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?
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 17 Class Notes: Week 0, Current News

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
http://orfe.princeton.edu/~alaink/PRT/Movies/DelhiIndiaPRT_Animation.mp4
Mon Sep 17 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; Current News

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 247 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

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 26

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, Current News

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 1

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 1 Precept

Presentation of MyCity Designs and Trip Generations
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
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 15
More on Networks and Princeton Trip Synthesizer
Ref.: NJ Trip Synthesizer; NationwideNetwork: Links, Nodes, ReadMe;
NationwideSynthesizedPersonTrips Current News

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

Wed Oct 17
More on Princeton Trip Synthesizer: Nationwide Synthesizer
Ref.: Current News, The transportation Problem Transportation Network Design, NJ Trip Synthesizer; Tharald’s Trip Display System,
Current News
Week 6
Mon Oct 22
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/Orf467F14Disaggreagated_Pixels_View.pptx; HillWyrough’14SeniorThesis; Brownell TRB_2014Paper
Current News

Tue Oct 24 Precept

Wed Oct 24
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 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
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 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 you 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)
Readings: Demers, A. et al “Competing With the Ghost of ADVANCE: Experimenting with Real-Time ATIS”,
Fontaine, M.D., et al,
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

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 Current News

**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.


**Current News**

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**Current News**

**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

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