USC Dornsife
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College of Letters, Arts and Sciences
Spatial Sciences Institute

SSCI 165Lgw |
Sustainability Science in the City

Units: 4

Term-Day-Time: Fall 2015 – MWF – 11:00-11:50 a.m.

Location: THH 202

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Course Description

Sustainability is among the most pressing scientific and social challenges of our time. Typically defined as utilizing natural resources so as to create a high quality of life for *future* as well as current generations, the idea of sustainability has provided a strong orientation towards a long-term re-thinking of the human role in and domination of ecosystems. Yet, despite the emergence of this sustainability discourse in the late 1980s, global climate change, ocean degradation, deforestation, habitat loss, and species endangerment continue nearly unabated. This situation seriously threatens the inventory of natural capital for present and future generations.

In response to such ongoing challenges, the field of *sustainability science* emerged in the late 1990s. It is a multidisciplinary collection of social, physical, and life sciences that work to understand the complex coupling of human and natural systems across global, national, regional, and local scales. Without a deep understanding and reconsideration of the human role in natural systems, it is impossible to envision a sustainable future. Thus, policymakers rely upon various forms of scientific knowledge and the scientific method itself to understand how to re-chart the human journey towards sustainability.

This course is a Category VI (Social Issues) course in the pre-Fall 2015 General Education program. In this course, you will learn how to analyze issues of climate change, resource management, and sustainability using data from the social and natural sciences to assess the validity of arguments about reshaping cities for sustainability. You will also critically evaluate and make use of media, Internet, and traditional academic sources to develop your own digital "Story Maps" on a key issue urban sustainability for one city.

This course is also Social Analysis (Category C) and Citizenship in a Global Era (Category G) course in the Fall 2015 General Education program. In this course, you will learn how social and ethical theories of sustainability relate to the emergence of sustainability science and how theory and empirical work are mutually constitutive. In particular, you will learn why the social and natural sciences and their methods are important to policies and planning for sustainable cities.

In 2008, an important global threshold was reached, with over 50% of people living in cities. According to UN forecasts, by 2050 70% of the Earth's growing population will be living in urban areas. The rapid growth of cities across the world results from a common undercurrent of global political and economic forces that rests on a history of colonialism. An understanding of these forces and how they might be reshaped to create sustainable forms of urban development will be key to our enquiry. Indeed, issues of global sustainability are increasingly *urban* issues: land use, population, consumption, industrial organization, and infrastructural technologies (e.g. energy).

In a series of laboratory experiences and linked writing exercises, you will learn how to articulate the relationships among observed phenomena, the analytical approaches and methods used to understand them, and their societal implications. For example, one

focus of sustainability science is improving our understanding of how the Earth's land cover and land use is changing as a result the growth of cities, and what it means for people and places. In the laboratory, you will learn how technological tools and data, such as geographic information systems and satellite imagery, are used for measuring land use/land cover change and how observed land use/land cover changes are linked to principles of urban form and urban economics. In a related writing assignment, you will consider how land use/land cover influences social well-being, economic livelihoods, and land use politics and regulation.

Learning Objectives

The central learning objective of this course is to enable students to understand how applications of particular scientific methods influence or are influenced by debates over urban sustainability.

Through a series of field and computer lab exercises, students will learn about data collection, non-experimental research design, computational modeling, and scientific validity. Students will learn how sustainability scientists measure and classify both natural and social systems in cities, and how they understand the complex interweaving of these systems with people and technologies. Through hands-on learning in the laboratory and engagement with the sustainability science literature, students will learn how science and analysis methods are connected to real-world challenges of urban sustainability.

Through a final course project called a "Story Map," students will perform analysis using GIS tools and also learn about the challenges and methods for synthesizing and communicating science with the public and policymakers. In our digital world, understanding and producing visual communication is just as important to informed citizenship as writing. The use of these tools is complemented by focused writing assignments in which students reflect on policy implications of laboratory experiences. In this course, students will learn basic cartographic principles and how to integrate maps with sensor data and digital resources to attractively communicate underlying science and policy. By the end of the course, students will be able to evaluate scientific claims and discuss alternative pathways toward sustainable cities with enriched understanding of the scientific context of knowledge and communication skills.

Required Reading and Supplementary Materials

Please acquire the texts listed below, all are available at the USC bookstore. **All other reading** listed in the syllabus is available under the tab marked **"Readings" on the course Blackboard**.

Pljawka, D. and Gromulat, M.A. 2012. Understanding Sustainable Cities: Concepts, Cases, and Solutions. Dubuque, IA: Kendall Hunt.

Smith, D.A. 2000. Third World Cities (Second Edition). New York: Routledge (*Note:* Ebrary book at USC library, available free to students)

Wheeler, S. 2013. Planning for Sustainability: Creating Livable, Equitable, and Ecological Communities (2nd Edition*).* New York: Routledge

Description and Assessment of Assignments

Students must attend all regularly scheduled lectures/in-class exercises, participate in labs, write short responses in online discussions, sit for mid-term and final examinations, and produce a final project called a "story map." **Absences from lab sessions** must be requested by sending an email to the teaching assistant. Excused absences from labs will be granted only for valid reasons; please notify us of the reason for your absence in your email.

Story maps tell about places, issues, and trends by enriching digital maps with content like various kinds of graphs, text, photographs, video, and audio. The underlying data often depict the coupling of social and natural systems. These may be things like wetland areas, land cover, and census data, and may also include live data streams such as temperature, precipitation, and traffic. They often present scientific data and analysis, but they are mainly designed for the general public and do not require their users to have special knowledge or skills in Geographic Information Systems (GIS).

Story maps are increasingly in use in sustainability science and are an important tool to describe the challenges of sustainable cities and pathways toward sustainability. For example, you can see an interactive story map that describes land use footprints of megacities here: http://storymaps.esri.com/stories/2014/growth-of-cities/. This story map was created as part of the Smithsonian's series on *Living in the Anthropocene: the Age of Humans*. Another example shows the warming of European cities as predicted in global climate models (see: http://storymaps.esri.com/stories/2012/warming-cities/).

In this course, you will create story maps that integrate data on social and natural systems around one of our course's learning modules. Additional information on each learning module and the potential for final projects is on the course Blackboard site. Your story maps will integrate scientific data like the examples above but will be focused

at local scales. An example of this sort of integration is a map of green infrastructure created for the City of Nashville (see, http://maps.nashville.gov/LID%5FSites/). For an example of a river revitalization map see: http://ugis.esri.com/LA_River_Tour/#map. Please note however that this particular story map, like some examples of story maps you may see on the web, is simply a montage of geotagged photographs. Your map will be much more than this. It may have photos for context, but it must be primarily an analytical report. It will use visualization of data or models like in the other examples linked above to communicate underlying analysis.

In addition to the lectures and in-class exercises, there is a set of 12 labs across the semester. These laboratory experiences are designed to introduce you to the tools of spatial and social analysis as well as to give you practical experience in implementing these tools to explore various problems within the framework of the scientific method. These assignments are linked to the lectures and class discussions, but do not duplicate the lecture experience. You must register for one laboratory session in addition to registering for the lectures. Your laboratory assignments will be completed during the 2-hour lab sessions and shortly after will be graded and returned

There will also be 6 online discussions on Blackboard (Bb). The purpose of the on-line discussions is to build skills for close reading and critical thinking using articles on social theory and peer-reviewed scientific articles taken from the sustainability science literature. The discussion forums function on Bb is quite useful in this regard. In each discussion, every student will make one short post responding to the instructor's prompt(s) and then make at least two posts responding to posts from other students or further prompts from the instructor and/or teaching assistant. Your participation in the online discussions will be *individually graded* using the gradebook feature on Bb.

Throughout the semester, students will also produce 6 summaries of articles from major press outlets (e.g., Atlantic Cities, Wall Street Journal, New York Times, and Los Angeles Times) on issues of sustainable cities. Students should use these short writing assignments strategically to explore existing interests and build background knowledge for the final project.

There will be one policy essay researched and written in response to a prompt from the instructor. The mid-term and final exams will include content learned in the laboratory sessions, in-class exercises, and online discussions sessions. **No make-up opportunities will be offered for missed exams or labs,** so mark the appropriate dates on your calendars! If you have a legitimate conflict, speak with the instructor as soon as possible. Also, note that there is **no credit for late assignments.**

Grading Breakdown

The following table shows the breakdown of the assignments and their weight in the final grade. The emphasis is on regularly completing a number of short assignments as well as solid performance on examinations and the final project.

Assignments	Number	Total Points (% of Grade)
Online Discussions	6	12
Laboratory Reports	12	24
Policy Essay	1	12
Article Summaries	6	12
Midterm Exam	1	10
Final Exam	1	15
Final Project: Story Map	1	15
Totals	**29**	**100**

Course Schedule

The course will be organized around the following seven modules with accompanying lectures, on-line discussions, in-class exercises, readings, laboratory experiences, and writing assignments:

Module 1| Theories and Key Concepts

Week 1

Class 1 | 8/24: Introduction to Course
Class 2 | 8/26: The Urban Sustainability Problematic
Class 3 | 8/28: Competing Definitions of Sustainability and Sustainable Cities
(*In class exercise: understanding the sustainability triangle)*

Week 2

Class 4 | 8/31: The Global Context of Sustainable Cities
Class 5 | 9/2: Sustainable Cities or Resilient Cities?
(In class exercise: volunteered geographic information (VGI) and urban sensors)
Class 6 | 9/4: Urban Land Development: The Growth Machine vs. Sustainability
(*In class exercise: social science classification*)

For class sessions 1-2 read: Wheeler (2013) pp. 1-84
For class session 3 read: Smith (2000) pp. 1-81
For class sessions 3-6 read: Wheeler (2013) pp. 223-343
For class session 3 & online discussion #1 read: Vos, R. O. 2007. "Defining sustainability: a conceptual orientation." *Perspective in Journal of Chemical Technology and Biotechnology* 82: 334-339.

Module 2| Urban Footprints: Resource Exploitation & Consumption

Week 3

Class 7 | 9/7: Labor Day (No class meeting)
Class 8 | 9/9: Urban Resource Appropriation
Class 9| 9/10: Life Cycle Assessment (LCA) Modeling
(*In class exercise: the life cycle of a t-shirt*)

Week 4

Class 10 | 9/14: The Causes and Consequences of Consumption
Class 11 | 9/16: Reshaping Consumption?
Class 12 | 9/18: Can individual approaches to consumption work?

For class sessions 7-8 read: Wheeler (2013) pp. 86-103 and Pljawak and Gromulat (2012)
For class session 10 read: Princen, T. 2002. "Consumption and its Externalities: Where Economy Meets Ecology pp. 23-42 in T. Princen, M. Maniates, and K. Conca (eds.) *Confronting Consumption*. Cambridge, MA: MIT Press.
For class session 11 read: Goldstein, N.J. and Cialdini, R.B. 2008. "A Room with a Viewpoint: Using Social Norms to Motivate Conservation in Hotels." *Journal of Consumer Research* 35: 472-482.
For class session 12 and online discussion #2 read: Maniates, M. 2002. "Individualization: Plant a Tree, Buy a Bike, Save the World?" pp. 43-66 in T. Princen, M. Maniates, and K. Conca (eds.) *Confronting Consumption*. Cambridge, MA: MIT Press.

Module 3 | Reclaiming Urban Nature

Week 5

Class 13 | 9/21: The Nature of the City
(*In class exercise: What is Wilderness?*)
Class 14 | 9/23: Water Resources in Cities
Class 15 | 9/25: Fieldtrip to Hyperion Treatment Plant (No regular class meeting)

Week 6

Class 16 | 9/28: Urban River Revitalization
Class 17 | 9/30: Gentrification: Social Consequences of Land Use and Land Use Change
Class 18 | 10/2: Fieldtrip to the Los Angeles River (No regular class meeting)

For class sessions 13-15 read: Pljawak and Gromulat (2012) Chapters 5 & 11
For class session 13 and online discussion #3 read: Cronon, W. 1996. "The Trouble with Wilderness: Or, Getting Back to the Wrong Nature." *Environmental History* 1(1): 7-28.
For class sessions 17 read: Wolch et al. 2014. "Urban Greenspace, Public Health, and Environmental Justice: The Challenge of Making Cities "Just Green Enough" *Landscape and Urban Planning* 125: 234-244.

Module 4| Climate Change: Mitigation and Adaptation

Week 7

Class 19 | 10/5: Mitigating GHG Emissions in Cities
Class 20| 10/7: Smart Growth or Smart Growth Machine?
Class 21 |10/9: Adapting to Climate Change in Cities

Week 8

Class 22 |10/12: Special Issue: Urban Heat Islands
Class 23 |10/14: Midterm Exam Review
Class 24 |10/16: Midterm Exam

For class sessions 19-21 read: Wheeler (2013) pp. 105-153; Pljawak and Gromulat (2012) Chapters 8
For class session 22 read: Pljawak and Gromulat (2012) Chapter 9

Policy Essay Due at Start of Class #19

Module 5| Environmental Justice (EJ): Community-based Sustainability Science

Week 9

Class 25 | 10/19: The Social History of Science in the EJ Movement
Class 26 | 10/21: Social and Spatial Analysis of Environmental "Bads"
Class 27 | 10/23: Social and Spatial Analysis of Environmental "Goods"

Week 10

Class 29 | 11/2: Competing Theories of Environmental Injustice
Class 27 | 11/4: The Role of EJ Analysis in Creating Sustainable Cities
Class 28 | 11/6: Special Issue: Ports of Los Angeles and Long Beach

For class sessions 20-21 read: Wheeler (2013) pp. 198-204; Pljawak and Gromulat (2012) Chapter 4
For class session #29 and online discussion #4 read: Pulido, L., S. Sidawi, and R. O. Vos 1996. "An Archeology of Environmental Racism in Los Angeles," *Urban Geography* 17: 419-439.

Module 6| Greening the Urban Economy and Urban Metabolism

Week 11

Class 29 | 11/9: Industrial Ecology: The Science of Sustainability
Class 30 | 11/11: The Urban Metabolism Concept and Models
Class 31 | 11/13: Globalization and Greening the Urban Economy

Week 12

Class 32 | 11/16: Green Jobs and New Regionalism
Class 33 | 11/18: Special Issue: Eco-Industrial Parks
Class 34 | 11/20: Field Trip to Port of Los Angeles (no regular class meeting)

For class session 24 read: Wheeler (2013) pp. 163-172 and Pljawak and Gromulat (2012) Chapter 10
For class session 25 read: Smith (2000) pp. 112-170
For class sessions 25-26 read: Wheeler (2013) pp. 174-179 & pp. 205-209
For online discussion #5 read: Newell, J. (Forthcoming) "Political Ecology of Urban Metabolism."

Module 7| Sustainability Science and Sustainable Citizenship

Week 13

Class 35 | 11/23: Sustainability Indicators: Measurement
Class 36 | 11/25: Thanksgiving Holiday (no class meeting)
Class 37 | 11/27: Thanksgiving Holiday (no class meeting)

Week 14

Class 38 | 11/30: Sustainability Indicators: Reporting
Class 39 | 12/2: How Can Geodesign Contribute?
Class 40 | 12/4: Sustainable Citizenship and Final Exam Review

For class sessions read: Wheeler (2013) pp. 216-220
For on-line discussion #6 read: Bullen, A. and Whitehead, M. 2005. "Negotiating the Networks of Space, Time and Substance: A Geographical Perspective on the Sustainable Citizen." *Citizenship Studies* 9: 499-516.

Final Examination on 12/9 from 11 a.m.- 1 p.m.

Laboratory Topics and Learning Objectives

Module 1 Lab: Modeling Impacts of Sea Level Rise in Manhattan
Module 2a Lab: Measuring Urban Land Cover Change by Satellite
Module 2b Lab: Living Model of Economic Input-Output Life Cycle Assessment
Module 2b Lab: The Carbon Footprint of Los Angeles
Introducing the Story Map
Module 3 Lab: Modeling Urban Forests
Story Map Skills Lab (Fieldtrip Reports)
Module 4 Lab: Analyzing Urban Heat Islands
Module 5 Lab: Environmental Equity & Air Toxics
Module 6 Lab: Modeling Eco-Industrial Symbiosis Opportunities
Module 7 Labs: Open Labs for Work on Story Maps (2)

Each of the 2-hour lab sessions will start on the hour with a brief introduction. These introductions will take no longer than 10 minutes and students arriving more than 10 minutes after the scheduled start times for their 12 laboratory sessions will be turned away and assigned a zero grade for that particular lab assignment. No lab reports will be accepted for grading if handed in outside of the regularly scheduled lab session. One or the other of two different kinds of tasks will be completed during the lab sessions, as explained below.

First, for the lab sessions linked to the course modules (see titles above), you will work on self-guided work tasks using specialized geographic analysis tools and one or more geospatial datasets or computer modeling tools. These tasks should take approximately 75 minutes to complete after which time, the instructor will convene a 15 minute roundtable discussion of what you have done, what it means, and how these tasks might have been varied and/or enhanced if performed by professionals in a real-world setting. The final 15 minutes of this series of lab sessions will be available for each of you to prepare and submit your final lab report for grading.

Second, in other weeks you will engage in a series of tasks during the lab sessions that are not linked to content specific course modules. Instead, these lab sessions will build skills needed for the Story Map final projects. As with the module labs, you will prepare short reports at the end of each lab session demonstrating that you have mastered the particular methods and lab skills being taught at each session.

The sequence of labs ends with two open labs in final weeks of the course. In these open lab sessions, you will make use of the datasets and geospatial software available in the lab to complete components of your story map. This will include connecting with and analyzing custom data and making maps. Some elements of the story map will be completed on your personal computers or using USC's general computer labs on your own time, and other elements will be created in the lab sessions where you have access to geospatial software, including templates to create a web-enabled final product.

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/b/11-00-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.
Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* *http://emergency.usc.edu* will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.