SYLLABUS

Orf 467
Transportation Systems Planning and Analysis v0
Fall 2018/2019

Course Description
Enrolled Students


Week 0
Wed Sep 12
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?
NHTSA: Early Estimate of Motor Vehicle Traffic Fatalities for the First Quarter of 2018
FATALITY ANALYSIS REPORTING SYSTEM (FARS) ENCYCLOPEDIA National Transportation Statistics:
Basic background on Transportation in the US (Pocket Guide 2018)
Travel Monitoring
Highway Statistics Publication Archive
Freight Facts & Figures 2017
Commodity Flow Survey
National Transportation Statistics 2018
WTI Crude
Homework 1: The Last Drop or StreetSmarts or The coming of autonomous Taxis; Due Monday, Sep 17
Notes: Current News Lecture 1 Notes

Week 1
Mon Sep 17
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 (Note: Movies (*.mp4) play in Edge & Safari, but may have trouble the Chrome browser. If you can’t see the video in Chrome, copy & paste the URL into Edge or Safari)
http://orfe.princeton.edu/~alaink/PRT/Movies/DelhiIndiaPRT_Animation.mp4
Mon Sep 17  Precept 7:30-8:50
Discussion of “Last Drop” and Big Picture view of Transportation in the next 20 years (be prepared to discuss this link!)

Homework #2: Transportation 2040… What do you think??

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 2040???, Smart Driving Car videos;
1st Princeton SmartDrivingCar Summit May 2017; 2nd Princeton SmartDrivingCar Summit May 2018;
PAVE_DARPA_Story ; Larry Burn’s book: Autonomy

Class Notes: The Case for SmartDrivingCars; Current News

Wed Sep 19
Yom Kippur… No formal class…. Discussion with the TAs of “Last Drop” and Big Picture view of Transportation in the next 20 years (be prepared to discuss this link!) If you wish to come to class Readings: Motor Fuel data and the Highway Trust Fund; State Gasoline Taxes

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

Week 2
Mon Sep 24
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, Current News.

Precept Mon 24 7:30pm

Discussion of MyCity homework objectives

Ref.: Class Notes MyCityTripGeneration

Background reference: NCHRP Synthesis 406 Advanced Practices in Travel Forecasting
Analytical Travel Forecasting NCHRP765 LincolnTravelDemandModel SCAG Modelling TCRP B-15 Characteristics of Urban Travel see especially: Overall Trip Rates; Travel Surveys:
http://www.travelsurveymanual.org/

Ref.: Demand Modeling Notes
Homework #2a,b My City Also See: My City Trip Generation
Examples: MyCityEx1, MyCityEx2, CityOfEden, CoFEReport La Ville Report LaVille Data
MyCitysummaryTableOrf467F16.xlxs Due: Mon. Oct 1 Before Precept.

Wed Sep 26
Special Seminar: Bruce Shaller, Principal, Schaller Consulting. “TNCs and AVs”

Week 3
Mon Oct 1
Special Seminar: Neil Pederson, Executive Director, Transportation Research Board, *The Critical Issues in Transportation Planning & Research in the Real World*

Ref.: 

Mon Oct 1 Precept
Relating the Travel Demand with Accessibility: **Trip Distribution**
Ref.: The Gravity Model, Example of Trip Distribution Mode Lincoln NEI SCAGTripDistribution
Class Notes: Notes Trip distribution Current News

Wed Oct 3
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 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; 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 8 Precept
Oral Presentations of Progress on MyCity: Work Trip Distribution + … Comparisons of Orf467F10 My Cities

Wed Oct 10
Special Seminar: **Autonomous Vehicles: Good, Bad, Ugly**, Sam Schwartz, President & CEO, Sam Schwartz Transportation Consultants, Author “*Street Smarts: The Rise of Cities and the Fall of Cars*”

Week 5
Mon Oct 15
**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, Assignemnet 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
Transportation Network Design; Hunt, Kornhauser, “Assigning Traffic Over Essentially-Least-Cost Paths” 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.

Monday Oct 15 Precepts
Oral Presentations of Final Report of MyCity & Discussion about networks

Wed Oct 17
Princeton Trip Synthesizer
Ref.: NJ Trip Synthesizer; NationwideNetwork: Links, Nodes, ReadMe;
NationwideSynthesizedPersonTrips The transportation Problem Transportation Network Design, NJ Trip Synthesizer; Tharald’s Trip Display System.

Week 6
Mon Oct 22
Special Seminar: Airline Route and Fleet Strategy, Financial Analysis, and Revenue Management, Steve Still, Founder of Seabury Airline Planning Group, LLC.

Mon Oct 22 Precept

Wed Oct 24
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; http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggregated_Pixels_View.pptx; HillWyrough’14SeniorThesis; Brownell TRB 2014Paper

Current News

@ 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 28 – Nov 4

Part 3 The Role of High Technology in Transportation

Week 7
Mon Nov 5
More on Modeling of Individual Person-trips in NJ and the Nation
SynthesizingDailyPersonTripsWithImpicationsOnRidesharing.pptx
Pdf version
Disaggregated Pixel Views in NJ
Orf467 National 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 5 7:30-9:00pm Precept

Wed Nov 7 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 12
Analyzing the ride-sharing potential of aTaxis in NJ and the Nation,
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 12 Precept
First impressions of Trips originating from your home county from Kyle’s NationWideTrips’16 Directory
Please work on your own. I’m unable to be there.

Wed Nov 14
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 19
In-vehicle Satellite Navigation: From TravTek to Navigation Based Services; Global Positioning Systems (GPS)
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

Mon Nov 19 Review Session for exam on Wednesday

**Exam**: Wednesday Nov 21 1:30- 2:50pm 101 Sherrerd
Exam covering weeks 1-10 Instructions

Wed Nov 21
NO CLASS (exam); Class Current News

Week 10
Mon Nov 26
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
Class Notes: Fundamentals of Machine Learning & “Extracting Cognition out of Images”. Chenyi Chen *16
Current News

Mon Nov 26 Precept
USA aTaxi16 Empty Vehicle Management Work Session Progress report of Final Projects: Final Project Teams and Task Assignment

Wed Nov 28
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. Current News

Assignment: HW7: Initial Investigation of Empty Vehicle Repositioning Needs for Shared aTaxis to serve your county’s intra-county trips.
Week 11

Mon Dec 3
NJ aTaxi Work Session: Empty aTaxi Management
Readings: aTaxisFinalProject_Analysis_of_Demand_for_and_Management_of_USA_aTaxi_System

Mon Dec 3 Precept 7:30pm Review for exam

Wed Dec 5

Week 12
Mon Dec 10
NJ aTaxi Work Session: Empty aTaxi Management
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

Assignment:

Mon Dec 10 Precept
NJ aTaxi Work Session: Homework 6 & HW7 work session

Assignment:

Wed Dec 123
Final Project Planning Session
Assignment: Final Project Assessment of RideSharing, ‘Last-Mile” and Optimal Empty Vehicle Management of Large Regional aTaxi Operation
Readings: Current News

Reading Period 10:00 am - 1:00pm Saturday Jan 12, 2019 Final Workshop on Term Project; Lunch will be served. Schedule