

SYLLABUS

Orf 467 *Transportation Systems Planning and Analysis* v0

Fall 2014/2015

Course Description

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

Week 0

Wed Sep 10

Introduction and Survey of Course

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

Reading: [Smart Driving Car](#)

[Has Growth in Automobile Use Ended?](#)

[Basic background on Transportation in the US](#)

National Transportation Statistics:

[Travel Monitoring](#)

[Highway Statistics Publication Archive](#)

[Freight Facts & Figures 2012](#)

[Commodity Flow Survey](#)

[2007http://www.bts.gov/publications/national_transportation_statistics/2013/pdf/entire.pdf](http://www.bts.gov/publications/national_transportation_statistics/2013/pdf/entire.pdf)

Energy Flow Diagram: [Total Energy wRejected 2011 ClassicView](#)

Energy Outlook: [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2010\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2010).pdf)

<http://www.eia.doe.gov/oiaf/aeo/index.html>

World Oil Demand & Reserves: <http://www.vaughns-1-pagers.com/economics/crude-oil-facts.htm>;

<http://www.eia.doe.gov/emeu/aer/txt/ptb1104.html>; <http://www.cnbc.com/id/33550165>

Homework 1: [The Last Drop or The Coming of autonomousTaxis](#) ; Due Tue Sep 16

Class Notes: [Week 0](#)

Week 1

Mon Sep 15 “Precept”

[Fundamentals of Machine Learning](#) and specific approaches to Computer Vision for Collision Avoidance and Self-Driving & Introduction to ChenyiChen Automated Driving Simulator “[DeepDriving](#)”. Chenyi Chen 'GS

Tue Sep 16 “Class”

Evolution of Urban transportation Technology: From the Omnibus to PRT

Historical evolution of National Transportation Policy leading to current National Transportation Policy,

Readings: [History Slides](#) [PRT@LHR](#); & [Smart Driving Car](#) videos

Discussion of “Last Drop” and Big Picture view of Transportation in the next 20 years ([be prepared to discuss](#) this link!) **Readings:** ; [Motor Fuel data and the Highway Trust Fund](#); [State Gasoline Taxes](#)

Wed Sep 17

Personal Rapid Transit, “Transport System of the Future???” History of PRT. autonomousTaxis,

Evolution of Crashless Cars

Readings: [KPMG Report on Crashless Cars](#); [Chunka Mui's Series in Forbes](#); [Todd Litman](#); NJ PRT [Academic Look](#), [state-wide autonomous Taxi](#); my [op-ed on this topic](#), [ITE Journal article](#), [Jerry Schneider's Source Page](#),

Reference: J. E. Anderson **Transit System Theory** Lexington Books, 1978 ISBN: 0-669-01902

More Links to aTaxi: [SmartDrivingCars](#); [2014 TRB Vehicle Automation Workshop](#), [Previous workshops on AV](#); [PAVE DARPA Story](#)

More Links on PRT: [PRT@LHR10Conf](#); [Podcar Stockholm 2011](#); [2GetThere/Masdar](#);

Animations: [IndiaPRT](#) ; [Bath](#)

Class [Notes \(PodcarPaper\)](#)

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

Week 2

Mon Sep 22

Modeling Transportation Systems; Development of a Formal Urban Transportation Planning (UTP) Process & Decision Making: The Central Jersey Transit Study ; Alternatives Analysis: Goals, Objectives, Metropolitan Planning Processes

Ref.: Cascetta, Ch. 1 [Class Notes](#)

Background reference: [NCHRP Synthesis 406 Advanced Practices in Travel Forecasting](#)

Ed Weiner, [Urban Transportation Planning In the United States: An Historical Overview: Fifth Edition](#) especially Ch 3 [3-C Urban Travel Forecasting Process](#), Ch 5 [Continuing Transportation Planning](#) ; Ch 13, especially: [Met and Statewide Planning Regs](#) , [Transportation Management Systems](#), [Analytical Travel Forecasting NCHRP765](#)

Homework #2a,b [My City](#) Examples: [MyCityEx1](#), [MyCityEx2](#), [CityOfEden](#), [CofEReport](#) Due: Tue. Sept 30 & Tue Oct 7.

Tue Sep 23 Precept

Discussion of MyCity homework objectives

Class Notes: [Simple Demand Modeling](#), [MyCity Trip Generation](#)

Wed Sep 24

Urban Travel & Transportation System Characteristics: Planning Studies and Methods: Travel Demand Surveys, Data Sources, Intro to Sequential Demand Forecasting Modeling Approaches; Relating the Travel Demand with Land Use: **Trip generation**; Activity-based demand models

Ref.: Cascetta, Ch. 4.1- 4.5 New York Met Area Study, (see Notes for links) Travel Modeling

Background & Data Reference: [MoreMyCity](#) ; [LincolnTravelDemandModel](#) [SCAG Modelling](#) [TCRP B-15 Characteristics of Urban Travel](#) see especially: [Overall Trip Rates](#); Travel Surveys: <http://www.travelsurveymanual.org/>

Class Notes [Notes](#) [Simple Demand Modeling](#), [LincolnTripGen](#) ; [The Gravity Model](#), [Example of Trip Distribution Mode Lincoln NEI](#) [SCAGTripDistribution](#)

Week 3

Mon Sep 29

Relating the Travel Demand with Land Use: **Trip Distribution**

Ref.:

Class Notes: [Notes](#) **Trip distribution**

Ref.:

Tue Sept 30 Precept

Presentation of MyCity Designs and Trip Generations

Wed Oct 1

Random Utility Theory and the modeling of **Mode Choice**

Ref.: **Class Notes** Cascetta, Ch. 3 [Class Notes](#), [ModeChoice](#), [SCAG ModeChoice LincolnModeChoice](#)

Homework #3 [Final Report for My City](#)

Week 4

Mon Oct 6

Tue Oct 7 Precept

Oral Presentations of Production, Attractions and Work Trip Distribution of MyCity

Wed Oct 8

Traffic Assignment and paths through networks; Network Analysis: Shortest Paths: Label Setting and Label Correcting, Shortest paths in Real Networks and Essentially Shortest Paths

Readings: Cascetta, Ch. <http://www.princeton.edu/~alaink/Orf467F10/LincolnTrafficAssignment.pdf> 5.1-5.3, Magnanti, Ch2, Ch4 ([to be distributed](#))

Ref.: [Class Notes](#) [SCAG Networks](#) [SCAG TrafficAssignment](#) [LincolnTrafficAssignment](#)
http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap04.pdf

Week 5

Mon Oct 13 More on: Paths through networks; Network Analysis: Shortest Paths: Label Setting and Label Correcting, Shortest paths in Real Networks and Essentially Shortest Paths

Label Setting Dijkstra's Algorithm

Readings: [DijkstraApplet](#)

Ref.: Magnanti [Ch 4, especially 4.5 through 4.9](#) [Class Notes c](#) ; [Readings on Networks](#), [Comparisons of Orf467F10 My Cities](#)

Tuesday Oct 14 Precept

Oral Presentations of Final Report of MyCity

Wed Oct 15 More on Networks: Dial and Radix Heap Implementations of Dijkstra's; Label Correcting; real world networks and stochastic issues

Ref.: Magnanti [Ch 4, especially 4.5 through 4.9](#) [Class Notes c](#) [FlowMapExamples](#)

Additional Readings: [Hunt, Kornhauser, "Assigning Traffic Over Essentially-Least-Cost Paths"](#), [He, Kornhauser & Ran, "Essentially best routes in dynamic and stochastic networks"](#), [Zhan & Noon, "Shortest Path Algorithm : An Evaluation using Real Road Networks"](#)

Assignment: [Magnanti](#): 2.1, 2.2, 2.3, 2.4, 2.5, 2.30, 2.31, 2.43, 2.44, 2.45, 4.1, 4.14, 4.15

(These are straight forward. Do them with your partners; turn in one solution set per two person pair. Both work on all problems), ***Due before precept Tuesday, Nov 4.***

Week 6

Mon Oct 20 Special Seminar: Joshua Herbach'08, Google Driver-less Car Team "*Advances in Towards Driverless Cars*"

Tue Oct 21 Precept (No precept... Mid term week)

Wed Oct 23

Oct 23 Princeton Trip Synthesizer

Ref.: [NJ Trip Synthesizer](#) ; [Tharald's Trip Display System](#)

Term Break Oct 26- Nov 2

Part 3 The Role of High Technology in Transportation

Week 7

Mon Nov 3

Organization of Term Assignment: New Jersey State-wide aTaxi System Design: [Assignment](#) v1, [Teams](#)

Reference: [NJPT04](#), [NJPT05](#), [NJPT07](#), [NJPT08](#), [NJPT09](#), [NJPTF10](#);

[SynthesizingIndividualTravelDemandInNJ](#)

Also:

https://blackboard.princeton.edu/@/68A6C449E5C2288BDBEEBEFFFEFB4C86/courses/1/ORF478-J06_F2012/attempt/1858046_1/s/CBrownell_Prospectus.pdf

Tue Nov 4 Lecture

Modeling of the ride-sharing potential of aTaxis in NJ and the Nation

Mufti: [TripSynthesizer](#); http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Ride-Sharing_Alain.pptx;

http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggreagated_Pixels_View.pptx;

[http://orfe.princeton.edu/~alaink/Theses/SeniorTheses%2714/Draft-](http://orfe.princeton.edu/~alaink/Theses/SeniorTheses%2714/Draft-Wyrough_NoationalDisaggregateTripSynthesizer.pdf)

[Wyrough_NoationalDisaggregateTripSynthesizer.pdf](#)

Wed Nov 5 Precept

More on Modeling of the ride-sharing potential of aTaxis in NJ and the Nation

http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Ride-Sharing_Alain.pptx

http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggreagated_Pixels_View.pptx;

Week 8

Mon Nov 10

Analyzing the ride-sharing potential of aTaxis in NJ and the Nation

Assignment: [Final Project](#); [1st Assignment](#); Familiarize yourself and summarize the underlying Land-Use and Trip Demand in Your 2 Counties Due Tuesday, Nov 18, 2014

Tue Nov 11 Precept

Group work session on Analyzing the ride-sharing potential of aTaxis in NJ and the Nation

Wed Nov 12

Toward Real-T Intelligent Transportation Systems (ITS): Advanced Traveler Information Systems (ATIS): In-vehicle Satellite Navigation: From TravTek to Navigation Based Services; Global Positioning Systems (GPS)

Readings: [Demers,A, et al](#) "Competing With the Ghost of ADVANCE: Experimenting with Real-Time ATIS",

Fontaine, M.D., et al, "Wireless Location Technology-Based Traffic Monitoring" Transportation Research Record No. 1993, 2007, pp. 51-58

511 Traffic <http://www.trafficland.com/>; [Bay Area](#) [South Florida](#) ; [Virginia TampaBay](#) ;

[Minnesota Georgia Traffic.com](#) ; [Real-time ATIS](#) <http://www.photoenforced.com/us.html>;

Class [Notes](#)

Assignment:

Week 9

Mon Nov 17

NJ aTaxi Work Session : Generating an individual daily trip file for everyone in New Jersey.

Class [Notes](#)

Tue Nov 18 Precept

NJ_aTaxi12 Work Session

Group Tasks [NewJerseyTripFile](#):

Wed Nov 19

Big Picture view of Transportation in the next 20-25 years ([be prepared to discuss!](#))

<http://etrucker.com>, <http://www.truckinginfo.com/>, <http://truklink.com/>, <http://www.truckload.org/>

Readings: [FY2015 Federal Transportation Budget](#); [The Federal legislation](#), [Map21](#) (Moving Ahead for Progress in the 21st Century) <http://www.pcmiller.com/news/industry/default.html>

Week 10

Mon Nov 24

Exam: Monday Nov 24 1:30- 2:50pm 101 Sherrerd
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Exam covering weeks 1-9 Instructions
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Wed Nov 26

NO CLASS (exam the previous evening);

Week 11

Mon Dec 1

[MATSim Singapore](#); [MATSim Lesson4](#);

NJ aTaxi Work Session : [NN Files](#) [SalemExample](#)

Tue Dec 2 Precept

NJ aTaxi Work Session :

Assignment: [Final Project](#); [2nd Assignment](#): Empty aTaxi Management Dec 9, 2014

Wed Dec 3

Individual presentations of Interim Report of NJ_aTaxi design

Readings: [aTaxisFinalProject Analysis of Demand for and Management of NJ aTaxi System](#)

Week 12

Mon Dec 8

Special Seminar: “[On the Way to Accident-free Driving](#)” Richard Krueger, Mercedes Benz USA

Tue Dec 9 Precept

NJ aTaxi Work Session :

Wed Dec 10

Individual presentations of Interim Report of NJ_aTaxi design

Readings: [aTaxisFinalProject Analysis of Demand for and Management of NJ aTaxi System](#)

Reading Period 10:00 am - 1:00pm Friday Jan 9, Final Workshop on Term Project; Lunch will be served. [Schedule](#)