

University of Illinois at Urbana-Champaign

Department of Urban and Regional Planning

UP 430/CEE 417 Urban Transportation Planning,  
Spring 2008 Mondays, 6 to 9 PM  
<http://epil.urban.uiuc.edu:8900/>  
225, 227 Temple Buell Hall

Instructors: Prof. Tschangho John Kim ([tjohnkim@uiuc.edu](mailto:tjohnkim@uiuc.edu))  
Dr. Jong Sung Lee ([jonglee@ncsa.uiuc.edu](mailto:jonglee@ncsa.uiuc.edu))  
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## UP 430: URBAN TRANSPORTATION PLANNING

### COURSE OVERVIEW

The course will examine a number of the more important issues, descriptive and analytical, dealing with urban transportation. We begin by taking a close look at the historical development of urban transportation and the fundamental question of the role of transportation in urban development. We will continue by examining the characteristics of urban transportation systems and their planning processes while emphasizing the use of analytical tools including CUBE, a transportation-planning package.

### REQUIREMENTS AND GRADING POLICY

A final term project, done with a partner, will be required for the course. In addition to the project, several short essays (five double-spaced pages a piece) and exercises will be assigned as the course progresses. The purpose of the essays and projects is to provide opportunities to integrate the principles of the course by analyzing selected problems in urban transportation. Assignments are expected on their due date. The grades on assignments submitted less than one week late will be reduced by one-half mark (ex. from A- to B+); assignments that are received between one to two weeks late will be reduced by one full grade. No credit will be given for assignments that are more than two weeks late.

The final grade for the course will be determined by the following criteria:

- Final Term Project: 30%
- Essays and Exercises: 60%
- Class Participation: 10%

### READING MATERIALS

The following article will be posted on the class web site:

Kim, Tschangho John, 2002, Transportation Planning and Engineering, in Knowledge for Sustainable Development - An Insight into the Encyclopedia of Life Support Systems, UNESCO Publishing-EOLSS Publishers, Paris, France, Oxford, UK.

Chapters of the following book published by UNESCO edited by Prof. Tschangho John Kim will be posted on the class web site. The full citation is:

[Author Name], 2004, [Chapter Title], in Transportation Planning and Engineering, edited by Tschangho John Kim, in Encyclopedia of Life Support Systems (EOLSS), EOLSS Publishers, Oxford, UK, [<http://www.eolss.net>]. For an abbreviation, the articles will be referred as EOLSS.

Assigned reading materials and books are reserved in the following places:

[CW] These reading materials will be available at the class web site

(<http://epil.urban.uiuc.edu:8900/>, username and password will be announced in the class).

[CPX] These materials are available at City Planning and Landscape Architecture Library.

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[ER] These materials are available at E-reserves

(<http://web.library.uiuc.edu/ereserves/querycourse.asp>).

[Web] These reading materials are available at the given web site.

## COURSE SCHEDULE

### **WEEK 1 (Jan 14): Transportation System and Policy Evolution -- An Historical Perspective**

Objective: An understanding of how transportation technologies developed is a prerequisite for sound transportation systems and policy analysis. In this section, we attempt to describe some important technological transportation innovations, their life cycles, and policy evolution.

Readings: [CW] Garrison, William L. 2004a, Historical Transportation Development, EOLSS  
[CW] Garrison, William L. 2004b, Technological Changes and Transportation Development, EOLSS  
[CW] Thompson, Gregory L. 2004, Transportation Development and Institutional Changes, EOLSS  
[CW] Nolan, James 2004, History of Goods Transportation, EOLSS  
[CPX] Bailey, Elizabeth E. 1989. Public Policy Appraisal: Two Hundred Years of Transportation and Communication Policy. Urbana-Champaign, IL: The Institute of Government and Public Affairs, University of Illinois

### **WEEK 2 (Jan 23): Problems in Transportation**

Key Questions: What is the global transportation problem? What is it about national transportation problems that make explicit government policy necessary, and what are (or should be) the aims of such policy? What are the advantages and disadvantages in dealing with transportation problems of a centrally planned society and a free enterprise society? What are non-transportation variables that cause transportation problems? What are socio-economic problems stemming from transportation systems?

Additional Questions: Is there a global energy problem? What trends of oil consumption are associated with automobile transport? What would be effective strategies to save fuel? Will a free transit system attract a significant number of riders? Can promoting transit systems save significant energy? What are the grounds that enable the government to take forceful steps to control vehicle emissions and noise? What are elasticities and how are they measured? Which is more prone, automobile or mass transit, to fatal accidents of occupants and non-occupants? What are the major causes of traffic accidents and which system is the most cost-effective for reducing accident rates? How much public control can society accept at the cost of reducing individual freedom? Is subsidy necessary in transportation? If so, who pays and who benefits? Which mode of transportation has received more subsidies and what are the

implications? What kind of system can bring more mobility to mobility-deprived people at low cost? What kind of fare system will equalize interests of different income groups? What is the historical background of federal regulations on transportation? What are costs and benefits of deregulation? Why have elected officials resisted congestion pricing although many analysts have shown its efficiency for reducing congestion? What is the impact of the congestion pricing on land use? What is the impact of the congestion pricing on the issue of equity? Will the congestion pricing help to revitalize central business districts or become another cause for further deterioration? Has congestion worsened or improved in the major U.S. metropolitan areas? Have highways been a force for urban dispersal?

- Readings:**
- [CW] Kim, Tschangho John 2002, Transportation Engineering and Planning
  - [CW] Benekohal, Rahim 2004, Safety of Transportation, EOLSS
  - [CW] Boyce, David 2004a, Transportation Systems, EOLSS
  - [CW] Boyce, David 2004b, Urban Transportation, EOLSS
  - [CW] Lay, Max G. 2004, Highways and Private Modes of Transportation, EOLSS
  - [CPX] Owen, Wilfred. 1972. *The Accessible City*. Washington, D.C.: The Brookings Institution.
  - [CPX] Altshuler, Alan, editor. 1979. *Current Issues in Transportation Policy*. Lexington, MA: Lexington Books.

**Essay 1:** An essay on any question listed on Week 2. **Due January 28, 2008.**

### **WEEK 3 (Jan 28): Transportation Goals and Objectives**

**Objective:** Understanding and pursuing broad goals as an integral part of the planning process is critical in the planning of transportation. Transportation is an element of the urban structure so pervasive in its influence that it must be considered as a fundamental factor in shaping both urban form and structure.

- Reading:**
- [CW] Bannister, David 2004, Sustainable Transport and Public Policy, EOLSS
  - [CW] Haynes, Kingsley E. 2004, Sustainable Institutions for Transportation Management: Principles and Evolution, EOLSS
  - [CW] Nijkamp, Peter 2004, Perspectives on Sustainable Transport, EOLSS
  - [CW] Nijkamp, Peter; Verhoef, Erik; Ubbels, Barry and Rodenburg, Caroline 2004, Sustainable Mobility, EOLSS
  - [CW] Schoon, John G. 1996. Transportation Systems and Service Policy: A Project-Based Introduction. New York, NY: Chapman and Hall. pp. 3-27
  - [ER] Tracz, Marian and B. Wawrzynkiewicz. 1993. Knowledge Acquisition from Multiple Experts: A Case of Transport Planning in Poland. In *Expert Systems in Environmental Planning*, edited by J.R. Wright, L.L. Wiggins, R.K. Jain, and T.J. Kim. New York, NY: Springer-Verlag. 261-274.
  - [CPX] Weiner, pp. 71-136 (Chs. 7-10)

**Essay 2:** An essay that identifies and contrasts different strategies or categories of controls on emissions from transportation. Include a discussion of your thoughts on the effectiveness (or suggestions for improvements) of the measures you choose to discuss. **Due Feb 4, 2008.**

#### **WEEK 4 (Feb 4): Transportation System Impacts**

**Objective** Transportation system impacts cover a broad spectrum, from the destruction of historic landmarks to the economic development of entire urban areas. We will consider the specific issues of energy consumption, air pollution, noise, land values and visual impacts. Particular attention will be given to the impacts of the 1990 Clean Air Act Amendments (CAAA) and its mandates on emission reduction as well as the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) and the 1998 Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21).

**Reading:**

[CW] Button, Kenneth 2004, Social Change and Demand for Mobility, EOLSS  
 [CW] Himanen, Veli 2004, Transportation and Air Quality, EOLSS  
 [CW] Lakshmanan, T.R. and Anderson, William P. 2004, Transportation in the 21st Century: Technological Innovation, EOLSS  
 [CW] Newman, Peter 2004, Transport and Energy, EOLSS  
 [CW] Niles, John S. 2004, Telecommunications Substitution for Transportation, EOLSS  
 [CW] Stough, Roger 2004, Mobility and Social, Technological and Environmental Changes, EOLSS  
 [CW] Stough Roger R. and Yang, Guang 2004, Intelligent Transportation Systems, EOLSS  
 [CW] Kim, Tschangho John; Lee, Jong Sung; Kang, Eun-Ah; Crelling, Ian and Stratus Consulting, Inc, 2001, Evaluation of Episodic and Seasonal Emission Control for Transportation in Illinois, Illinois Transportation Research Center, IDOT.  
 [ER] Ortolano, L. 1997. *Environmental Regulation and Impact Assessment*. New York, NY: John Wiley and Sons, Inc. 265-282 and 315-344.  
 [ER] Kim, T.J. and P.F. Hanley. 1996. Short-Term Impact Analysis of Pricing Strategies on VMT Reduction. In *Transport, Land-Use and the Environment*, edited by Y. Hayashi and J. Roy. Dordrecht, The Netherlands: Kluwer Academic Publishers: 191-209.  
 [ER] Shrouds, J.M. 1995. Challenges and Opportunities for Transportation: Implementation of the Clean Air Act Amendments of 1990 and the Intermodal Surface Transportation Efficiency Act of 1991. *Transportation* 22: 193-215.  
 [Web] The Federal Highway Administration of the United States Department of Transportation webpage on TEA-21 (<http://www.fhwa.dot.gov/tea21/>)  
 [ER] Miericke, E. and T.J. Kim. 1993. TRAMS: Transportation Related Air Management System. *Computers, Environment, and Urban Systems* 17, 6: 521-531.

### **WEEK 5 (Feb 11): Evaluation of Transportation Alternatives**

**Key Questions:** What is cost-benefit analysis? What are its advantages and disadvantages? What is the theory behind consumer surplus and how do we apply it to evaluate alternative transportation proposals? What are the relationships among the capital recovery factor, interest rates and discount rates? What are the differences between the cost-benefit analysis and cost-effectiveness analysis? Have the real world decision-making processes been based on cost-benefit analysis or cost-effectiveness? How can the general public or civic groups participate in transportation decision-making processes?

**Readings:** [CPX] Golden, B.L., E.A. Wasil and P.T. Harker, editors. 1989. *The Analytic Hierarchy Process: Applications and Studies*. New York, NY: Springer-Verlag.  
[CPX] Adler, H. 1987. *Economic Appraisal of Transport Projects*. Baltimore, MD: The Johns Hopkins University Press.  
[ER] Ortolano, L. 1997. *Environmental Regulation and Impact Assessment*. New York, NY: John Wiley and Sons, Inc. 374-401.  
[CPX] Stokey, E. and R. Zeckhauser. 1978. A Primer for Policy Analysis. New York, NY: W.W. Norton. 134-176  
[CPX] Weiner, pp. 125-136 (Ch. 10)

**Essay 3:** An essay describing TIGER files and their usefulness for transportation planning. **Due Feb. 18, 2008.**

### **WEEK 6 (Feb 18): Transportation Data Management Systems**

**Objective:** We will examine the types of data usually required by transportation planners and the techniques used to gather this information. We will identify sources of data including census files.

**Readings:** [CPX] Klosterman, Richard E. 1992. *TIGER: A Primer for Planners*. Planning Advisory Service (PAS) Report Number 436. Chicago, IL: American Planning Association.  
[ER] Lew, Alan A. and Richard E. Klosterman. 1992. Taking TIGER by the Tail: A Software and Data Review. *URISA Journal* 4, 2: 106-117.  
[ER] Klosterman, Richard E. and Alan A. Lew. 1992. TIGER Products for Planning. *Journal of the American Planning Association* 58, 3: 379-385.  
[ER] You, Jinsoo, Z. Nedovic-Budic, and T.J. Kim. 1997. A GIS-Based Traffic Analysis Zone Design: Technique (Part I). *Transportation Planning and Technology* 21: 45-68.  
[ER] You, Jinsoo, Z. Nedovic-Budic, and T.J. Kim. 1997. A GIS-Based Traffic Analysis Zone Design: Implementation and Evaluation (Part II). *Transportation Planning and Technology* 21: 69-91.

**Essay 4:** Write an essay recommending the desirable transportation system options for reducing traffic congestion and emissions in US metropolitan areas. Or an essay responding to one of the questions posted at week 6 or another of your choosing related to mass transit. **Due Feb 25, 2008.**

### **WEEK 7 (Feb 25): The Options -- Mass Transit**

**Key Questions:** Are mass transit systems desirable even if the ridership has been steadily declining? Is it economically feasible to revitalize mass transit systems? What actions should be taken by public and private sectors to achieve revitalization? What are sufficient and necessary conditions to achieve an increase of transit ridership? What are the policy options and technological options for alleviating current transportation problems? What are the relationships between the cost-effective policy options and their political feasibility of acceptance? What are orders of acceptability among innovative options with respect to political systems in the U.S.? What options do we have that have to do with regional transportation and freight transportation problems?

**Readings:** [CW] Brooks, Mary R. 2004, Water Transport Systems and Port Developments, EOLSS  
[CW] Inamura, Hajime 2004, International and Interregional Transportation, EOLSS  
[CW] Lave, Roy E. and Mathias, Rosemary G. 2004, Paratransit Systems, EOLSS  
[CW] Lee, Yeong Heok, Yoo, Kwang Eui and Park, Changho 2004, Airport Design and Development, EOLSS  
[CW] Martland, Carl 2004, Railroad Transportation, EOLSS  
[CW] Pels, Eric 2004, Network Developments in Aviation, EOLSS  
[CW] Vuchic, Vukan 2004, Urban Public Transportation Systems, EOLSS  
[ER] Gomez-Ibanez, J.A. 1996. Big-City Transit Ridership, Deficits, and Politics: Avoiding Reality in Boston. *Journal of the American Planning Association* 62, 1: 30-50.  
[ER] Cervero, R. and R. Gorham. 1995. Commuting in Transit Versus Automobile Neighborhoods. *Journal of the American Planning Association* 61, 2: 210-225.  
[ER] Cervero, R. 1994. Rail Transit and Joint Development: Land Market Impacts in Washington, D.C. and Atlanta. *Journal of the American Planning Association* 60, 1: 83-94.

### **WEEK 8 (Mar 3): Urban Transportation Planning Process (UTPP): General overview and trip generation**

**Objectives:** An understanding of the urban transportation planning process is essential for sound transportation system and policy analysis. We will examine the Urban Transportation Planning Process (UTPP) with particular respect to planning techniques for passenger transport system analysis. We will begin to examine the details of the UTPP by looking at the techniques used by transportation planners to

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estimate trip generation. Trip generation, trip distribution, mode choice, and trip assignment, comprise the four stages of the travel forecasting process.

We will become familiar with a computer package called CUBE beginning with the analysis of travel in the UIUC Campus area. A multimodal transportation-planning model for the UIUC Campus area will be used to analyze travel demand. We will focus on the overall process and base network in this session

Readings: [CPX] Sheffi, Y. 1985. *Urban Transportation Networks*. Englewood Cliffs, NJ: MIT, Prentice-Hall, Inc. 1-18.

### **Lab 1: Preparing Data for Cube & Cube Voyager Scripting**

Objectives: In this exercise, you will learn how to prepare the data for the transportation planning models and Cube Voyager scripting.

HW 1: Check the class website. **Due March 10, 2008.**

### **WEEK 9 (March 10): UTPP – Trip Distribution**

#### **Lab 2: Trip Distribution**

Objectives: In this exercise, you will generate an O-D (Origin-Destination) matrix using a gravity model: doubly constrained gravity model. In first part, we will use MS Excel to calculate the values in O-D matrix. In second part, we will use Cube Voyager to operate trip distribution with same data as the data used in the first part.

HW 2: Check the class website. **Due March 24, 2008**

### **WEEK 10 (March 17): Spring Break**

### **WEEK 11 (March 24): UTPP – Mode Choice**

#### **Lab 3: Mode Choice**

Objectives: In this exercise, you will perform the mode choice analysis by using the multinomial logit model. In first part, we will use MS Excel to perform the mode choice. In second part, we will use Cube Voyager to operate mode choice with same data as the data used in the first part.

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**HW 3:** Check the class website. **Due March 31, 2008**

### **WEEK 12 (March 31): UTPP – Route Choice**

#### **Lab 4: Trip Generation, Trip Distribution, and Route Choice**

**Objectives:** In this exercise, you will build a simple passenger forecasting model with trip generation, trip distribution and route choice by using Cube Voyager. In order to make it simple, this exercise doesn't use Mode Choice and Public Transit Assignment model.

**HW 4:** Check the class website. **Due April 7, 2008**

### **WEEK 13 (April 7): UTPP – Scenario Analysis using CUBE**

#### **Lab 5: Cube Reports**

**Objectives:** In this exercise, you will run how to use Cube Reports to generate reports for scenarios. The following exercise is excerpted from “**Discover Cube Reports Tutorial**” by Citilabs. The contents are modified according to the needs of this class.

**Final Project** Final Project is announced. Check the class website.

### **WEEK 14 (April 14): Final Project**

**Final Project** Each group should complete the planning analysis for their chosen scenario and prepare a class presentation. The presentation should be created using Microsoft Power Point. In addition, each group should submit a final report.

### **WEEK 15 (April 21): Final Presentation**