Biology 262/Env 274, Fall 2013 M/W 3:05--4:20, BioSci 130
Cities and Trees/People, Plants, and Pollution/Constructed Climates
Prof. Will Wilson, wgw@duke.edu, BioSci 250
Office Hours: M 10-1/W 11-1
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With most Americans living in cities or suburbia, an understanding of urban environments becomes more important for making good decisions concerning our future needs. My service on a few of Durham's city and county commissions led to the realization that I needed more information to make a more compelling argument for greater public spending on trees and urban nature. What are the unique features of urban environments? What role does "nature" play in cities? What financial arguments underpin allocating public funds to parks and greenspace versus schools and security? What good are urban trees? Do urban trees capture much carbon while considering their costs? Do urban trees help cool the city? Does urban nature improve citizens' lives? Do all socioeconomic groups have equal access to "urban open space"?

As a result of seeking answers to those questions, I developed this course and the accompanying book. In this course we will learn about the environmental properties of cities, including urban heating and cooling, pollution and health, energy and carbon, air and water quality, economic value, and health and welfare socioeconomic inequities. Sadly, we won't solve issues like global warming or preserving clean water and air, but we will learn about the essential environmental science underpinning the choices we face.

I expect students to prepare for class by finishing the required readings as outlined in the syllabus below. These readings come from the book I wrote, *Constructed Climates* (available at Duke Bookstore and freely available on the web at *constructedclimates.org*), and a primary publication involving the daily book reading assignment.

Each class meeting begins with a four-minute, five-question multiple choice and True/False quiz on the assigned readings, with printed materials allowed for reference. Your advance preparation reduces our reliance on the specifics of lectures and allows for more discussions and clarifications of that material, as well as discussion of related topics.

A one-page, one-sided, summary of the primary publication assigned for the Monday class period will be due at the beginning of Monday's class. Assigned papers may be discussed at length, and randomly chosen students will be asked to lead the discussions of issues the papers cover – thus, come prepared to lead a conversation.

Your course grade involves exams, quizzes, and reading summaries:

3 Exams	20% each
Quizzes	20%
Summaries	20%

Quizzes can not be made up, but the lowest score will be dropped. With a prior Dean's excuse for missing class, an alternative quiz may be taken **during office hours (and with prior notice) within one week after missing the quiz**. Summaries must be submitted to Elle via email (ellee.cook@duke.edu) as a Word or pdf attachment before Monday's class.

Bio262/Env274, Fall 2013 Course Schedule: (vers. 9/4/2013)

Meeting #:Date Reading (Ch:Fig)	**Topics**
1: M 8/26	Introductions; Outline; Grading; Cheating Policy; Overview
2: W 8/28 A:1-6; 1:1,4,5 Pozzi & Small 2005	Graphs and Units; Human densities; Regulation and Limitation; Harvesting vs. Farming; Modern agriculture
3: M 9/2 1:2,3,6,7 Potter et al. 2006	Net primary productivity; evapotranspiration; yield; nitrogen; watersheds
4: W 9/4 1:8-12 Riley et al. 2005	Urban ecology; stormwater; local reservoirs; water quality
5: M 9/9 Reading: Booth 1991 Arnold & Gibbons 1996	Stormwater I
6: W 9/11 2:1-3,8 Wilson et al. 2003	Impervious surfaces; thermal mass; albedo; urban heat island; Solar energy; blackbody radiation; light energy
7: M 9/16 2:4-6,11 Dixon & Mote 2003	UHI-induced storms; urban rain; lightning; absorption and scattering; albedo/shading;
8: W 9/18 2:7,9,10 Souch & Grimmond 2006	heat and water; UHIs and climate change
9: M 9/23 2:12-18 McPherson 2001	physiology:crowns/DBH; scaling; transpiration; heat stress; stormwater; permeable paving
10: W 9/25 Reading: Roy etal 2008 Meyer etal 2003	Stormwater II
11: M 9/30	EXAM I

12: W 10/2 3:1-4 Kiehl & Trenberth 1997	energy reserves; energy sources; units; urban E use; US E use; energy and economy
13: M 10/7 3:5-9 Seneviratne et al. 2006	photosynthesis; light and Ch-*a*; review NPP; biodiversity; nutrients; carbon cycle; pools/fluxes; CO_2 emissions; climate change; phenology; urban/rural differences; soils
14: W 10/9 3:10-13 Jo & McPherson 1995	air conditioning; wood equivalents; solar equivalents; stored/sequestered carbon; footprints; urban tree costs; carbon budget
M: 10/14	*FALL BREAK*
15: W 10/16 3:14-17 Akbari et al. 2001	urban E use; wood heat; energy budget; trees/energy reduction; white roofs
16: M 10/21 4:1-4 Likens et al. 2005	VOCs; emissions; biogenic/anthropogenic; natural selection
17: W 10/23 4:5-9 Kuttler & Strassburger 1999	ozone; troposphere/stratosphere; NO_x; NAAQS; ozone and temperature; 1hr/8hr;
18: M 10/28 4:10-14 McDonald et al. 2007	urban vs. rural levels; ozone damage to plants; coal-burning plants
19: W 10/30	EXAM II

20: M 11/4 5:1-4 Ellis et al. 2006	values:stated/revealed; WTP/WTA; tragedy of the commons; public goods model; ecosystem services
21: W 11/6 5:5-9 Kuo & Sullivan 2001	historical feelings; short/long term costs/benefits; public housing; vegetation and violence; child development; stress; obesity; relative importance; property values
22: M 11/11 5:10-12 Gidlofgunnarson & Ohrstrom 2007	park preferences; neighborhood trees; biodiversity; lyme disease example; air quality
23: W 11/13 6:1-4 Byrd & Joad 2006	heat and mortality; asthma and ozone; MI/pneumonia; demographic transitions
24: M 11/18 6:5-7 Franco & Sanstad 2006	standard mortality; air conditioning
25: W 11/20 6:8-11 Grove et al. 2006	socioeconomic distributions; environmental inequities: heat, vegetation, parks
26: M 11/25 6:12-14 Ezzati et al. 2008	environmental inequities: pollution, health, life expectancy; SAT scores
W 11/27	*THANKSGIVING BREAK*
27: M 12/2	Review
28: W 12/4	Exam III
Sun 12/15	***NO FINAL EXAM***