***SYLLABUS***  ***SYLLABUS***

*Orf 467*

*Transportation Systems Planning and Analysis v0*

Fall 2016/2017

[Course Description](http://www.princeton.edu/~alaink/Orf467F16/Orf467CourseDescriptionF16.pdf)

# 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 14

Introduction and Survey of Course

Elements of the transportation sector of the economy, the player, the technologies, the information sources **Reading:** [*Smart Driving Car,*](http://smartdrivingcar.com/) [*Street Smart*](https://www.amazon.com/Street-Smart-Rise-Cities-Fall/dp/1610395646/ref=sr_1_1?ie=UTF8&qid=1472481596&sr=8-1&keywords=street+smart+the+rise+of+cities+and+the+fall+of+cars) by Samuel Schwartz [Has Growth in Automobile Use Ended*?*](http://www.princeton.edu/~alaink/Orf467F13/HasGrowthInAutomobileUseEnded_Pace-Pickrel.pdf)[2015 Motor Vehicle Crashes: Overview](https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812318)

[Open data and traffic fatalities](https://www.mapbox.com/blog/fars-2015/)

National Transportation Statistics:

[Basic background on Transportation in the US](http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/Pocket%20Guide%202016.pdf) (Pocket Guide 2016)

[*Travel Monitoring*](http://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm)

[*Highway Statistics Publication Archive*](http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubsarc.cfm)

[*Freight Facts & Figures 2015*](http://www.princeton.edu/~alaink/Orf467F16/FHWA2015FreightFactsF_complete.pdf)

[*Commodity Flow Survey 2012*](http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/ec12tcf-us.pdf)

[*National Transportation Statistics 2016*](http://www.princeton.edu/~alaink/Orf467F16/NTS_Entire_16Q1.pdf)

Energy Flow Diagrams: [2015 Chart;](https://flowcharts.llnl.gov/)  [Total Energy\_wRejected 2013](https://flowcharts.llnl.gov/energy.html)  [ClassicView](http://www.princeton.edu/~alaink/Orf467F13/ClassicViewEnergy_flow_2011_med.png) ; [Energy Consumption](http://www.eia.gov/todayinenergy/detail.cfm?id=26912)

Energy Outlook 2015:<http://www.eia.gov/forecasts/aeo/pdf/0383%282015%29.pdf>; [Preliminary 2016](https://www.eia.gov/forecasts/aeo/index.cfm) World Oil Demand & Reserves: [BP Statistical Review of World Energy, June 2016](https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-full-report.pdf)

[WTI Crude](http://data.cnbc.com/quotes/%40CL.1)

**Homework 1:** [The Last Drop **or** Street Smart **or** The Coming ofautonomousTaxis](http://www.princeton.edu/~alaink/Orf467F16/HW1LastDropOrf467F16.pdf) ; Due Monday, Sep 19 **Class Notes:** [**Week 0,**](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16Lec1.pdf) [**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_091416.pdf)

# Week 1 Mon Sep 19

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:** [PRT@LHR;](http://www.princeton.edu/~alaink/Orf467F11/Orf467F11PRT@LHR.pdf) [Jerry Schneider’s Source Page,](http://faculty.washington.edu/jbs/itrans/) [PRT@LHR10Conf;](http://www.princeton.edu/~alaink/Orf467F10/PRT@LHR10_Conf) [Podcar\_Stockholm\_2011;](http://podcarcity.org/index.php?id=2722)

[2GetThere/Masdar;](http://www.2getthere.eu/) Animations: [IndiaPRT](http://orfe.princeton.edu/~alaink/PRT_Movies/DelhiIndiaPRT_Animation.mpg) ; [Bath;](http://orfe.princeton.edu/~alaink/PRT_Movies/ARUP_Bath_station.avi) NJ PRT [Academic](http://orfe.princeton.edu/~alaink/NJ_PRT_F10/NJ_PRT_F10FinalReport.pdf) Look, **Class Notes:** [**History Slides**](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16_Evolution_of_Transport_Technology_2016.pdf) **,** [**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_091916.pdf)

# Mon Sep 19 Precept

Discussion of “Last Drop” and Big Picture view of Transportation in the next 20 years ([be prepared to discuss](http://www.princeton.edu/~alaink/Orf467F13/MobilityChangeby2033Orf467F13.pdf) this link!) **Readings:** ; [Motor Fuel data and the Highway Trust Fund;](http://www.fhwa.dot.gov/policyinformation/motorfueldata.cfm) [State Gasoline Taxes](http://taxfoundation.org/article/state-gasoline-tax-rates-2009-2013)

# Wed Sep 21

autonomousTaxis, Evolution of Crashless Cars

**Readings:** [KPMG Report on Crashless Cars;](http://orfe.princeton.edu/~alaink/SmartDrivingCars/CenterForAutomotiveResearchSelf-DrivingCarsReport.pdf) [Chunka Mui’s Series in Forbes;](http://www.forbes.com/sites/chunkamui/2013/03/01/googles-trillion-dollar-driverless-car-part-5-how-automakers-can-still-win/) [Todd Litman;](http://orfe.princeton.edu/~alaink/SmartDrivingCars/Reports&Speaches_External/Litman_AutonomousVehicleImplementationPredictions.pdf) [state-wide autonomousTaxi;](http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F12/ORF467F12aTaxiFinalReport.pdf) my [op-ed on this topic,](http://www.princeton.edu/~alaink/Orf467F11/MobilityChangeby2030Orf467F11.pdf) [ITE Journal article](http://radar.planetizen.com/node/41112)  [*Smart Driving Car*](http://smartdrivingcar.com/) *videos;* [**2014 TRB Vehicle**](http://www.auvsi.org/avs2014/proceedings)

[**Automation Workshop,**](http://www.auvsi.org/avs2014/proceedings) [**Previous workshops on AV**](http://www.vehicleautomation.org/) [**;PAVE\_DARPA\_Story**](http://orfe.princeton.edu/~alaink/SmartDrivingCars/Presentations/PAVE_DARPA_Links2Movies.pptx)

**Class Notes:**[The Case for SmartDrivingCars;](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16_TheCaseForSmartDrivingCars.pptx) [**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_092116.pdf)

# Part 2. Planning and Analysis Tools of Transportation Demand and Investment Week 2 Mon Sep 26

Special Seminar: Samuel I. Schwartz, Author “[*Street Smarts: The Rise of Cities and the Fall of Cars”*](https://www.amazon.com/Street-Smart-Rise-Cities-Fall/dp/1610395646/ref=sr_1_1?ie=UTF8&qid=1472481596&sr=8-1&keywords=street+smart+the+rise+of+cities+and+the+fall+of+cars)

**Class Notes:** Slides: [pdf,](http://www.princeton.edu/~alaink/Orf467F16/SamSchwartz092616PrincetonUniversity.pdf) [pptx](http://www.princeton.edu/~alaink/Orf467F16/SamSchwartz092616PrincetonUniversity.pptx)  [**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_092616.pdf)

# Mon & Tue Sep 26, 27 (Normal time 7:30 on Monday and 8:30 on Tuesday)

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

Discussion of MyCity homework objectives

**Ref.:** Cascetta, Ch.1 [***Class Notes***](http://www.princeton.edu/~alaink/Orf467F16/Class4PlanRegOrf467F16.pdf)

**Background reference:** [NCHRP Synthesis 406 Advanced Practices in Travel Forecasting](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_406.pdf)

Ed Weiner, [***Urban Transportation Planning In the United States: An Historical Overview:*** Fifth Edition](http://www.tongji.edu.cn/~yangdy/utp/utp_top.htm) especially Ch 3 [3-C Urban Travel Forecasting Process,](http://www.tongji.edu.cn/~yangdy/utp/ch3.htm) Ch [5 Continuing Transportation Planning](http://www.tongji.edu.cn/~yangdy/utp/ch5.htm#5.11) ; Ch 13,

especially: [Met and Statewide Planning Regs](http://www.tongji.edu.cn/~yangdy/utp/ch13.htm#13.6) , [Transportation Management Systems,](http://www.tongji.edu.cn/~yangdy/utp/ch13.htm#13.8)

[Analytical\_Travel\_Forecasting\_NCHRP765](http://www.princeton.edu/~alaink/Orf467F14/AnalyticalTravelForecastingNCHRP765_091314.pdf)

**Homework**  **#2a,b** [My City](http://www.princeton.edu/~alaink/Orf467F16/HW2a,b_MyCityOrf467F16.pdf)  Examples: [MyCityEx1,](http://www.princeton.edu/~alaink/Orf467F05/ExampleCityHWOrf467F04/Arron-DanCityOrf467F04.xls) [MyCityEx2,](http://www.princeton.edu/~alaink/Orf467F05/ExampleCityHWOrf467F04/Kalmbach-BakerCityOrf467F04.xls) [CityOfEden,](http://www.princeton.edu/~alaink/Orf467F09/City%20of%20Eden%20II.xlsx) [CofEReport](http://www.princeton.edu/~alaink/Orf467F09/Eden%20II.doc) Due: Mon/Tue. Oct 3/4 & Mon/Tue Oct 10/11 Before Precept.

[**Class Notes:**](http://www.princeton.edu/~alaink/WWS527aF05/WWS527aF05L9Demandmodeling.pdf) [**MyCityTripGeneration**](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16MoreMyCityTrip%20Generation.pdf)

# Wed Sep 28

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,](http://www.nymtc.org/BPM/bpmindex.html) (see Notes for links) [Travel Modeling](http://tmip.fhwa.dot.gov/clearinghouse/docs/mvrcm/)

**Background & Data Reference:** [;LincolnTravelDemandModel SCAG\_Modelling](http://www.princeton.edu/~alaink/Orf467F12/LincolnTravelDemandModel.pdf) [TCRP B-15 Characteristics of Urban Travel](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_73a.pdf) see especially: [Overall Trip Rates;](http://onlinepubs.trb.org/Onlinepubs/tcrp/TCRP_rpt_73c.pdf) Travel Surveys: <http://www.travelsurveymanual.org/>[**Class Notes**](http://www.princeton.edu/~alaink/WWS527aF05/WWS527aF05L9Demandmodeling.pdf) [Simple Demand Modeling](http://www.princeton.edu/~alaink/Orf467F17/Orf467F17L5Demandmodeling.ppt)[,](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L5Demandmodeling.pdf) [LincolnTripGen](http://www.princeton.edu/~alaink/Orf467F12/LincolnTripGen.pdf) ;

# Week 3 Mon Oct 2

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

**Ref**.: [The Gravity Model**,**](http://www.princeton.edu/~alaink/Orf467F12/The%20Gravity%20Model.pdf)[Example of Trip Distribution Mode Lincoln NEl](http://www.princeton.edu/~alaink/Orf467F12/LincolnTripDistribution.pdf)  [SCAGT](http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap05.pdf)ripDistribution

[**Class Notes:**](http://www.princeton.edu/~alaink/WWS527aF05/WWS527aF05L9Demandmodeling.pdf) [**Notes**](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L6TripDistribution.pdf)  **Trip distribution** [**Current News**](http://www.princeton.edu/~alaink/Orf467F17/CurrentNews/CurrentNews_100217.pdf)

**Mon Oct 2 Precept**

Presentation of MyCity Designs and Trip Generations

# Wed Oct 4

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

**Ref.:**  [**Class Notes**](http://www.princeton.edu/~alaink/WWS527aF05/WWS527aF05L9Demandmodeling.pdf) Cascetta, Ch.3 [Class Notes,](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L7ModeSplit.pdf) [ModeChoice,](http://onlinepubs.trb.org/Onlinepubs/nchrp/cd-22/v2chapter5.html) [SCAG\_ModeChoice](http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap06.pdf) [LincolnModeChoice](http://www.princeton.edu/~alaink/Orf467F10/LincolnModeSplit.pdf)

**Homework**  **#3**[Final Report for My City](http://www.princeton.edu/~alaink/Orf467F16/HW3MyCityFinalReportOrf467F16.pdf) [**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_100416.pdf)

**Week 4**

# Mon Oct 10

**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:** [DykstraApplet;](http://www.dgp.toronto.edu/people/JamesStewart/270/9798s/Laffra/DijkstraApplet.html) [Another Dykstra Visualization](https://www.cs.usfca.edu/~galles/visualization/Dijkstra.html) [http://www.princeton.edu/~alaink/Orf467F10/LincolnTrafficAssignment.pdf5](http://www.princeton.edu/~alaink/Orf467F10/LincolnTrafficAssignment.pdf).1-5.3, Magnanti, Ch2, Ch4 ([to be distributed)](http://www.princeton.edu/~alaink/Orf467F16/Readings&AssignmentNetworks.pdf)

**Ref.:** [Class Notes](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L10TrafficAssign.pdf)  [SCAG\_Networks](http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap04.pdf)  [SCAG\_TrafficAssignment](http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap08.pdf)  [LincolnTrafficAssignment](http://www.princeton.edu/~alaink/Orf467F10/LincolnTrafficAssignment.pdf) <http://www.scag.ca.gov/modeling/pdf/MVS03/MVS03_Chap04.pdf>

**Assignment:** [Magnanti: 2](http://www.princeton.edu/~alaink/Orf467F16/Readings&AssignmentNetworks.pdf).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 21.***

# Tue Oct 11 Precept

**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 Dijksta’s; Label Correcting; real world networks and stochastic issues **Readings:**

**Additional Readings:**[,He, Kornhauser & Ran, “Essentially best routes in dynamic and stochastic networks”,](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.332.4657&rep=rep1&type=pdf)

[Zhan & Noon, “Shortest Path Algorithm : An Evaluation using Real Road Networks](http://pubsonline.informs.org/doi/pdf/10.1287/trsc.32.1.65)

**Ref.:** [Class Notes](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L11Networks.pdf) Magnanti [Ch 4, especially 4.5 through 4.9;](http://www.princeton.edu/~alaink/Orf467F13/Readings&AssignmentNetworks.pdf) [Readings on Networks,](http://www.princeton.edu/~alaink/Orf467F15/Readings&AssignmentNetworks.pdf) [Comparisons of Orf467F10 My Cities,](http://www.princeton.edu/~alaink/Orf467F09/MyCitysummaryOrf467F09.xlsx) [FlowMapExamples;](http://www.princeton.edu/~alaink/Orf467F11/FlowMapExamples.pdf) [Tharald Fongaard’15 Traffic Flow Display System](http://depler.no/route-devel/#/)

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

# Wed Oct 12

**Princeton Trip Synthesizer**

**Ref.:** [NJ Trip Synthesizer ;](http://www.princeton.edu/~alaink/Orf467F15/NJ_PersonTripSynthesis.pdf) [Tharald’s Trip Display System](http://depler.no/route-devel/#/)

# Week 5

**Mon Oct 17**

## More on: Paths through networks;

Network Flow (Transportation Problem); Wardrop’s 1st & 2nd Principles, Assignemnet Techniques and kshortest paths

**Ref.:**[Transportation Network Design](http://www.princeton.edu/~alaink/Orf467F15/TransportationNetworkDesign_Mathew.pdf) [;Hunt, Kornhauser, “Assigning Traffic Over Essentially-Least-Cost Paths”](http://trrjournalonline.trb.org/doi/pdf/10.3141/1556-01ttp:/trb.metapress.com/content/b6232269383r2638/) [The transportation Problem](http://orms.pef.czu.cz/text/transProblem.html)

Posponed Special Seminar: Adam Jonas, Managing Director, Morgan Stanley|Research, “[*The Business Case for Driverless Cars”*](http://orfe.princeton.edu/~alaink/SmartDrivingCars/Videos/AdamJonas10T_MorganStanley.mp4)

**Monday Oct 17 & Tuesday Oct 18 Precepts**

Oral Presentations of Final Report of MyCity & Discussion about networks

# Wed Oct 19

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

**Mon Oct 24**

Special Seminar: Joshua Herbach’08, Google Driver-less Car Team “*Self-Driving Cars”*

# Week 6

**Tue Oct 25 Precept (No precept… Mid term week)**

## Wed Oct 26

[Comparisons of MyCity 2016](http://www.princeton.edu/~alaink/Orf467F16/MyCity2016/MyCity2016ComparisonTable.xlsx)

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

Organization of Term Assignment: Nation-wide aTaxi System Design: [Assignment](http://www.princeton.edu/~alaink/Orf467F15/Orf467F15USA_aTaxiAssignment.doc) v1,  [Teams](http://www.princeton.edu/~alaink/Orf467F15/NationWide_aTaxi_System/Orf467F15_aTaxi_Teams.pdf)

**Reference:** [*NJPRT04,*](http://www.princeton.edu/~alaink/Orf467F04/NJ%20PRT%20Final%20Small.pdf) [*NJPRT05,*](http://orfe.princeton.edu/~alaink/PRT05_Orf467F05) [*NJPRT07,*](http://orfe.princeton.edu/~alaink/Papers/PRT_NJ_Orf467F07_FinalReport.pdf) [*NJPRT08*,](http://orfe.princeton.edu/~alaink/Papers/ORF%20467F08PRTSystem.pdf) [*NJPRT09,*](http://orfe.princeton.edu/~alaink/NJ_PRT_F09/NJ_PRT_F09FinalReport.pdf) [*NJPRTF10;*](http://orfe.princeton.edu/~alaink/NJ_PRT_F10/NJ_PRT_F10FinalReport.pdf)

[*Synthesis of Daily Person Trips in NJ(*](http://www.princeton.edu/~alaink/Orf467F11/SynthesisOfNJ_PersonTrips/NJ_PersonTripSynthesis.pptx)*Summary Slides)*

[*SynthesizingIndividualTravelDemandInNJ*](http://www.princeton.edu/~alaink/Orf467F11/FinalReportORF467F11.pdf)

Mufti:TripSynthesizer;

[http://orfe.princeton.edu/~alaink/NJ\_aTaxiOrf467F14/Orf467F14Disaggreagated\_Pixels\_View.pptx;](http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggreagated_Pixels_View.pptx) [http://orfe.princeton.edu/~alaink/Theses/SeniorTheses%2714/DraftWyrough\_NoationalDisaggregateTripSynthesizer.pdf\](http://orfe.princeton.edu/~alaink/Theses/SeniorTheses%2714/Draft-Wyrough_NoationalDisaggregateTripSynthesizer.pdf/)  ; Brownell\_TRB\_2014Paper

# Term Break Oct 30 – Nov 6

**Part 3 The Role of H**i**gh Technology in Transportation**

## Week 7

## Mon Nov 7

More on Modeling of Individual Person-trips in NJ and the Nation

<http://www.princeton.edu/~alaink/Orf467F16/Orf467F16IndividualTripSynthesizer.pptx>

[Disaggregated\_Pixel\_Views in NJ](http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F14/Orf467F14Disaggreagated_Pixels_View.pptx)

[Orf467National\_aTaxiPixelGrid](http://www.princeton.edu/~alaink/Orf467F16/FinalProject/Orf467National_aTaxiPixelGrid.pdf)

[Examples\_of\_some \_{Lat,Lon}\_<->\_PixelCoordinates](http://www.princeton.edu/~alaink/Orf467F16/FinalProject/SampleHalfMilePixelCoordinates.xlsx)

[NationWide Trip Data](http://orf467.princeton.edu/NationWideTrips'16/)

[Visualization of USA Person Trips](http://www.princeton.edu/~alaink/Orf467F15/NationWide_aTaxi_System/VisualizationUSA_Trips_FongaardPerricone.pdf)

**Ref.:**

[Earth Point: Excel To Kml – Display Excel Files in Google Earth](https://www.earthpoint.us/ExcelToKml.aspx)

[***Driverless: Intelligent Cars and the Road Ahead***  by Hod Lipson and Melba Kurma, MIT Press, 312 pp](https://www.amazon.com/Driverless-Intelligent-Cars-Ahead-Press-ebook/dp/B01K13FURS/ref=tmm_kin_swatch_0?_encoding=UTF8&qid=&sr=)

**Assignment:** Trip Distributions and Ride-sharing Opportunities in your county: Familiarize yourself and summarize the underlying PresonTrip Distribution in [Your Counties:](http://orf467.princeton.edu/) Due Precept, Nov 14/15, 2015

## Tue Nov 8 7:30-9:00pm Precept (No Monday Precept!!)

Dr. Chenyi Chen

DeepDriving: Application of Deep Learning to Automated Driving

[Fundamentals of Machine Learning](http://www.princeton.edu/~alaink/Orf467F14/Fundamentals%20of%20Everything.pdf) 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*](http://orfe.princeton.edu/~alaink/SmartDrivingCars/PDFs/DeepDriving_ChenyiChen_ICCV_Sept2015.pdf)

[*Using\_GTAV\_to\_Learn\_Distances\_TRB\_Final*](http://orfe.princeton.edu/~alaink/TRB'17/Using_GTAV_to_Learn_Distances_TRB_Final.pdf)A. Filipowicz & A. Kornhauser

**Class Notes:** [Fundamentals of Machine Learning](http://www.princeton.edu/~alaink/Orf467F14/Fundamentals%20of%20Everything.pdf)  &[“](http://www.princeton.edu/~alaink/Orf467F15/Deep%20Driving.pdf)[**Extracting Cognition out of Images**](http://www.princeton.edu/~alaink/Orf467F16/ExtractingCognitionOutOfImages.pptx)”. *Chenyi Chen \*16*

## Wed Nov 9 Lecture

Synthesis of Nationwide Individual PersonTrips: Discuss Final Term Projects

**Ref.:** [List Final Projects Orf467F16](http://www.princeton.edu/~alaink/Orf467F16/FinalProject/ListFinalProjectsOrf467F16.pdf) ; [Final Project Teams and Task Assignment](http://www.princeton.edu/~alaink/Orf467F16/FinalProject/FinalProjectLineupOrf467F16.xlsx)

**Class Notes:**

## Week 8 Mon Nov 14

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

**Readings:** [*Interplay\_Between\_Fleet-size,\_LoS and\_EmptyRepositioning*](http://orfe.princeton.edu/~alaink/TRB'17/Interplay_Between_Fleet-size,_LoS%20and_EmptyRepositioning.pdf) S. Zhu & A. Kornhauser

[*A Ridesharing Analysis with a Hitchhiking Modification Applied to Taxi Trips in New York*](http://orfe.princeton.edu/~alaink/Theses/SeniorTheses'16/Schindele'16Hitchhicking_Thesis.pdf)A. Schindele’16

[*Quantifying the Potential for Dynamic Ride-Sharing of New York City’s Taxicabs*](http://orfe.princeton.edu/~alaink/Theses/SeniorTheses'16/Bhat'16NYC_TaxiRideSharing_Thesis.pdf) S. Bhat’16

[*Analyzing 1.1 Billion NYC Taxi and Uber Trips, with a Vengeance*](http://toddwschneider.com/posts/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*](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16Kornhauser_AVO_AnalysisThroughoutNJ.pptx)

**Mon/Tue Nov 14/15 Precept**

First impressions of Trips originating from you home county from Kyle’s [NationWideTrips’16 Directory](http://orf467.princeton.edu/NationWideTrips'16/)

## Wed Nov 16

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

**Class**[**Current News**](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_111616.pdf)

**Week 9**

## Mon Nov 21

Toward Real-Time 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](http://www.princeton.edu/~alaink/Orf467F07/2006%20ASCE%20AATT%20conf%20paper%20id13947%20ghost%20v3.pdf) “Competing With the Ghost of ADVANCE: Experimenting with Real-Time ATIS”, Fontaine, M.D., et al,

511 Traffic<http://www.trafficland.com/>[;Bay Area](http://traffic.511.org/)  [South Florida](http://www.511southflorida.com/) ; [Virginia](http://www.511virginia.org/) [TampaBay](http://www.511tampabay.com/traffic.html) ; [Minnesota](http://www.511mn.org/)   [Traffic.com](http://www.traffic.com/) ; [Real-time ATIS](http://www.princeton.edu/~alaink/Orf467F07/2006%20ASCE%20AATT%20conf%20paper%20id13947%20ghost%20v3.pdf) [http://www.photoenforced.com/us.html;](http://www.photoenforced.com/us.html) **Class** [**Notes**](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16L16RealTimeIssuesInSatNav.ppt) **[Current News](http://www.princeton.edu/~alaink/Orf467F16/CurrentNews/CurrentNews_112116.pdf)**

**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/OpenBelowGradeDinkyStationConcepts.pdf)

**http://orfe.princeton.edu/~alaink/Presentations/RadicalImprovements3wPRT.pptx**

**Wed Nov 23**

NO CLASS (exam the previous evening);

# Week 10

## Mon Nov 28

Empty aTaxi repositioning in your USA County

**Class Notes:** [Management of Empty aTaxis](http://www.princeton.edu/~alaink/Orf467F16/Orf467F16Kornhauser_ManagementOfEmpty_aTaxis.pdf)

**Assignment**[**:** HW-](http://www.princeton.edu/~alaink/Orf467F15/HW6_ManagingEmpty_aTaxis.pdf)[6 Investigate Empty vehicle Repositioning Implications of USA Mobility](http://www.princeton.edu/~alaink/Orf467F16/HW6_ManagingEmpty_aTaxis.pdf)[.](http://www.princeton.edu/~alaink/Orf467F15/HW6_ManagingEmpty_aTaxis.pdf)

**Readings:** Shirley Zhu’s Thesis ([Zhu'16MakingTransportationGreat\_Thesis.pdf](http://orfe.princeton.edu/~alaink/Theses/SeniorTheses'16/Zhu'16MakingTransportationGreat_Thesis.pdf)) and “[Interplay\_Between\_Fleet-size,\_LoS and\_EmptyRepositioning](http://orfe.princeton.edu/~alaink/TRB'17/Interplay_Between_Fleet-size,_LoS%20and_EmptyRepositioning.pdf)” S. Zhu & A. Kornhauser

## Tue Nov 29 Precept

[USA\_aTaxi16](http://www.princeton.edu/~alaink/Orf467F15/HW6_ManagingEmpty_aTaxis.pdf) [Empty Vehicle Management Work Session](http://www.princeton.edu/~alaink/Orf467F16/HW6_ManagingEmpty_aTaxis.pdf) Progress report of Final Projects: [Final Project Teams and Task Assignment](http://www.princeton.edu/~alaink/Orf467F16/FinalProject/FinalProjectLineupOrf467F16.xlsx)

**Wed Nov 30**

Special Seminar: Adam Jonas, MD, Morgan Stanley “[Disrupting World-wide Mobility](http://orfe.princeton.edu/~alaink/SmartDrivingCars/Videos/Adam_Jonas_Shared%20Mobility_VideoPrimerOct2016.pdf)”

[Slide Presentation](http://www.princeton.edu/~alaink/Orf467F16/20161130%20-Jonas_Orf467_Princeton.ppt)

## Week 11

**Sunday Dec 4 7:30pm Review for Exam 101Sherrerd**

## Mon Dec 5

[**Exam**](http://www.princeton.edu/~alaink/Orf467F15/OldExams/Orf%20467F13Exam.docx)**:** **Monday Dec 5**  1:30- 2:50pm 101 Sherrerd

Exam covering weeks 1-9 [Instructions](http://www.princeton.edu/~alaink/Orf467F15/OldExams/Orf%20467F13Exam_Instructions.pdf)

## Tue Dec 6 Precept

NJ aTaxi Work Session :

**Assignment:** [Final Project; 2nd Assignment:](http://www.princeton.edu/~alaink/Orf467F14/HW6,Final%20Project%3b%202nd%20Assignment.pdf) Empty aTaxi Management Dec 13, 2015

## Wed Dec 7

Individual presentations of Interim Report of NJ \_aTaxi design

**Readings:** [aTaxisFinalProject\_Analysis\_of\_Demand for and Management of USA aTaxi System](http://www.princeton.edu/~alaink/Orf467F14/aTaxisFinalProject_Analysis_of_Ridesharing&Empty_aTaxiDemand.pdf)

**Week 12**  **Mon Dec 12**

NJ aTaxi work Session

**Tue Dec 13 Precept**

NJ aTaxi Work Session :

**Repeated Assignment**[**:** HW-](http://www.princeton.edu/~alaink/Orf467F15/HW6_ManagingEmpty_aTaxis.pdf)[6 Investigate Empty vehicle Repositioning Implications of USA Mobility](http://www.princeton.edu/~alaink/Orf467F16/HW6_ManagingEmpty_aTaxis.pdf)

## Wed Dec 14

Individual presentations of Interim Report of NJ \_aTaxi design

**Readings:** [aTaxisFinalProject\_Analysis\_of\_Demand for and Management of NJ aTaxi System](http://www.princeton.edu/~alaink/Orf467F14/aTaxisFinalProject_Analysis_of_Ridesharing&Empty_aTaxiDemand.pdf)

**Reading Period** 10:00 am - 1:00pm Saturday Jan 14, Final Workshop on Term Project; Lunch will be served. [Schedule](http://www.princeton.edu/~alaink/Orf467F11/Orf467F11FinalProjSched.htm)