

SUMAK4130 Sustainable Cities

Spring 2014

Instructor: Jit Bajpai

Email: jnb2133@columbia.edu

1. Course Overview

For the first time in history over half the world's population lives in urban areas. Today there are over 400 cities of more than a million residents compared to 12 cities in 1900. By 2050 the share of the world's urban population is expected to reach 70 percent, and most growth will occur in the developing world. As urban population growth continues, urban centers face the problems of aging infrastructure, economic growth, changing climate, congestion, pollution, and demands of inhabitants to enhance their quality of life. Cities consume 75 percent of world's energy and produce almost 80 percent of global GHG emissions. In response many cities are striving to be a low carbon city while sustaining healthy economic and social life. But addressing the new urban agenda requires a new model of cooperation across sectors and all tiers of government to redirect the urban economic development into paths that are restorative. The purpose of this course is to prepare its students to understand, analyze, and develop policies and procedures to address the sustainability issues being faced by urban centers of the developed and developing world, their decision-makers and inhabitants.

2. Course Objectives

Students in the course are assumed to have had no previous in-depth exposure to sustainable urban development and urban planning. By the end of the course, students will have learned the following skills necessary to develop strategies and related actions to enhance sustainability of cities:

- Identify and support the good practices in green and efficient urban development and planning;
- Review policies and foster technologies used to promote energy efficiency and reduced GHG emissions from buildings and transportation;
- Review policies and foster technologies necessary to ensure healthy sanitation;
- Examine policies and foster technologies necessary for the effective collection, disposable, and possible re-use of waste;
- Approaches to climate change adaptation & mitigation measures undertaken by cities; and
- Examine, track, and analyze sustainability metrics and indicators for urban centers

3. Course Content

PART A: SUSTAINABLE CITIES – AN INTRODUCTION

Week 1: Linking Sustainability Concept and Cities

Required Readings:

- Sean Fox: Urbanization as a Global Historic Process: Theory & Evidence from Sub-Saharan Africa, *Population & Development Review*, 38(2), Page 285-310, June, 2012 (see newcourseworks Files and Resources-> Syllabus)
- Campbell Scott, "Green Cities, Growing Cities & Just Cities: Urban Planning & the Contradictions of Sustainable Development", *Journal of American Planning Association* 62:3, 296-312, 1996
<http://www.tandfonline.com/doi/pdf/10.1080/01944369608975696>

Recommended Readings:

- William E. Rees, "Achieving Sustainability: Reform or Transformation?" *Journal of Planning Literature*, Vol. 9, No.4, May 1995, pp-343-361.
<http://jpl.sagepub.com/content/9/4/343.full.pdf+html>
- Portney, Kent E., "Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities", Cambridge, Chapter 1, MIT Press, 2003.

Class Exercise: Participants will complete in advance the personal ecological footprint estimate using the online calculator and determine the potential for reduced resource usage.

<http://coolclimate.berkeley.edu/getwidget>

Week 2: Urban Development and Economics

Required Readings:

- Bret Clark, "Ebenezer Howard and Marriage of Town & Country: An Introduction to Howard's Garden Cities of Tomorrow", *Organization & Environment*, Sage, 2003
<http://oae.sagepub.com/content/16/1/87.full.pdf+html>
- Mathias Wendt, "The Importance of Death and Life of American Cities by Jane Jacobs to Profession of Urban Planning", *New Visions for Urban Affairs*, Volume 1, Spring 2009
<http://www.sppa.udel.edu/sites/suapp.udel.edu/files/The%20Importance%20of%20Death%20and%20Life%20Final.pdf>

Recommended Readings:

- Arthur O'Sullivan, "Urban Economics", Seventh Edition, Chapters 1, 6 &7, McGraw Hill, 2009

Week 3: Sustainable Urban Spatial Structure

Guest Speaker: Alain Bertaud, Former Lead Urban Specialist, World Bank

Required Readings:

- Bertaud Alain, "Clearing the air in Atlanta: Transit or Smart Growth or Conventional Economics", *Journal of Urban Economics* 54, 2003
http://alain-bertaud.com/images/AB_Clearing_The_Air_in%20Atlanta_1.pdf
- Bertaud Alain, "Transportation and Urban Spatial Structure", April 2002
http://alain-bertaud.com/images/AB_Transportation_and_Urban_Spatial_Structure_revised2.pdf
- Echenique M. H., Hargreaves A.H., Michel G. and Namdeo A., "Growing Cities Sustainably", *Journal of American Planning Association*, 78:2, Pages 121-137, 2012
<http://www.tandfonline.com/doi/pdf/10.1080/01944363.2012.666731>

Recommended Readings:

- Transport Research Board, "Driving and the Built Environment: The Effect of Compact Development on Motorized Travel, Energy Use, and CO2 emissions", Summary, Special Report 298, Washington, D.C., 2009,
http://www.nap.edu/openbook.php?record_id=12747

Week 4: Framework for Multi-level Urban Governance & Enabling Policies

Guest Speaker: Prof. Ester Fuchs, Founding Director, Center for Urban Research and Policy, Columbia University

Required Readings:

- OECD, "Cities and Climate Change", Part III Governance Page 171-223, 2010
http://www.oecd-ilibrary.org/governance/cities-and-climate-change_9789264091375-en
- Iclei, "PlanNYC case Study", April, 2010,
<http://www.icleiusa.org/library/documents/PlaNYC%20Media%20Toolkit.zip/view>

PART B: DIMENSIONS OF URBAN SUSTAINABILITY

Week 5: Sustainability Indicators & Low Carbon Cities: A Road Map

Required Readings:

- Portney, Kent E., "Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities", Cambridge, Chapter 2: Measuring the Seriousness of Sustainable Cities, MIT Press, 2003.
- Skea J. and S. Nishioka, "Policies and Practices for a Low Carbon Society", National Institute for Environmental Studies, Editorial 2006.
http://www.fao.org/fileadmin/user_upload/rome2007/docs/Policies%20and%20practices%20for%20a%20low-carbon%20society.pdf
- World Bank, City GHG Emissions per Capita Table, 2010.
http://siteresources.worldbank.org/INTUWM/Resources/GHG_Index_Mar_9_2011.pdf

Recommended Readings:

- C40 Cities, "Climate Action in Megacities, Cities baseline and opportunities", Executive Summary, Pages 1-12, Arup Report, 2011.
<http://www.c40citieslive.squarespace.com/storage/ARUP%20C40%20Basline%20Report.pdf>

Class Exercise: Participants will be divided into sector specific groups. Each group will review in advance the Santa Monica Sustainability Progress Report particularly the sector assigned to them (e.g., housing, resource conservation etc.), and present their group's assessment of the city performance in meeting the planned sustainability goals and targets of the sector.

<http://www.smgov.net/Departments/OSE/progressReport/default.aspx>

Week 6: Urban Design & Travel Mobility

Guest Speaker: Richard Kuzmyak, Principal, Renaissance Planning Group, Arlington, VA

Required Readings:

- Jenks Mike, Jones Colin, "Dimensions of the Sustainable City", Chapter 2: "Elements of Urban Form", SpringerLink, 2010
- Kuzmyak R: "Land Use and Traffic Congestion", Arizona DOT, Report 618, 2012: Executive Summary (pages 1-6) and if interested in supporting literature read Chapter 2 (pages 11-42).
http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ618.pdf

Recommended Reading:

- US. EPA, "Green Communities", <http://www.epa.gov/greenkit/index.htm>

Week 7: Urban Transportation Systems

Required Readings- Read 2 of 3:

- Suzuki H, Cervero R, Luchi K., “Transforming Cities with Transit”, Pages 1-21, The World Bank, 2012
<http://issuu.com/world.bank.publications/docs/9780821397459>
- Jenks Mike, Jones Colin, “Dimensions of the Sustainable City”, Chapter 3: “Travel & Mobility”, SpringerLink, 2010
- Joan Fitzgerald, Emerald Cities: Urban Sustainability & Economic Development, Chapter 6: “Creating a Green Transportation Economy”, Oxford University Press, 2010

Class Exercise: Students will complete review of one of the following four case studies prior to the class. The class will discuss the lessons of each case study and its effectiveness in promoting sustainable transport strategy.

- Lam, S.H. and Toan T.D., “Land Transport Policy and Public Transit in Singapore”, Transportation 33(2): 171-188, 2006
<http://www.springerlink.com/content/q5r8g4211x38664h/fulltext.pdf>
- ESMAP, Bagota, Columbia, Bus Rapid Transit for Urban Transport, Nov. 2009
<http://www.esmap.org/esmap/node/660>
- ESMAP, Cairo - Arab Republic of Egypt, Taxi Scrapping & Recycling Project, 2010
http://www.esmap.org/esmap/sites/esmap.org/files/CS_Cairo_Taxi_Scrapping_and_Recycling_062910.pdf
- Schaller Bruce, “New York City Congestion Pricing Experience and Implications for Road Pricing Experience in US”, NY City DOT, Transport Policy 17, 2010
http://www.nyc.gov/html/dot/downloads/pdf/schaller_paper_2010trb.pdf

Midterm Due 5PM Wednesday March 13th

Week 8: Mid-term Case study Review

http://www.nyc.gov/html/dcp/pdf/cwp/vision2020_nyc_cwp.pdf

March 18-22 Spring recess

Week 9 (March 28): Urban Energy Infrastructure and Energy Efficiency

Guest Speaker: Stefan Denig, Vice-President, Siemens AG

Required Readings:

- Joan Fitzgerald, Emerald Cities: Urban Sustainability & Economic Development, Chapter 3: “Renewable Cities” and Chapter 4: “Building the Energy-Efficient City”, Oxford University Press, 2010.
- Jenks Mike, Jones Colin, “Dimensions of the Sustainable City”, Chapter 6: Energy Use, SpringerLink, 2010

Recommended Reading:

- Feng Liu, Anke S. Mayer, John F. Hogan, “Mainstreaming the Building Energy Efficiency Codes in Developing Countries: Global Experience and Lessons from Early Adopters”, Executive Summary, The World Bank Working Paper 204, ESMAP, 2010.
http://www.esmap.org/esmap/sites/esmap.org/files/WP_204_GBL_Mainstreaming%20Building%20Energy%20Efficiency%20Codes%20in%20Developing%20Countries_Overview_1.pdf

Week 10: Climate Change & Environment

Required Readings:

- The World Bank, Urban Risk Assessment – An Approach for Understanding Climate & Disaster Risk in Cities, 2012, Pages 1-25.
<http://elibrary.worldbank.org/content/book/9780821389621>
- Mehrotra, S., C. E. Natenzon, A. Omojola, R. Folorunsho, J. Gilbride & C. Rosenzweig. (2009). “Framework for city climate risk assessment”, Washington, DC: World Bank, Pages 1–11.
<http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1256566800920/6505269-1268260567624/Rosenzweig.pdf>
- Vision 2020: New York City Comprehensive Waterfront Plan, Chapter 3: “Goal 8 - Increase Climate Resilience”.
http://www.nyc.gov/html/dcp/pdf/cwp/vision2020_nyc_cwp.pdf

Recommended Readings:

- The World Bank, “Climate Resilient Cities – A Primer on Reducing Vulnerabilities to Disasters”, Pages 1-38, 2009
http://siteresources.worldbank.org/INTEAPREGTOPURBDEV/Resources/Primer_e_book.pdf
- The World Bank, “Cities and Climate Change: Responding to an Urban Agenda”, 2011
<http://siteresources.worldbank.org/INTUWM/Resources/340232-1205330656272/CitiesandClimateChange.pdf>
- ICLEI, “Preparing for Climate Change – A Guidebook for Local, Regional and State Governments”, 2007
http://www.iclei.org/fileadmin/user_upload/documents/Global/Programs/CCP/Adaptation/ICLEI-Guidebook-Adaptation.pdf

Week 11: Poverty & Environmental Justice

Required Readings:

- Portney, Kent E., “Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities”, Cambridge, Chapter 6: Is Sustainable City a More Egalitarian Place? Sustainable Communities, Environmental Equity, and Social Justice, MIT Press, 2003.
- Jenks Mike, Jones Colin, “Dimensions of the Sustainable City”, Chapter 5: Social Acceptability, SpringerLink, 2010
- Perlman Janice E., Sheehan Molly O’Meara, “Fighting Poverty & Environmental Justice in Cities”, 2007 State of the World: Our Urban Future, Chapter 9, World Watch Institute.
http://www.megacitiesproject.org/pdf/SOW_07_chapter_9.pdf

Class Exercise: Participants will discuss four cases: Participatory budgeting in Brazil; Innovation in Housing for the Poor: Cemex (<http://www.iccwbo.org/uploadedFiles/WBA/CEMEX.pdf>); Getting private utilities in to slums, Manila water concession; and SEWA: Empowerment through mobilization of poor woman on a large scale (<http://info.worldbank.org/etools/docs/reducingpoverty/case/79/fullcase/India%20SEWA%20Full%20Case.pdf>).

Week 12: Urban Water, Sanitation & Solid Waste Management

Guest speaker: Dan Hoornweg, Chief Safety & Risk Officer, Province of Ontario, Canada and Former Lead Adviser on Sustainable Cities, The World Bank

Required Readings:

- Fitzgerald Joan, Emerald Cities, Chapter 5: “Is There Treasure in our Trash”, Page 116-144, Oxford University Press, 2010.
- Stephenson T., “Municipal Sewage Treatment in 2050”, Presented at the Carbon Impact of the Water Supply, Use and Treatment; Future Plans, Cranfield University, UK, May 2009.
https://dspace.lib.cranfield.ac.uk/bitstream/1826/4281/1/Municipal_Sewage_Treatment_2050-2009.pdf
- Jenks Mike, Jones Colin, “Dimensions of the Sustainable City”, Chapter 9: Neighborhood Designs and Sustainable Life styles, SpringerLink, 2010

Recommended Reading:

- Vision 2020: New York City Comprehensive Waterfront Plan, Chapter 3: “Goal 4- Improve Water Quality”.
http://www.nyc.gov/html/dcp/pdf/cwp/vision2020_nyc_cwp.pdf
- World Bank, “Waste Management in China: Issues & Recommendations”, Working Paper no. 9, Infrastructure Department, East Asia & Pacific Region, 2005
<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/EXTEAPREGTOPURBDEV/0,,contentMDK:20535612~pagePK:34004173~piPK:34003707~theSitePK:573913,00.html>

Week 13: Case Studies – Student Presentations

Each of the five case study groups will prepare in advance a brief presentation (15 minutes or 6-7 slides) on their respective case study lessons for the class. The presentation should highlight the key features of sustainability actions, their effectiveness and potential for replication.

- Hammarby Sjostad, Stockholm, Sweden, 2007
<http://www.aeg7.com/assets/publications/hammarby%20sjostad.pdf>
<http://www.hammarbysjostad.se/inenglish/pdf/Grontmij%20Report%20eng.pdf>
- Melbourne, Australia
<http://www.melbourne.vic.gov.au>
- Liverpool Sustainable Development Plan, 2005
<http://liverpool.gov.uk/Images/SustainableDevelopmentPlan.pdf>
- Rotterdam Mitigation Action Program, 2010,
<http://www.rotterdamclimateinitiative.nl/documents/ENG-mitigation-annual-plan2010.pdf>
Rotterdam Adaptation Program, 2010,
http://www.rotterdamclimateinitiative.nl/documents/RCP/English/RCP_ENG_def.pdf
- City of London 2010, Delivering London’s Energy Future: The Mayor’s Draft Climate Change Mitigation & Energy Strategy for Consultation with London Assembly and Functional Bodies, February, 2010
http://www.london.gov.uk/climatechange/sites/climatechange/staticdocs/Delivering_Londons_Energy_Future.pdf

PART C: SUSTAINABILITY PLANNING

Week 14: Approach to Sustainability Planning

Required Readings:

- The World Bank, “Eco2 cities Ecological Cities as Economic Cities”, 2010

http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/Eco2Cities_synopsis.pdf

- Low Carbon City Development Guidance in Japan, Ministry of Land, Infrastructure, Transport & Tourism, presentation on Oct. 22, 2010
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1270074782769/6925944-1288991290394/Day2_P2_2_MLIT_forWeb.pdf

Class Demo.: ESMAP, TRACE a tool for Rapid Assessment of City Energy, 2010.

<http://www.esmap.org/esmap/sites/esmap.org/files/TRACE%20%20PAGER%202011.pdf>

Week 15: GHG Emission Analysis and Carbon Financing

Guest Speaker: TBD

Required Readings:

- World Bank, "A city-wide approach to carbon finance", 2010
http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/A_city-wide_approach_to_carbon_finance.pdf
- C40, ICLEI, WRI, "Global Protocol for Community Scale GHG Emissions", June 2012
http://www.ghgprotocol.org/files/ghgp/GPC_PilotVersion_1.0_May2012_20120514.pdf
- UNFCCC, "CDM Methodology Booklet", Nov. 2010
http://cdm.unfccc.int/methodologies/documentation/meth_booklet.pdf#IV
- UNEP, Guidebook to Finance CDM projects, May 2007
<http://cd4cdm.org/Publications/FinanceCDMprojectsGuidebook.pdf>

Class Review: Participants will review various aspects of the selected projects including the description of project activities, GHG emission estimation, monitoring framework, IRR calculation etc.

- Metro Delhi, India, CDM project
<http://cdm.unfccc.int/Projects/DB/SQS1297089762.41/view>
- Salta Landfill Gas Project, Argentina, July 2007
http://www.netinform.net/KE/files/pdf/Salta_SSC_PDD_v9_06Nov2007.pdf

4. Method of Grading and Evaluation

Attendance (10% of Final Grade)

Attendance is mandatory for each class session. If you have to miss class for any reason, you must notify the professor by e-mail before the start of the class session. Each unexcused absence will negatively impact your overall grade in the class. Two or more unexcused absence could result in failure to pass the course.

Reading Responses (10% of Final Grade)

Each week, students will post brief "Reading Responses" between 250-300 words to the Course works Discussion page by 11am the Tuesday before class. These posts will be succinct responses to that week's reading assignments, identifying at least 2 key themes of the reading and suggesting one area for further class discussion. Reading responses will not be individual grades, but an overall grade will be assigned based on timely submission and completeness of the responses.

First Group Presentation: 5%

Each student will be randomly assigned to one of the study groups to review the progress report of a city's sustainability indicators. Working as a group, students will prepare a 5 to 7 minute PowerPoint presentation on the group assessment of the progress made in meeting the goals and targets of each area.

Midterm Examination: 25%

The midterm examination will be a 5-page (double-spaced, Times New Roman 12 point font) paper responding to questions on an assigned case study. The midterm examination will be due at the start of class on the assigned date.

Group Project/Presentation: 20%

Each student will be randomly assigned to one of five case study groups. Working as a group, students will prepare a 3-page (double-spaced, Times New Roman 12 point font) paper and a 5 to 7 minute PowerPoint presentation responding to the questions outlined in the case study.

Final Examination: 30%

The final examination will be a 10-page (double-spaced, Times New Roman 12 point font) paper comparing and contrasting 2 world cities with populations greater than 5 million (one developed/one developing) in terms of. The final examination will be due by e-mail at the end of the final exam period.

Grading Policies:

The following identifies how points awarded to individual assignments translate into letter grades for the course:

A= 93-100, A- = 90-92, B+ = 87-89, B = 84-86, B- = 80-83, C+ = 77-79, C = 74-76, C- = 70-73, D = 66-69, F = 65 or fewer

Late Assignment Policy:

Assignments are due on the dates/times identified. One letter grade will be deducted from any assignment submitted after the due date/time. Assignments not received by the time final grades must be submitted will receive zero points for the assignment.

Incompletes:

As outlined in the School's grading and academic starts policy, "A grade of 'I' (incomplete) is a temporary grade indicating failure to complete assigned work. The mark is given only upon the request of the student and at the discretion of the instructor. The student and faculty member must sign a completed 'Request for Grade of Incomplete Form' before the final class session. The 'I' must be removed within one year after the end of the semester in which the student received the grade. Students seeking an extension of this time limit must have the approval of the instruction and successfully petition of the director of their program. If no petition is made, or if the petition is unsuccessful; the grade is changed to an N-Permanent Incomplete- which remains on the student's permanent record."

5. Textbooks and Course Readings

Chapters from a variety of different textbooks and journal articles will be used throughout this course. All texts can be found either electronically or have been placed on reserve in the University library system. Unless otherwise noted, these readings are required and should be read prior to the appropriate session. Some readings are identified as *recommended* (i.e. you

are not required to read them), but they contain information that may be useful as you complete your course assignments.

Text Books:

- Portney, Kent, "Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities", Cambridge, MIT Press, 2003.
- Jenks Mike, Jones Colin, "Dimensions of the Sustainable City", SpringerLink, 2010 (also available as an e-book at the Columbia University Library).
- Joan Fitzgerald, "Emerald Cities: Urban Sustainability & Economic Development", Oxford University Press, 2010.

Suggested Additional Readings:

Stephen Coyle, "Sustainable and Resilient Communities", John Wiley & Sons Inc., 2011

Heinberg Richard & Lerch Daniel, "The Post Carbon Reader", Watershed Media, 2010

Bogart, William. "Don't call it Sprawl: Metropolitan Structure in the 21st Century". New York: Cambridge University Press, 2006.

Allen, A. 2001. "Containment landfills: the myth of sustainability." *Engineering Geology*.60 (1-4): 3-19

Gadgil, A. 1998. "Drinking water in developing countries." *Annual Review of Energy and Environment* 23: p.253-286.

Hailstorm, D., Jeppsson U., and Kärrman, E. 2000. "Assessment Methodologies for Urban Infrastructure." *Environmental Impact Assessment Review* 20(3): 311-321.

Cynthia Rosenzweig, William D. Solecki, Stephen A. Hammer & Shagun Mehrotra, "Climate Change and Cities", Cambridge University Press, 2011

Jonathan Dickinson, "Inventory of New York City Greenhouse Gas Emissions", April, 2007
<http://books.google.com/books?hl=en&lr=&id=c2OLIYNxETMC&oi=fnd&pg=PA5&dq=Inventory+of+New+York+City+Greenhouse+gas+emissions&ots=kD4HC3zsDb&sig=iWWvXtk8RX-ExXjpQfC9kyawhpQ#v=onepage&q&f=false>

Moreno, E., and Warah, R. 2006. "The State of the World's Cities Report 2006/7: Urban and slum trends in the 21st century." *UN Chronicle*. 43 (2). Retrieved on January 28, 2010, from <http://un.org/Pubs/chronicle/2006/issue2/0206p24.htm>

World Bank, "China Low Carbon Cities Book", Chapter 1.3: Low Carbon Cities in China: Characteristics, Roadmap and Indicators, Sept. 2011

Ted Talk by Norman Foster on Green Agenda
http://www.ted.com/talks/norman_foster_s_green_agenda.html

Ted Talk by William McDonough on Cradle to Cradle Design

http://www.ted.com/talks/william_mcdonough_on_cradle_to_cradle_design.html

Senseable

<http://senseable.mit.edu/livesingapore/visualizations.html>

6. Policies

Academic Integrity

The School of Continuing Education does not tolerate cheating and/or plagiarism in any form. Those students who violate the Code of Academic and Professional Conduct will be subject to the Dean's Disciplinary Procedures. The Code of Academic and Professional Conduct can be viewed online at: <http://ce.columbia.edu/node/217>

Please familiarize yourself with the proper methods of citation and attribution. The School provides some useful resources online; we strongly encourage you to familiarize yourself with these various styles before conducting your research.

Violations of the Code of Academic and Professional Conduct will be reported to the Associate Dean for Student Affairs.

Accessibility Statement

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>