CEE 8813C: Infrastructure, Megacities and Sustainable Development
School of Civil & Environmental Engineering
Georgia Institute of Technology
Spring 2009

COURSE SYLLABUS

Instructor: Dr. Adjo Amekudzi
Credits: 3 Hours
Course Location: Mason 142A, W: 3:05 – 5:55P

Office Hours: By Appointment
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COURSE DESCRIPTION

Megacities are defined by the United Nations as cities with over 10 million people. While there were two megacities in the world in 1950 (i.e., New York and London), there are at least 25 megacities around the world today and several examples where megacity conglomerations have begun to develop into megaregions. Demographic data show that in the year 2000, urban populations outnumbered rural populations for the first time in the history of the world; and projections show that by the year 2030 two-thirds of the world's population will live in urban areas. With this rapid urbanization, a new urban environment is emerging that will require improved approaches to infrastructure development and management to maintain global economic competitiveness, regional quality of life, and the overall sustainability of cities and regions around the world. This graduate-level elective introduces a Sustainable Engineering (SE) paradigm and reviews ideas and approaches to infrastructure decision making to promote sustainable development.

COURSE OUTCOMES

Upon completing this course, students will demonstrate understanding of the ideas, theories and issues that frame the provision of infrastructure to promote sustainable development in megacities and megaregions around the world. They will be able to discuss the strengths and limitations of existing theories and analytical tools to assist with infrastructure investment decision making; and they will be able to select and apply appropriate tools to assess infrastructure systems for their contributions to sustainable development. They will demonstrate knowledge of the infrastructure and sustainability literature. They will also demonstrate basic research and information skills, and the basic principles of technical communication: written, oral and visual, in their term project papers and oral presentations. The importance of leadership in sustainable development will be introduced through selected readings and lectures in the course.

COURSE CONDUCT

This Georgia Tech Honor Code is the standard of conduct for this course. The Honor Code is available at http://www.honor.gatech.edu/. Discussion and interaction are important in this course. Discussion is encouraged on homework assignments and group projects. However, each student is expected to turn in a unique solution. Discussion and collaboration on in-class and take-home exams is unacceptable. Plagiarism is unacceptable. To understand what constitutes plagiarism, review the following website produced by the Writing Tutorial Services at Indiana University, Bloomington, IN: www.indiana.edu/~wts/wts/plagiarism.html. Breaches of academic honesty (plagiarism or cheating) will be dealt with in accordance with University policy.

COURSE EVALUATION

	Standard	Alternate
Homework (5)	40%	40%
Midterm (1)	30%	15%
Term Paper/Presentation (1)	30%	30%
Final (Optional)	0%	15%

COURSE READINGS

Students will be provided with a compilation of selected articles and book chapters over the course of the semester on various topics including the following: sustainable development and transportation, megacities and megaregions, sustainability plans and policies, sustainability evaluation methods, performance measurement and indicators, green design standards and asset management.

COURSE OUTLINE

Week	Date	Topics	Out	Due
1	1/7	Course overview Global Trends and Sustainable Development	HW 1	
2	1/14	Current Issues in Transportation and Sustainable Development -- TRB Conference		
3	1/21	Sustainability Policies and Plans; Planning Paradigms and Methods	HW 2, Term Project	HW 1
4	1/28	Sustainability Evaluation Methods: MultiCriteria Methods, Footprint Analysis, LCA, Multiobjective Methods		HW 2
5	2/4		HW 3	
6	2/11	Sustainability Performance, Performance Measures and Indicators		HW 3
7	2/18	Research and Information Skills (Li) Engineering Communications (Rosenstein)		Project Description
8	2/25	MIDTERM		
9	3/4	Megacities, Infrastructure and the Environment in Developing Regions		Project Bibliography
10	3/11	Green Design Standards	HW 4	Lit Review Synthesis
11	3/18	*Spring Break*		
12	3/25	Asset Management: Overview and Current Issues		Abstract and Outline, HW 4
13	4/1	Infrastructure Evaluation and Reporting	HW 5	Draft Paper
14	4/8	Leadership		HW 5
15	4/19	Project Presentations		
16	4/22			Final Paper and Slides
17	4/27	FINAL		

Disclaimer: This syllabus is provisional and may be amended during the semester as necessary. Any changes will be announced in class. 1/6/09

CEE 8813C

INFRASTRUCTURE, MEGACITIES & SUSTAINABLE DEVELOPMENT

Amekudzi
Reading List

Spring 2009

Georgia Institute of Technology

READING LIST

Week 1: Global Trends and Sustainable Development

George Musser. **The Climax of Humanity**, Scientific American Special Issue: Crossroads for Planet Earth, September 2005.

Joel E. Cohen. **Human Population Grows Up**, Scientific American Special Issue: Crossroads for Planet Earth, September 2005.

Michael Webber. **Catch-22: Water vs. Energy**, Scientific American Special Issue: Earth 3.0 – Solutions for Sustainable Progress, October 2008.

Erla Zwingle. **Cities -- Challenges for Humanity**, National Geographic Magazine, November 2002.

Week 2: Current Issues in Transportation and Sustainable Development

Articles from 2009 Annual Transportation Research Board Conference

Week 3: Sustainability Policies and Plans; Planning Paradigms and Methods

Margaret Dewar and David Epstein. Planning for "Megaregions" in the United States. Journal of Planning Literature, 2007, 22; 108 – 124.

Paul J. H. Schoemaker. Scenario Planning: A Tool for Strategic Thinking, Sloan Management Review, Winter 1995.

New Zealand Transport Strategy, 2008. New Zealand Ministry of the Environment.

European Union, Common Transport Policy, 1992 –

Week 4/5: Sustainability Evaluation Methods

Christy Mihyeon Jeon; Adjo A. Amekudzi and Randall L. Guensler. Sustainability Assessment at the Transportation Planning Level: Performance Measures and Indexes. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C.

Josias Ziestman; William E. Knowles; Tara L. Ramani; Jae Su Lee; and Brian S. Bochner. Sustainability Enhancement Tool for State DOTs using Performance Measurement. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C.

Adjo Amekudzi and C. Jotin Khisty. Sustainability Footprints, Calculus and Infrastructure Systems Evaluation. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C.

Week 6: Sustainability Performance, Performance Measures and Indicators
Christy Mihyeon Jeon and Adjo Amekudzi. Addressing Sustainability in Transportation Systems: Definitions, Indicators and Metrics. ASCE Journal of Infrastructure Systems, Vol. 11, No.1, March 1, 2005: 31-50. Robert A. Johnston. Indicators for Sustainable Transportation Planning. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C.
Week 7: Engineering Communication/Research and Information Skills
Hojjat Adeli. On Principles of Scholarly Research Contributions: How to Avoid Multiple Rounds of Review. Handout: Fundamental Elements of an Abstract (Rosenstein)
Week 8: MIDTERM
N/A
Week 9: Asia and Sub-Saharan Arica
Infrastructure. The Africa Report. No. 8, October 2008: 116- 120 Om Prakash Agarwal and Samuel L. Zimmerman. **Towards Sustainable Mobility in Urban India**. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C. Jiang Yulin and Li Zhenyu. **Environmental Governance for Sustainable Transportation in China**. 2008 Annual Meeting of the Transportation Research Board, CD ROM Proceedings, Washington, D.C.
Week 10: Green Design Standards
The Green Highways Partnership, http://www.greenhighways.org/ NYSDOT, Green LITES Project Design Certification Program, Report, September 2008. WASDOT, Green Roads: A Sustainability Rating System for Roadways. Martina Soderlund, Stephen Muench, Kim Willoughby, Jeff Uhlmeyer and Jim Weston, TRB 2008 Annual Meeting CDROM US Green Building Council, US Environmental Protection Agency, LEED Rating

Systems, http://www.usgbc.org
Week 11: Spring Break
N/A
Week 12: Asset Management
National Asset Management Group (NAMS). International Infrastructure Management Manual – Version 3.1, 2006. (Selected Readings) American Association of State Highway and Transportation Officials, 2002 Transportation Asset Management Guide, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C. (Selected Readings)
Week 13: Infrastructure Evaluation and Reporting
ASCE Report Card, www.asce.org GA ASCE Report Card, www.ascega.org National Council on Public Works Improvement (NCPWI), **The Nation's Public Works, Defining the Issues**, Washington, D.C., 1986. Chp. 2: Needs Studies: 7-21. **Fragile Foundations: A Report an America's Public Works**. National Council on Public Works Improvement, February 1988.
Week 14: Leadership
Marcus Buckingham and Donald O. Clifton. Now, Discover Your Strengths, The Free Press, New York, 2001. Maxwell, John. The 360 Degree Leader, Nelson Business: 2005.
Weeks 15/16: Project Presentations
N/A

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