Course Description

Enrolled Students


Week 0

Wed Sep 13
Introduction and Survey of Course
Elements of the transportation sector of the economy, the player, the technologies, the information sources
Reading: Smart Driving Car, Street Smart by Samuel Schwartz Has Growth in Automobile Use Ended? 2017 Motor Vehicle Crashes: 1st Half
FATALITY ANALYSIS REPORTING SYSTEM (FARS) ENCYCLOPEDIA National Transportation Statistics:
Basic background on Transportation in the US (Pocket Guide 2017)
Travel Monitoring
Highway Statistics Publication Archive
Freight Facts & Figures 2015
Commodity Flow Survey
National Transportation Statistics 2017
WTI Crude
Homework 1: The Last Drop or StreetSmarts or The coming of autonomous Taxis; Due Monday, Sep 18 Class Notes: Week 0, Current News

Week 1

Mon Sep 18
Evolution of Urban transportation Technology: From the Omnibus to PRT (Personal Rapid Transit, “Transport System of the Future??” History of PRT; Historical evolution of National Transportation Policy leading to current National Transportation Policy.
Readings: Travel in London; PRT@LHR; Jerry Schneider’s Source Page, PRT@LHR10Conf; Podcar_Stockholm_2011; 2GetThere/Masdar; Animations: IndiaPRT; Bath; NJ PRT Academic Look, Class Notes: History Slides, Current News Arrange: http://orfe.princeton.edu/~alaink/PRT/Movies/DelhiIndiaPRT_Animation.mp4
Mon Sep 18 Precept
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
Readings: KPMG Report on Crashless Cars; Chunka Mui’s Series in Forbes; Todd Litman; state-wide autonomous Taxi: Transportation in 2038???, Smart Driving Car videos; Automation Workshop, 1st Princeton SmartDrivingCar Summit May 2016; PAVE_DARPA_Story
Class Notes: The Case for SmartDrivingCars;

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

Week 2
Mon Sep 26
Class Discussion on the Future of Transportation Technology, given Transitions that have happened over the past 150 year. Come prepared having looked at HW 2 & Class Notes
Homework 2: How will the Mobility Environment Change by 2038? ; Due Tuesday, Sep 27
Class Notes: Slides: The Case for SmartDrivingCars, Adam Jonas Views of Future Mobility & Questions from HW2.

Precept Tue 27 7:30pm NOTE DAY Change from Monday
Discussion of MyCity homework objectives
Ref.: Class Notes MyCityTripGeneration

Background reference: NCHRP Synthesis 406 Advanced Practices in Travel Forecasting
Analytical_Travel_Forecasting_NCHRP765
Homework #2a,b My City Also See: My City Trip Generation
Examples: MyCityEx1, MyCityEx2, CityOfEden, CofEReport La Ville Report LaVille Data
MyCitysummaryTableOrf467F16.xlSX Due: Mon. Oct 2 & Mon 3 Before Precept.

Wed Sep 27
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 Demand Modeling Notes

Background & Data Reference: LincolnTravelDemandModel SCAG_Modelling TCRP B-15 Characteristics of Urban Travel, see especially: Overall Trip Rates; Travel Surveys: http://www.travelsurveymanual.org/
Class Notes Simple Demand Modeling, LincolnTripGen

Week 3
Mon Oct 2
Relating the Travel Demand with Land Use: Trip Distribution
Ref.: The Gravity Model, Example of Trip Distribution Mode Lincoln NEI SCAGTripDistribution
Class Notes: Notes Trip distribution Current News

Mon Oct 2 Precept
Presentation of MyCity Designs and Trip Generations
Random Utility Theory and the modeling of Mode Choice
Ref.: Class Notes Cascetta, Ch. 3 Class Notes, ModeChoice, SCAG_ModeChoice LincolnModeChoice
Homework #4 Final Report for MyCity, Current News

Week 4
Mon Oct 9
Traffic Assignment and paths through networks; Network Analysis: Shortest Paths; Label Setting and Label Correcting, Shortest paths in Real Networks and Essentially Shortest Paths; Dijkstra’s Algorithm Readings: DijkstraApplet; Another Dijkstra Visualization
http://www.princeton.edu/~alaink/Orf467F17/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
Current News

Mon Oct 10 Precept
Oral Presentations of Progress on MyCity: Work Trip Distribution + …
Comparisons of Orf467F10 My Cities

Wed Oct 11
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; Dial and Radix Heap Implementations of Dijkstra’s; Label Correcting; real world networks and stochastic issues
Network Flow (Transportation Problem); Wardrop’s 1st & 2nd Principles, Assignment Techniques and k-shortest paths
Ref.: Class Notes Magnanti Ch 4, especially 4.5 through 4.9; Readings on Networks, FlowMapExamples; Tharald Fongaard’15 Traffic Flow Display System
The transportation Problem
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 Friday, Oct 20.

Week 5
Mon Oct 16
More on Networks and Princeton Trip Synthesizer
Ref.: NJ Trip Synthesizer; NationwideNetwork: Links, Nodes, ReadMe; NationwideSynthesizedPersonTrips Current News

Monday Oct 16 Precepts
Oral Presentations of Final Report of MyCity & Discussion about networks

Wed Oct 18
More on .Princeton Trip Synthesizer: Nationwide Synthesizer
Ref.: Current News, The transportation Problem Transportation Network Design, NJ Trip Synthesizer; Tharald’s Trip Display System,
Week 6

Mon Oct 23
More on NJ Trip Synthesizer. Modeling of the ride-sharing potential of aTaxis in NJ and the Nation
Reference: NJPRT04, NJPRT05, NJPRT07, NJPRT08, NJPRT09, NJPRT10;
A National Hybrid Activity/Agent-Based Demand Model to Characterize the Mobility of the United States, K. Marocchini, Jan 2017
Mufti: TripSynthesizer;
http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggregated_Pixels_View.pptx;
HillWylough’14SeniorThesis ; Brownell_TRB_2014Paper
Current News.

Tue Oct 24 Precept (Precept moved to Wednesday Oct 25 @ 4:30 in Friend 008)

Wed Oct 25
Special Seminar: Autonomous Vehicles: Good, Bad, Ugly, Samuel I. Schwartz, President & CEO, Sam Schwartz Transportation Consultants, Author “Street Smarts: The Rise of Cities and the Fall of Cars”
Comparisons of MyCity 2017

@ 4:30pm Friend 008 Special Seminar: Joshua Herbach’08, Waymo Full Self-drivingCar Team “Update on Waymo’s Full Self-Driving Cars”

Term Break Oct 29 – Nov 5

Part 3 The Role of High Technology in Transportation

Week 7

Mon Nov 6
More on Modeling of Individual Person-trips in NJ and the Nation
SynthesizingDailyPersonTripsWithImpicationsOnRidesharing.pptx
Pdf version
Disaggregated_Pixel_Views in NJ
Orf467National_aTaxiPixelGrid
Examples_of_some_{Lat, Lon} _<->_ PixelCoordinates
NationWide Trip Data
Visualization of USA Person Trips
Current News
Ref.:
Earth Point: Excel To Kml – Display Excel Files in Google Earth
Driverless: Intelligent Cars and the Road Ahead by Hod Lipson and Melba Kurma, MIT Press, 312 pp
Assignment: Homework 6: Ride-Sharing Potential in MyCounties Due Wednesday Nov 15, 2017

Mon Nov 6 7:30-9:00pm Precept
**Wed Nov 8 Lecture**

Synthesis of Nationwide Individual PersonTrips: Discuss Final Term Projects  
**Ref.:** List Final Projects Orf467F16 | Final Project Teams and Task Assignment  
**Class Notes:** Current News

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**Week 8**

**Mon Nov 13**

Analyzing the ride-sharing potential of aTaxis in NJ and the Nation,  
**Readings:** *Interplay Between Fleet-size, LoS and Empty Repositioning* S. Zhu & A. Kornhauser  
*A Ridesharing Analysis with a Hitchhiking Modification Applied to Taxi Trips in New York* A. Schindele’16  
*Quantifying the Potential for Dynamic Ride-Sharing of New York City’s Taxicabs* S. Bhat’16  
*Analyzing 1.1 Billion NYC Taxi and Uber Trips, with a Vengeance* T. Schneider  
Nationwide Person Trip DataBase: [http://orf467.princeton.edu/db](http://orf467.princeton.edu/db)  
**Class Notes:** AV0_Analysis_of_aTaxi_Trips_Throughout_NJ  
**Current News**

**Mon Nov 13 Precept**

First impressions of Trips originating from your home county from Kyle’s [NationWideTrips’16 Directory](http://orf467.princeton.edu/db). Please work on your own. I’m unable to be there.

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**Wed Nov 15**

More on: Analyzing the ride-sharing potential of aTaxis in NJ and the Nation. Visitors (Dr. Stan Young & Dr. Venu Garikapati) from National Renewable Energy Lab to learn about what you are doing.  
**Readings:** *Initial assessment and modeling framework development for automated mobility districts* & *Next Generation Integrated Mobility: Driving Smart Cities*  
**Class Current News**

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**Week 9**

**Mon Nov 20**

**Readings:** Demers, A., et al “Competing With the Ghost of ADVANCE: Experimenting with Real-Time ATIS”, Fontaine, M.D., et al,  
**Couple things for fun:**  
[http://orfe.princeton.edu/~alaink/Presentations/DinkyFutureFinalAlainAndrew.ppt](http://orfe.princeton.edu/~alaink/Presentations/DinkyFutureFinalAlainAndrew.ppt)  
[http://orfe.princeton.edu/~alaink/Presentations/OpenBelowGradeDinkyStationConcepts.pdf](http://orfe.princeton.edu/~alaink/Presentations/OpenBelowGradeDinkyStationConcepts.pdf)  
[http://orfe.princeton.edu/~alaink/Presentations/RadicalImprovements3wPRT.pptx](http://orfe.princeton.edu/~alaink/Presentations/RadicalImprovements3wPRT.pptx)  
**Class Notes** Current News

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**Wed Nov 22**

NO CLASS (exam the previous evening);

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**Week 10**

**Mon Nov 27**

Dr. Chenyi Chen *16 DeepDriving: Application of Deep Learning to Automated Driving
**Fundamentals of Machine Learning** and specific approaches to Computer Vision for Collision Avoidance and Self-Driving & Introduction to ChenyiChen Automated Driving Simulator

**Ref.** C. Chen, et. al. *DeepDriving: Learning Affordance for Direct Perception in Autonomous Driving*

**Using GTAV to Learn Distances TRB Final** A. Filipowicz & A. Kornhauser; **Capsule Networks** (CapsNets) - Tutorial; *Computer Vision for Autonomous Vehicles: Problems, Datasets & State-of-the-Art*

**Class Notes:** Fundamentals of Machine Learning & “Extracting Cognition out of Images”. Chenyi Chen *16

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**Tue Nov 28 Precept**

USA aTaxi16 Empty Vehicle Management Work Session  Progress report of Final Projects: Final Project Teams and Task Assignment

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**Wed Nov 29**

Empty aTaxi repositioning in your USA County

**Hold over: Look at version2 of OnePixelExample:**

**V2_OnePixelExample_FinalOriginPixel17031_17.xlsx**

**Class Notes:** Management of Empty aTaxis

**Assignment:** HW7: Initial Investigation of Empty Vehicle Repositioning Needs for Shared aTaxis to serve your county’s intra-county trips.

**Readings:** Shirley Zhu’s Thesis ([Zhu'16MakingTransportationGreat_Thesis.pdf](http://example.com)) and “Interplay_Between_Fleet-size,_LoS_and_EmptyRepositioning” S. Zhu & A. Kornhauser

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**Week 11**

**Sunday Dec 3**

**Mon Dec 4**

Special Seminar: Ben Baldanza, Former CEO Spirit Airlines, Exec. VP of Commercial & Planning @ Jet Blue. “Planning for Cuba and Beyond”

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**Mon Dec 4 Precept 7:30pm  Review for exam**

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**Wed Dec 6**

**Exam: Wednesday Dec 6  1:30- 2:50pm 101 Sherrerd**

Exam covering weeks 1-10 **Instructions**

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**Week 12**

**Mon Dec 11**

NJ aTaxi Work Session: Empty aTaxi Management

**Readings:** aTaxisFinalProject_Analysis_of_Demand_for_and_Management_of_USA_aTaxi_System

**Assignment:**

**Mon Dec 11  Precept**

NJ aTaxi Work Session: Individual presentations of Interim Report of NJ _aTaxi design
Assignment: Final Project; Assignment: Empty a Taxi Management

Wed Dec 13
Special Seminar: Marty St. George, Exec. VP of Commercial & Planning @ Jet Blue. “Planning for Cuba and Beyond”

Reading Period 10:00 am - 1:00pm Saturday Jan 13, Final Workshop on Term Project; Lunch will be served.
Schedule