

SYLLABUS

WWS 527a

Transportation Policy Analysis and Systems Planning

Fall 2003

Professor Alain L Kornhauser	Class Hours: Mon.-Wed. 9:00-10:20 am; (Tentative); 011 Robertson Hall (WWS)
Office: E-407 EQuad	
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Tel: 609-258-4657	
Course Requirements:	% of final grade
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 heightened sensitivity of security creates new challenges. 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. 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: Reference Textbooks:

Meyer, M. D., & Miller, E. J. (M&M) *Urban Transportation Planning, A Decision-Oriented Approach*, 2nd ed. McGraw-Hill, 2001, ISBN 0-07-242332-3
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*, 2nd 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 2003 Annual Meeting, May, 2003
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

Week 1

Mon Sep15

Introduction and Survey of Course

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>

Wed Sep17

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

Mon Sep 22

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> ; FY2003 DOT Budget Brief

<http://ostpxweb.dot.gov/budget/FY03BiB.pdf>

Wed Sep24

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

Reading: to be distributed

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

Week 3

Mon Sep29

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

Making:

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

Wed Oct 1

Urban Travel & Transportation System Characteristics:

Ref.: M&M, Ch 3

Week 4

Mon Oct 6

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

Wed Oct 8

Demand Analysis

Ref.: M&M , Ch. 5.0 – 5.3

Week 5

Mon Oct 13

Land Use Models

Ref.: M&M , Ch. 6

Wed Oct 15

Modeling Trip Generation,

Assignment: Layout, generate trips for "Your Town"

Ref.: M&M , Ch. 5.4.1

Week 6

Mon Oct 20

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

Wed Oct 22

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 25- Nov 2

Week 7

Mon Nov 3

Analysis, Network Analysis: Paths, Trees and Cycles

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

Wed Nov 5

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

Mon Nov 10

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 PTNM to generate traffic density maps for your "competitive" transportation system

Ref.: Hand-out on PTNM

Wed Nov 12

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

Mon Nov 17

In-vehicle Navigation: From TravTek to nRouteCommerce

Readings: To be Distributed

Wed Nov 19

Global Positioning Systems

Readings: Kaplan & Leva: Fundamentals of Satellite Navigation

Week 10

Mon Nov 24

Exam covering weeks 1-9

Wed Nov 26

The concept of “Dual-Use” technology for Homeland Security and Real-time operational efficiency

Readings: To be Distributed

Week 11

Mon Dec 2

Homeland Security and 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>

Mon 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

Mon Dec 9, Wed Dec 11

Supply Modeling and analysis of Local Transportation Problems: Securing Transportation Operations, Moving beyond "Just-in-Time", 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.