Orf 467
Transportation Systems Planning and Analysis v0
Fall 2017/2018

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
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
autonomousTaxis, Evolution of Crashless Cars
Readings: KPMG Report on Crashless Cars; Chunka Mui’s Series in Forbes; Todd Litman; state-wide autonomousTaxi; 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
Ed Weiner, Urban Transportation Planning in the US: An Historical Overview; 5th Edition; 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.xlx 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
Additional Readings: He, Kornhauser & Ran, “Essentially best routes in dynamic and stochastic networks”,
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; NationalWideNetwork: 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, NJPRTF10; SynthesizingIndividualTravelDemandInNJ & the Nation
A National Hybrid Activity/Agent-Based Demand Model to Characterize the Mobility of the United States, K. Marocchini, Jan 2017
Mufti: TripSynthesizer;
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
SynthesizingDailyPersonTripsWithImplicationsOnRidesharing.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
Dr. Chenyi Chen
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


Using GTAV to Learn Distances TRB_Final A. Filipowicz & A. Kornhauser

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

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

Week 8

Mon Nov 13

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

Readings: Interplay_Between_Fleet-size_LoS_and_EmptyRepositioning 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

Class Notes: AVO_Analysis_of_aTaxi_Trips_Throughout_NJ

Current News

Mon Nov 13 Precept

First impressions of Trips originating from you home county from Kyle’s NationwideTrips’16 Directory

Please work on your own. I’m unable to be there.

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

Week 9

Mon Nov 20


In-vehicle Satellite Navigation: From TravTek to Navigation Based Services; Global Positioning Systems (GPS)


511 Traffic http://www.trafficland.com/Bay Area_South Florida; Virginia TampaBay; Minnesota Traffic.com; Real-time ATIS http://www.photoenforced.com/us.html; Class Notes Current News

Couple things for fun:

http://orfe.princeton.edu/~alaink/Presentations/DinkyFutureFinalAlainAndrew.ppt
http://orfe.princeton.edu/~alaink/Presentations/OpenBelowGradeDinkyStationConcepts.pdf
http://orfe.princeton.edu/~alaink/Presentations/RadicalImprovements3wPRT.pptx
Week 10
Mon Nov 27
Empty aTaxi repositioning in your USA County
Class Notes: Management of Empty aTaxis
Assignment: HW-6 Investigate Empty vehicle Repositioning Implications of USA Mobility.

Tue Nov 28 Precept
USA_aTaxi16 Empty Vehicle Management Work Session Progress report of Final Projects: Final Project Teams and Task Assignment

Wed Nov 29

Exam: Wednesday Nov 29 1:30- 2:50pm 101 Sherrerd
Exam covering weeks 1-10 Instructions

Week 11
Sunday Dec 3
7:30pm Review for Exam 101Sherrerd

Mon Dec 4
Special Seminar: Ben Baldanza, Former CEO Spirit Airlines, , Exec. VP of Commercial & Planning @ Jet Blue. “Planning for Cuba and Beyond”

Tue Dec 5 Precept
NJ aTaxi Work Session :
Assignment: Final Project; 2nd Assignment: Empty aTaxi Management  Dec 13, 2015

Wed Dec 6
Individual presentations of Interim Report of NJ _aTaxi design
Readings: aTaxisFinalProject_Analysis_of_Demand for and Management of USA aTaxi System

Week 12
Mon Dec 11
NJ aTaxi work Session

Tue Dec 12 Precept
NJ aTaxi Work Session :
Repeated Assignment: HW-6 Investigate Empty vehicle Repositioning Implications of USA Mobility
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]