

SYLLABUS

WWS 527a

*Transportation Policy Analysis and Systems Planning*

Fall 2002

Professor Alain L Kornhauser	Class Hours: Tue.-Thu. 1:30-2:50am; (Tentative); 008 Friend Center
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<b>Course Requirements:</b>	<b>% of final grade</b>
bi-weekly assignments	30%
"tenth - week" exams	30%
Term project due at end of Reading Period	30%
Class participation	10%

**Course Description**

Studied is the transportation sector of the economy from a technology and broad public policy perspective. The focus is on the modeling and methodologies that underpin the policy formulation, capital and operations planning, and real-time operational decision making within the transportation industry. With shifting national priorities, the Federal role in transportation is changing significantly. The shift towards privatization caused market forces to play a much bigger role in the transportation sector. Radical concepts such as "value" pricing, private toll roads and for-profit mass transportation are beginning to be seriously considered as elements of a broad transportation policy. The heightened sensitivity of security creates new challenges. Meanwhile, local issues of traffic congestion, road construction and transportation-related environmental issues are dominant themes of grass roots politics.

The first part of the course, "policy, planning and decision making", surveys the transportation sector of the economy by studying and evaluating the current change in the balance between Federal, regional and local transportation agencies, private transportation providers, consumers of transportation and those impacted by transportation. Studied are the roles played by each of the participants in the transportation sector of the economy. The historical evolution of transportation policy will provide a perspective for evaluating current proposals for a reorientation of transportation priorities.

The second part of the course, "tools", focuses on the quantitative aspects of transportation design, planning and analysis. Studied are the methodologies used in the transportation planning process: its objective, its models and its data requirements. Focus will be on methodologies of the planning process that are appropriate for addressing broad national policy issues as well as detailed and specific local circulation and traffic issues.

The third part of the course, "technologies", focuses on the users of transportation and how emerging technologies may improve the way that we use transportation. Studied are the various elements of intelligent transportation systems (ITS) that apply advanced communications, computation and control systems. The introduction of many of these systems is in response to improved service demanded by the shippers and travelers. Studied will be advanced traveler information systems and advanced transportation management.

The final part of the course, "applications", applies the policy perspectives, tools, and technologies elements of the course to current transportation issues. In each of the final week, a current transportation topic is studied. Students are assembled into groups, each of which is responsible for addressing the issue from one of the three elements. Group responsibilities are rotated so that each group has the opportunity to address a current issue from each of the three perspectives. Issues are assigned during the previous week's precept. Group presentations and discussions occur during normal class periods.

Course requirements include weekly readings, assignments, several computer labs, one "tenth week" exam, a term project and class participation. Two (2) 80 minute classes. A few field trips to local transportation facilities will be added.

**Textbook: Required Textbooks:**

Meyer, M. D., & Miller, E. J. (M&M) *Urban Transportation Planning, A Decision-Oriented Approach*, 2<sup>nd</sup> ed. McGraw-Hill, 2001, ISBN 0-07-242332-3

**Reference Textbooks:**

Ran, B., Boyce, D. *Dynamic Urban Transportation Network Models*, Lecture Notes in Economics & Mathematical Systems, #417, Springer-Verlag

Oppenheim, N. *Urban Travel Demand Modeling*, Wiley, 1995, ISBN 0-471-55723-4

Bank, J.H., *Intro to Transportation Engineering*, 2<sup>nd</sup> ed. McGraw-Hill, 2002, ISBN 0-07-243188-1

Graber, N.J, and Hoel, L.A., *Traffic and Highway Engineering*, Brooks/Cole, 2002, ISBN 0-534-38743-8

Kaplan & Leva: *Fundamentals of Satellite Navigation*

Magnanti

**Other References: .**

IVHS America, Strategic Plan for Intelligent Vehicle-Highway Systems, May, 1992 US Dept. of Transportation,

Proceedings of the IVHS America 2000 Annual Meeting, April, 2000

USDOT, FHWA, Conference Proceedings: Automated Highway Systems, Precursor

Systems Analysis, Interim Results Workshop, FHWA-RD-94-101, August, 1994  
U. of Minnesota, PRT I, PRT II, PRT III, 1972,1973, 1975  
Transportation Research Board, Special Report 232, Advanced Vehicle and Highway Technologies, 1991  
USDOT, FHWA Proceedings of the Dynamic Traffic Assignment Workshop, August, 1994

<http://www.bts.gov/> US Transportation Statistics

<http://www.fhwa.dot.gov/tea21/index.htm> Current Federal Transportation Legislation

<http://www.fhwa.dot.gov/trafficinfo/index.htm#TRFF> National traffic & road closure

## **Part 1. Perspective on the Transportation Sector of the Economy: Its Function, Its Players, Its Technologies, Its Policies, Its Information Sources**

### **Short week**

#### **Th Sept 12**

Introduction and Survey of Course

#### **Readings:**

### **Week 1**

#### **Tu Sep17**

Elements of the transportation sector of the economy, the player, the technologies, the information sources

**Reading:** [\*Pocket Guide to Transportation, BTS\*](#) [\*The Changing Face of Transportation\*](#)  
USDOT <http://www.fhwa.dot.gov/ohim/hs99/index.htm>

#### **Th Sep19**

Historical evolution of National Transportation Policy

**Readings:** Coyle Ch. 1-4, pp. 2-129 (passed out); *National Transportation Statistics* BTS  
<http://www.bts.gov/btsprod/nts/> ; *Brief History of US DOT*  
<http://isweb.tasc.dot.gov/Historian/history.htm>

### **Week 2**

#### **Tu Sep 24,**

Current National Transportation Policy and the FY03Budget Proposal for Transportation

**Reading:** Transportation for the 21st Century for Transportation. PL105-178,  
Transportation Equity Act for the 21st Century (T21)

<http://www.fhwa.dot.gov/tea21/index.htm> ; FY2001 DOT Budget Brief  
<http://ostpxweb.dot.gov/budget/FY01BiB.pdf>

#### **Th Sep26**

The Private Sector side of Transportation. Carriers, shippers 3<sup>rd</sup> party logistics, and other service providers

**Reading:** to be distributed

## **Part 2. Planning and Analysis Tools of Transportation Demand and Investment**

### **Week 3**

#### **Tu Oct 1**

Development of a Formal Urban Transportation Planning (UTP) Process & Decision Making:

**Ref.:** M&M, Ch 2 Planning & Decision Making

#### **Th Oct 3**

Urban Travel & Transportation System Characteristics:

**Ref.:** M&M, Ch 3

### **Week 4**

#### **Tu Oct 8**

Planning Studies and Methods: Travel Demand Surveys, Data Sources, Intro to Sequential Demand Forecasting Modeling Approaches:

**Ref.:** M&M, Ch 4 Data Management & Use in Decision Making

#### **Th Oct 18**

Demand Analysis

**Ref.:** M&M , Ch. 5.0 – 5.3

### **Week 5**

#### **Tu Oct 15**

Land Use Models

**Ref.:** M&M , Ch. 6

#### **Th Oct 17**

Modeling Trip Generation,

**Assignment:** Layout, generate trips for "Your Town"

**Ref.:** M&M , Ch. 5.4.1

### **Week 6**

#### **Tu Oct 22**

Models of Trip Distribution; Transport behavior of individuals and households Models of demand elasticities,

**Assignment:** Distribute trips for "Your Town"

**Ref.:** M&M , Ch. 5.4.2

#### **Th Oct 24**

Models of Mode Choice behavior of individuals

**Ref.:** M&M , Ch. 5.4.3-6

**Assignment:** Layout a "competitive" transportation system and estimate it's ridership

**Term Break Oct 27- Nov 2**

## **Week 7**

**Tu Nov 5**

Analysis, Network Analysis: Paths, Trees and Cycles

**Ref.:** M&M Ch 7, Magnanti, Ch2, Ch3

**Th Nov 7**

Network Analysis: Shortest Paths: Label Setting and Label Correcting, Shortest paths in Real Networks and Essentially Shortest Paths

**Readings:** Zhan & Noon, "Shortest Path Algorithm : An Evaluation using Real Road Networks"; Kornhauser & Hunt, "Essentially Shortest Paths"; Magnanti, Ch4, Ch5

## **Week 8**

**Tu Nov 12**

Models of Network Assignment: Data sources and Computer Software for Traffic Analysis and Planning Studies Geographic Information Systems Introduction to the Princeton Transportation Network Model and Graphic Information System Computer lab using: PTNM, Truck Analysis Display System: TADS

**Assignment:** Use PTMN to generate traffic density maps for your "competitive" transportation system

**Ref.:** Hand-out on PTNM

**Th Nov 14**

Shortest paths in Real Networks and Essentially Shortest Paths

**Readings:** Zhan & Noon, Shortest Path Algorithm : An Evaluation using Real Road Networks; Kornhauser & Hunt, Essentially Shortest Paths

## **Part 3 The Role of High Technology in Transportation**

### **Week 9**

**Tu Nov 19**

In-vehicle Navigation: From TravTek to nRouteCommerce

**Readings:** To be Distributed

**Th Nov 21**

Global Positioning Systems

**Readings:** Kaplan & Leva: Fundamentals of Satellite Navigation

### **Week 10**

**Tu Nov 26**

Exam covering weeks 1-9

### **Week 11**

**Tu Dec 2**

Issues of real-time transportation decisions & Dynamic Traffic Assignment, Problem formulation, data sources

**Readings:** Kornhauser, White, "The Princeton Dynamic Route Guidance Analysis System" Proceedings of the Dynamic Traffic Assignment Conference, Chantilly VA, May, 1994. <http://www.fhwa.dot.gov/trafficinfo/index.htm#TRFF>

#### **Tu Dec 4**

Supply Role of Automation in Public Transportation Systems; Recent Developments in Automated People Movers and Personal Rapid Transit Systems. Study of the Newark Airport and Raytheon's PRT 2000

**Readings:** Video on PRT, field trip to Newark Airport people mover facility, readings from E. Anderson; PRT 2000 Raytheon CO. Nov, 1994

### **Part 4 Current High Profile Local Application**

#### **Week 12**

#### **Tu Dec 9, Th Dec 11**

Supply Modeling and analysis of Local Transportation Problems: Case study of the Princeton Area: S-92, The Millstone Bypass, Alleviating truck traffic on US 206 and local traffic congestion, Value pricing on the NJ Turnpike, Hudson River Bridges and Rt 1.

**Readings:** Fehlig, M, Kornhauser, A. "Value Pricing on Rt 1" TRB 2003

**Reading Period** 10:00 am - 1:00pm Tuesday Jan 7, Oral presentation of term projects.