home: A Short History of Private Life* (New York: Anchor Books, 2011), Ch VI 'The Fuse Box' pp 131-159
- Amy Seidl, *Finding Higher Ground: Adaptation in the Age of Warming* (Boston: Beacon, 2011), Ch 5 'Our Oldest and Newest Energy' pp 89-112
- Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009), Ch 4 'The Greening and De-Greening of the White House' pp 65-78

**PART II - Resilience and Sustainability at the Building and Settlement Scale: Self-Reliance or Network? - Lectures and Lab Time**

### Class 5

Lecture – Paradigms of Shrinkage and Growth within Urban Resiliency

Readings

- Brett Milligan, "Landscape Migration," *Places Journal*, June 2015. Accessed 16 Aug 2019. <https://doi.org/10.22269/150629> (or on Canvas)
- Jill Desmini, 'From Planned Shrinkage to Formerly Urban: Staking Landscape Architecture's Claim in the Shrinking City Debate', *Landscape Journal: design, dscape Journal: design, planning, and management of the land*, Volume 33, Number 1, 2014, pp. 17-35 (on Canvas)
- Ford Heights History, <http://www.encyclopedia.chicagohistory.org/pages/472.html>
- On Rainready Calumet Corridor, see: <https://www.cnt.org/urban-flooding> and <https://www.cnt.org/sustainable-economic-development>

Lab Time – Precedent Studies in anticipation of term project

Ford Heights Excursion

Tour and Workshop, Ford Heights, Ill: information will be provided separately

### Class 6

Presentation – Precedent Studies presented Submittals – Precedent Study slide decks Assignment – Ford Heights term project initiated

### Class 7

Guest Lecture – Carter Craft, Senior Economic Officer, Consulate General of the Netherlands, NY

Lab Time – Develop hypothesis, develop visualization concept, develop design proposal.



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### Class 8

Guest Lecture – Identifying and Mapping NYC’s Food Systems, Kubi Ackerman, Independent Curator and Consultant

#### Readings

- Carolyn Steele, *Hungry City: How Food Shapes Our Lives* (London: Random House UK, 2013) pp ix-xiii, 1-52
- Carolyn Steele, “How food shapes our cities,” TEDGlobal 2009, Jul 2009 (15:40 video) at [https://www.ted.com/talks/carolyn\\_steel\\_how\\_food\\_shapes\\_our\\_cities?language=en](https://www.ted.com/talks/carolyn_steel_how_food_shapes_our_cities?language=en)
- Christian Peters et al., ‘Foodshed Analysis and its Relevance to Sustainability,’
- *Renewable Agriculture and Food Systems* (2009) 24: 1-7
- Brett Milligan, ‘Landscape Migration: Environmental design in the Anthropocene,’
- *Places Journal*, 2015 (online) <https://placesjournal.org/article/landscape-migration/>

### Class 9

Guest Lecture – Disaster Recovery and Equity, Allison Bridges, Postdoctoral fellow, Earth Institute, Columbia University

#### Readings

Smith, Gavin P., and Dennis Wenger. 2007. “Sustainable Disaster Recovery: Operationalizing An Existing Agenda.” In *Handbook of Disaster Research, Handbooks of Sociology and Social Research*, eds. Havidán Rodríguez, Enrico L. Quarantelli, and Russell R. Dynes. New York, NY: Springer New York, 234–57.

Smith, Neal. "There's No Such Thing as a Natural Disaster" SSRC [http://understandingkatrina.ssrc.org/Smith/van Holm](http://understandingkatrina.ssrc.org/Smith/van_Holm), Eric Joseph, and Christopher K Wyczalkowski. 2018. “Gentrification in the Wake of a Hurricane: New Orleans after Katrina.” *Urban Studies*: 0042098018800445.

### Class 10

Presentations – Proposals for Ford Heights projects; guest discussants

Submittals – Proposal slide decks

### Class 11

Lecture – Integrating Input into Resiliency Planning through Technology and Participatory Design

Lab Time – Consultations with Professor and TA

### Class 12

Lab Time – Consultations with Professor and TA

### Class 13

Presentations – Final term project presentations; guest discussants.

Final Submissions Due

Submittals – Final term project slide decks and longer reading response.