# UP/ENVS 406—Urban Ecology

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Over half the global population now lives in cities, and urban land use is expected to triple in area by 2030. As a result of the increasing dominance of cities, ecologists have increasingly focused their attention on urban environments in order to understand the important processes affecting urban ecosystems. Perhaps more than any other ecosystem, however, an understanding of urban habitats requires an analysis of the social as well as ecological factors affecting ecosystems. In this course, we will examine the new urban ecology, and combine ecological analyses with historical, anthropological, and sociological studies of urban nature. How are urban ecosystems similar to or different from other habitats? What are the characteristic features of urban ecosystems? How are cities connected to the ecology of distant ecosystems? What distinctive ecosystems are created in urban areas? How do we construct nature in urban ecosystems? As a human-dominated ecosystem, cities require both scientific and social-scientific analysis in order to evaluate the ecological footprint of cities, assess their ecological sustainability, examine growth management, unravel the connections between ecology and public health, or work to protect plants and animals from encroaching urbanization.

## Objectives

I. Expose students to recent research on the ecology of urban ecosystems

II. Understand the interdisciplinary nature of urban ecosystems

III. Familiarize students with recently developed tools for analyzing urban ecosystems

## Course Structure:

The course will be a mixture of lecture and discussion. Lectures will cover concepts and new research on the scientific aspects of urban ecology. For each lecture I have assigned a review article or article from the primary literature that introduces the lecture topic. I will also provide bibliographies for further reading. After every 3 lectures or so, we will read and discuss a paper from the humanities or social sciences that addresses topics, questions and concepts raised in the preceding lectures. In this way we will be able to appreciate how understanding urban ecology requires an interdisciplinary approach. There will be two lab sessions where I will introduce analytical tools for investigating urban ecology. You will need to bring your laptop to class for these sessions.

All readings will be posted on the course Compass site. These readings are required, but there is no additional textbook or course packet to purchase. I will also post the slides from the lectures (but not the notes) on the Compass site.

**Course Requirements:**

1) Students will arrive in class having read the material, and will take an active part in discussion. Write down notes and questions on the readings. Bring them up in class discussion. Participation in discussion will account for 10% of the grade. (no need to hand anything in, however).

2) Students will write one 5-page paper on a particular species of urban plant, animal or other organism. I will provide a list of species from which to select. The paper will account for 15% of the grade. Papers must be typed, double spaced, single sided, and handed in on paper. I will *not* accept electronic submissions. Paper is due March 2nd.

3) Students will write a paper of about 15 pages on a topic of their choice. The paper must integrate scientific and humanities/social scientific approaches to urban nature. The paper will be due at 5pm, May 8th in my box in Room 111 Buell Hall. Late papers will not be accepted. The paper will account for 35% of the grade. Papers must be typed, double spaced, single sided, and handed in on paper. I will *not* accept electronic submissions.

4) Two exams, March 16 and May 2. The second exam, on the last day of class, will not be cumulative. Each exam accounts for 20% of the grade. There is no final exam scheduled during finals week.

**Academic Honesty**--You are strongly encouraged to discuss class assignments with others, but your work in papers and exams must be your own. Do not quote directly (and direct quotations must be indicated with quote marks " ") or paraphrase from published works (including the web, and including Wikipedia) without a proper citation. Footnote ideas and information that are not common knowledge. When in doubt about what academic integrity requires, ASK! Failure to abide by the principles of academic honesty will result in a failing grade for the course. University of Illinois guidelines can be found at http://studentcode.illinois.edu/article1_part4_1-401.html. You are expected to be familiar with this section of the student handbook.

**Course Schedule**

January 17 **Urban Ecology—Introduction**
Schwarz, Kirsten, Dustin L. Herrmann, and Melissa R. McHale. "Abiotic Drivers of Ecological Structure and Function in Urban Systems." *Urban Wildlife conservation*. Springer US (2014) 55-74.

January 19. **Ecological Niche**
Kark, Salit, et al. "Living in the city: can anyone become an 'urban exploiter'?." *Journal of Biogeography* 34.4 (2007): 638-651.

January 24. **Discussion.**
Biehler, Dawn Day. *Pests in the city: flies, bedbugs, cockroaches, and rats*. University of Washington Press, 2013. Chapter 3, "Flies: Agents of Interconnection in Progressive Era Cities."

January 26. **Island Biogeography—**
Collinge, Sharon K. "Ecological consequences of habitat fragmentation: implications for landscape architecture and planning." *Landscape and urban planning* 36.1 (1996): 59-77.

January 31. **Habitat and Fragmentation—**
Ramalho, Cristina E., and Richard J. Hobbs. "Time for a change: dynamic urban ecology." *Trends in ecology & evolution* 27.3 (2012): 179-188.

Feburary 2. **Metapopulations and corridors—**
LaPoint, Scott, et al. "Ecological connectivity research in urban areas." *Functional Ecology* 29.7 (2015): 868-878.

February 7. **Discussion**
Evans J. "The spatial politics of conservation planning." In Krueger R, (ed.), Gibbs D, (ed.). *The Sustainability Paradox: urban political economy in the United States and Europe*. New York: Guilford. 2008. p. 238-265.

February 9. **Bedbugs**
Wang, Changlu, et al. "Characteristics of Cimex lectularius (Hemiptera: Cimicidae), infestation and dispersal in a high-rise apartment building." *Journal of Economic Entomology* 103.1 (2010): 172-177.

February 14. **Urban Ecology and Disease—**
LaDeau, Shannon L., et al. "The ecological foundations of transmission potential and vector-borne disease in urban landscapes." *Functional ecology* 29.7 (2015): 889-901.

February 16. **Discussion.**
Coreil, Jeannine, Linda Whiteford, and Diego Salazar. "The household ecology of disease transmission: Dengue fever in the Dominican Republic." *The anthropology of infectious diseases: International health perspectives* (2000).

February 21. **Disturbance and Succession,**
Oldfield, Emily E., et al. "FORUM: challenges and future directions in urban afforestation." *Journal of Applied Ecology* 50.5 (2013): 1169-1177.

February 23. **Restoration**
Hobbs, Richard J., et al. "Managing the whole landscape: historical, hybrid, and novel ecosystems." *Frontiers in Ecology and the Environment* 12.10 (2014): 557-564.

Feburary 28. **Discussion**.
Safransky, Sara. "Greening the urban frontier: Race, property, and resettlement in Detroit." *Geoforum* 56 (2014): 237-248.

March 2. **Species Paper due.**

March 2. **Ecosystem Services—**
Gómez-Baggethun, Erik, and David N. Barton. "Classifying and valuing ecosystem services for urban planning." *Ecological Economics* 86 (2013): 235-245.

March 7. **Urban Forests**
Chen, Wendy Y., and C. Y. Jim. "Assessment and valuation of the ecosystem services provided by urban forests." *Ecology, planning, and management of urban forests*. Springer New York, 2008. 53-83.

March 9. **i-tree lab**
http://www.itreetools.org/

March 14. **Discussion**
Heynen, Nik, Harold A. Perkins, and Parama Roy. "The political ecology of uneven urban green space the impact of political economy on race and ethnicity in producing environmental inequality in Milwaukee." *Urban Affairs Review* 42.1 (2006): 3-25.

March 16. **1st Exam**.

March 28. **Measuring Urban Sustainability and Ecological Footprint Analyses**
Roche, María Yetano, et al. "Concepts and methodologies for measuring the sustainability of cities." *Annual Review of Environment and Resources* 39.1 (2014): 519.

March 30. **Urban Metabolism,**
Baccini, Peter, and Paul H. Brunner. Chapter 3, *Metabolism of the anthroposphere: analysis, evaluation, design*. MIT Press, 2012.

April 4. **Urban Metabolism Analysis lab.**
http://www.stan2web.net/

April 6. **Sewage Sludge,**
Schneider, Daniel. "Purification or Profit: Milwaukee and the Contradictions of Sludge." *Histories of the Dustheap: Waste, Material Cultures, Social Justice* (2012): 171

April 11. **Discussion.**
Cousins, Joshua J., and Joshua P. Newell. "A political–industrial ecology of water supply infrastructure for Los Angeles." *Geoforum* 58 (2015): 38-50.

April 13. **Urban bacterial habitats: sewage treatment plants, landfills, industrial ecosystems**

Read, Adam D., Mark Hudgins, and Paul Phillips. "Aerobic landfill test cells and their implications for sustainable waste disposal." *The Geographical Journal* 167.3 (2001): 235-247.

April 18. **Urban wildlife.**
Amanda D. Rodewald , Stanley D. Gehrt "Wildlife Population Dynamics in Urban Landscapes." *Urban Wildlife conservation*. Springer US, (2014) pp 117-147.

April 20 **Urban Rivers**.
Paul, Michael J., and Judy L. Meyer. "Streams in the urban landscape." *Annual review of Ecology and Systematics* (2001): 333-365.

April 25. **Domestic spaces**
Belaire, J. Amy, Christopher J. Whelan, and Emily S. Minor. "Having our yards and sharing them too: The collective effects of yards on native bird species in an urban landscape." *Ecological Applications* 24.8 (2014): 2132-2143.

April 27. **Discussion**
Robbins, Paul, and Julie T. Sharp. "Producing and consuming chemicals: the moral economy of the American lawn." *Economic Geography* 79.4 (2003): 425-451.

May 2. **2nd Exam**

May 8. **Final Paper due**